Appendix D

Geology and Soils

ESA

D-1 Preliminary Geotechnical Investigation

ALBUS-KEEFE & ASSOCIATES, INC
GEOTECHNICAL CONSULTANTS

March 25, 2019
J.N.: 2798.00

Mr. Ken Lee
Pacific Plaza Premier Development Group
9661 E Las Tunas Dr, Suite A
Temple City, CA 91780

Subject: **Preliminary Geotechnical Investigation, Proposed Mixed-Use Development, 700 and 800 San Gabriel Boulevard, San Gabriel, CA, 91776.**

Dear Mr. Lee,

Pursuant to your request, ***Albus-Keefe & Associates, Inc***. is pleased to present to you our preliminary geotechnical investigation report for the subject mixed-use development. This report presents the results of our field investigation, laboratory testing, engineering analyses, as well as our preliminary geotechnical recommendations for design and construction of the subject development.

We appreciate this opportunity to be of service to you. If you have any questions regarding the contents of this report, please do not hesitate to call this office.

Sincerely,

ALBUS-KEEFE & ASSOCIATES, INC.

Paul Hyun Jin Kim
Associate Engineer

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TABLE OF CONTENTS

1.0 INTRODUCTION **1**
1.1 PURPOSE AND SCOPE 1
1.2 SITE LOCATION AND DESCRIPTION 1
1.3 PROPOSED DEVELOPMENT 3
2.0 INVESTIGATION **3**
2.1 RESEARCH 3
2.2 SUBSURFACE EXPLORATION 3
2.3 LABORATORY TESTING 4
3.0 GEOLOGIC CONDITIONS **4**
3.1 SOIL CONDITIONS 4
3.2 GROUNDWATER 5
3.3 FAULTING 5
4.0 ANALYSES **5**
4.1 SEISMICITY 5
4.2 STATIC SETTLEMENT 6
5.0 CONCLUSIONS **6**
5.1 FEASIBILITY OF PROPOSED DEVELOPMENT 6
5.2 GEOLOGIC HAZARDS 6
5.2.1 Ground Rupture 6
5.2.2 Ground Shaking 6
5.2.3 Liquefaction 7
5.3 STATIC SETTLEMENT 7
5.4 EARTHWORK AND MATERIAL CHARACTERISTICS 7
5.5 SHRINKAGE AND SUBSIDENCE 8
5.6 SOIL EXPANSION 8
6.0 RECOMMENDATIONS **8**
6.1 EARTHWORK 8
6.1.1 General Earthwork and Grading Specifications 8
6.1.2 Pre-Grade Meeting and Geotechnical Observation 8
6.1.3 Site Clearing 8
6.1.4 Site Preparation (Removals and Overexcavations) 9
6.1.5 Fill Placement 9
6.1.6 Import Materials 10
6.1.7 Temporary Excavations 10
6.1.8 Shoring 10
6.2 SEISMIC DESIGN PARAMETERS 11
6.3 PRELIMINARY FOUNDATION DESIGN 11
6.3.1 General 11
6.3.2 Soil Expansion 12
6.3.3 Settlement 12
6.3.4 Allowable Bearing Value 12
6.3.5 Lateral Resistance 12
6.3.6 Footings and Slabs-on-Grade 13
6.3.7 Foundation Observations 13

TABLE OF CONTENTS

6.4 RETAINING/SCREEN WALLS 14
6.4.1 General 14
6.4.2 Allowable Bearing Value and Lateral Resistance 14
6.4.3 Earth Pressures 14
6.4.4 Footing Reinforcement 14
6.4.5 Footing Observations 15
6.4.6 Drainage and Moisture-Proofing 15
6.4.7 Retaining Wall Backfill 16
6.5 EXTERIOR FLATWORK 16
6.6 CONCRETE MIX DESIGN 17
6.7 PRELIMINARY PAVEMENT DESIGN 17
6.7.1 Pavement Structural Sections 17
6.7.1 Subgrade Preparation 17
6.7.2 Aggregate Base 17
6.7.3 Asphaltic Concrete 18
6.7.4 Concrete Paver 18
6.7.5 Portland Cement Concrete 18
6.8 POST GRADING CONSIDERATIONS 18
6.8.1 Site Drainage and Irrigation 18
6.8.2 Utility Trenches 19
6.9 PLAN REVIEW AND CONSTRUCTION SERVICES 20
7.0 LIMITATIONS 20
8.0 REFERENCES 22

FIGURES AND PLATES

Figure 1 - Site Location Map
Plate 1 – Geotechnical Map

APPENDICES

APPENDIX A - Exploratory Logs
Boring Logs - Plates A-1 through A-21

APPENDIX B - Laboratory Test Program
Table B-1 – Summary of Laboratory Test Results
Plates B-1 and B-2 – Grain Size Distribution Plots
Plates B-2 through B-8– Consolidation Test Plot
Plates B-9 and B-10– Direct Shear Plots

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purposes of our geotechnical investigation were to evaluate geotechnical conditions within the project area and to provide preliminary conclusions and recommendations relevant to the design and construction of the proposed improvements at the subject site. The scope of this investigation included the following:

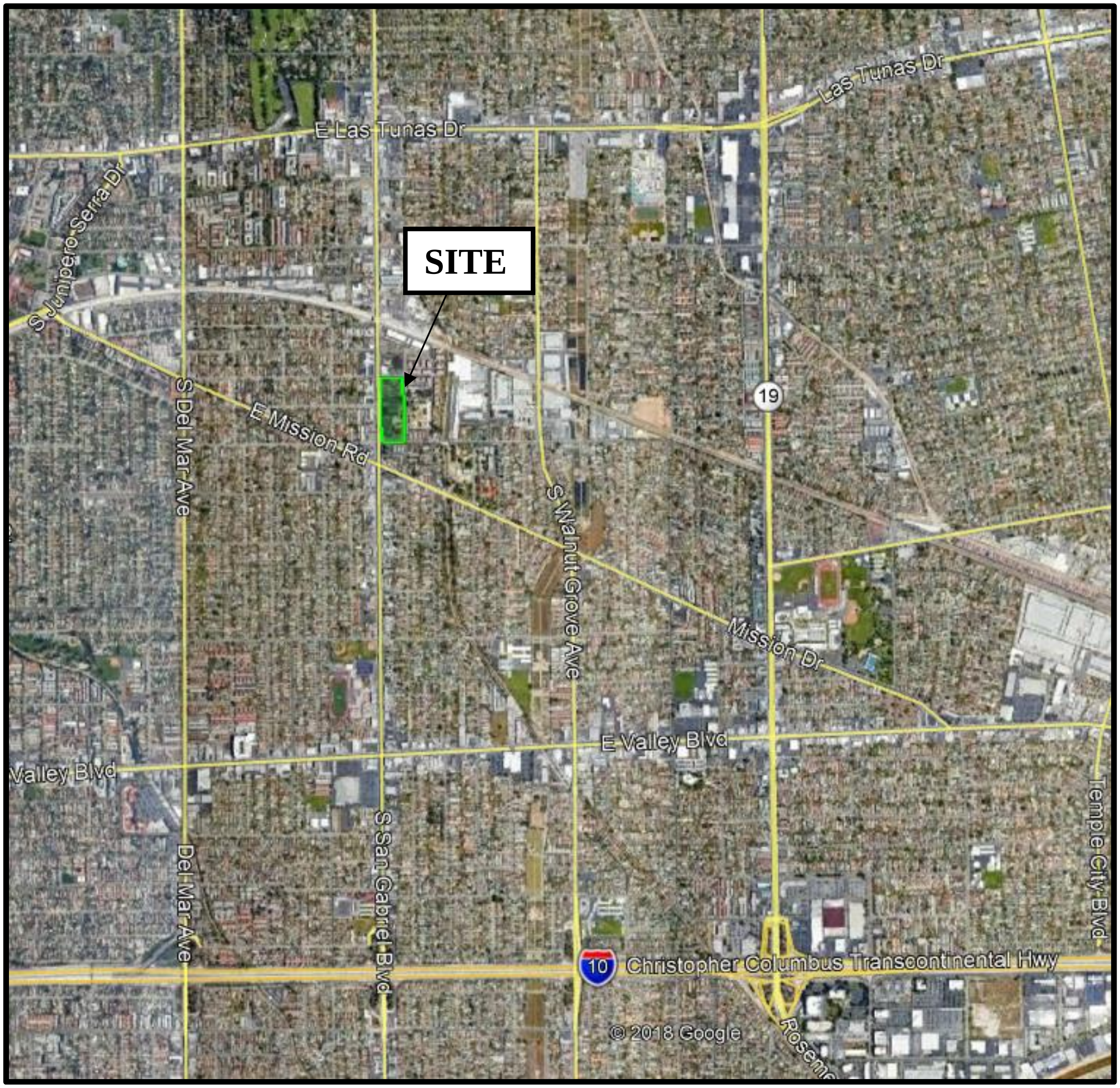
- Review of the referenced conceptual site plan
- Review of published geologic and seismic data for the site and surrounding area
- Exploratory drilling and soil sampling
- Laboratory testing of selected soil samples
- Engineering analyses of data obtained from our review, exploration, and laboratory testing
- Evaluation of site seismicity, liquefaction, and settlement potential
- Preparation of this report

1.2 SITE LOCATION AND DESCRIPTION

The site is located at 700 and 800 San Gabriel Boulevard within the city of San Gabriel, California. The property is bordered by the East El Monte Street to the north, South San Gabriel Boulevard to the west, East Grand Avenue to the south, and South Gladys Avenue to the east. The location of the site and its relationship to the surrounding areas is shown on Figure 1, Site Location Map.

The site consists of a rectangular shaped property containing approximately 5.9 acres of land and is currently an undeveloped lot. Improvements associated with the site include traces of gravel roads from previous site use and irrigation lines present within the south-eastern portion of the site. The eastern, western, and southern perimeter of the property is bounded by chain-link fencing. The northern portion of the site perimeter is bounded by a chain-link fence on top of a masonry retaining wall.

Topographically the site is relatively flat with elevations ranging from approximately 380 feet above Mean Seal Level (MSL) to approximate 373 feet above MSL descending to the southwest (based on Google Earth). Drainage is generally directed to the east and south and onto South Gladys and East Grand Avenue. Vegetation within the site consists of small shrubs and grass throughout the site. Also, mature palm trees are located within the south eastern portion of the site.



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SITE LOCATION MAP

Pacific Plaza Premier Development Group
Proposed Mixed-Use Development
700 and 800 San Gabriel Boulevard
San Gabriel, California

NOT TO SCALE

FIGURE 1

1.3 PROPOSED DEVELOPMENT

Based on the architectural site plans by Media Portfolio, the proposed development for the site will consist of two mixed use buildings with a total of 243 residential units and approximately 1,315,150 ft^2 of commercial space. Development would consist of two main buildings with one basement level for parking, one 20-foot-high ground level of retail and parking (2 levels), and four levels of residential over the retail and parking space. We anticipate the residential levels will be wood-framed and supported by a post-tension concrete podium deck. The parking and retail space are anticipated to utilize light-gauge steel framing and post-tension concrete decks.

Improvements will also consist of interior driveways and parking areas, underground utilities, and landscaping. Structural or grading plans regarding the proposed residential development were not provided to us at the time of this report.

2.0 INVESTIGATION

2.1 RESEARCH

We have reviewed the referenced geologic publications, maps and aerial photographs (see references). Data from these sources were utilized to develop some of the findings and conclusions presented herein. Based on this firm's review of the referenced aerial photos, the subject site was a nursery with several small structures at the southern and northern portions of the property and a large canopy structure at central portion of the property as early as 1994. Between 1953 and 1964, several structures were constructed at the northern portion of the site. Several structures were again constructed throughout the site between 1972 to 1980. The site has remained relatively unchanged since then.

2.2 SUBSURFACE EXPLORATION

Subsurface exploration for this investigation was conducted at the site on February 20, 2019 and February 21, 2019, and consisted of drilling eight (8) exploratory borings. The borings were drilled to maximum depths of approximately 51.5 feet below the existing ground surface utilizing a truck-mounted, hollow-stem-auger drill rig. A representative of *Albus-Keefe & Associates, Inc*. logged the exploratory excavations. Visual and tactile identifications were made of the materials encountered, and their descriptions are presented on the Exploration Logs in Appendix A. The approximate locations of the exploratory excavations completed by this firm are shown on the enclosed Geotechnical Map, Plate 1.

Bulk, relatively undisturbed and Standard Penetration Test (SPT) samples were obtained at selected depths within the exploratory boring for subsequent laboratory testing. Relatively undisturbed samples were obtained using a 3-inch O.D., 2.5-inch I.D., California split-spoon soil sampler lined with brass rings. SPT samples were obtained from the boring using a standard, unlined SPT soil sampler. During each sampling interval, the sampler was driven 18 inches with successive drops of a 140-pound automatic hammer falling 30 inches. The number of blows required to advance the sampler was recorded for each six inches of advancement. The total blow count for the lower 12 inches of advancement per soil sample is recorded on the exploration log. Samples were placed in sealed containers or plastic bags and transported to our laboratory for analyses. The borings were backfilled with auger cuttings upon completion of sampling.

Additionally, two percolation test borings, P-1 and P-2, were also excavated to approximate depths of 14.5 and 39 feet respectively. Percolation test boring P-1 was excavated in the vicinity of exploratory borings B-1 and percolation test boring P-2 was excavated in the vicinity of exploratory boring B-4 for subsequent percolation testing. The percolation test wells were later backfilled with auger cuttings upon completion of testing. Results of our percolation testing will be discussed under a separate cover.

2.3 LABORATORY TESTING

Selected samples of representative earth materials from the borings excavated at the site were tested in the laboratory. Tests consisted of in-place density and moisture, maximum density/optimum moisture, grain-size analysis, consolidation, pH, chloride content, and soluble sulfate content. Descriptions of laboratory test criteria and a summary of the test results are presented in Appendix B and on the boring logs in Appendix A.

3.0 GEOLOGIC CONDITIONS

3.1 SOIL CONDITIONS

Descriptions of the earth materials encountered during our investigations are summarized below and are presented in detail on the Exploration Logs presented in Appendix A.

Soil materials encountered at the site consist of alluvial deposits overlain by undocumented artificial fills associated with the previous site development. Based on our exploratory borings, the artificial fill materials typically measure 2 to 6 feet below existing grades. Thicker portions of the artificial fill were generally observed within the central and east half of the site. However, artificial fills of greater thickness may be present within portions of the site. The artificial fill materials are generally comprised of brown silty sand and sandy silt. These materials are typically damp to very moist and loose to medium dense.

The alluvial deposits were encountered below the artificial fill materials to the maximum depth of exploration, 51.5 feet below the ground surface (bgs). The alluvial deposits are comprised of predominantly coarse-grained soils with occasional fine-grained layers typically encountered at depths of 20 to 30 feet below the ground surface. The fine-grained layers varied in thickness and were generally not consistent throughout the site. The coarse-grained soils typically consist of brown sand with varying amounts of silt. These deposits are typically damp to very moist, and loose to medium dense but become dense to very dense at a depth of about 10 feet beneath the ground surface. The fine-grained soils typically consist of light brown and reddish-brown sandy silt, silty clay, and clayey silt. These deposits are typically damp to wet, and stiff to hard.

3.2 GROUNDWATER

Groundwater was not encountered during this firm's subsurface exploration to the maximum depth explored, 51.5 feet below the existing ground surface. A review of the CGS Seismic Hazard Zone Report 024 indicates that historical high groundwater levels for the general site area have been mapped as deep as 50 to 100 feet below the existing ground surface. Perched groundwater was observed in boring B-5 at 28 feet below the existing ground surface.

3.3 FAULTING

Geologic literature and field exploration do not indicate the presence of active faulting within the site. The site does not lie within an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act. Table 3.1 presents a summary of all the known seismically active faults within 10 miles of the site.

TABLE 3.1
Summary of Faults

Name	Distance (miles)	Slip Rate (mm/yr.)	Preferred Dip (degrees)	Slip Sense	Rupture Top (km)	Fault Length (km)
Elysian Park (Upper)	1.86	1.3	50	reverse	3	20
Raymond	2.27	1.5	79	strike slip	0	22
Verdugo	4.46	0.5	55	reverse	0	29
Sierra Madre Connected	5.77	2	51	reverse	0	76
Sierra Madre	5.77	2	53	reverse	0	57
Elsinore; W+Gi+T+J+CM	7.23	--	84	strike slip	0	241
Elsinore;W	7.23	2.5	75	strike slip	0	46
Elsinore;W+GI	7.23	--	81	strike slip	0	83
Elsinore;W+GI+T	7.23	--	84	strike slip	0	124
Elsinore;W+GI+T+J	7.23	--	84	strike slip	0	199
Clamshell-Sawpit	7.76	0.5	50	reverse	0	16
Hollywood	8.23	1	70	strike slip	0	17
Puente Hills (LA)	8.88	0.7	27	thrust	2.1	22

4.0 ANALYSES

4.1 SEISMICITY

We have performed probabilistic seismic analyses utilizing the U.S. Seismic Design Maps web application by the U.S. Geological Survey (USGS). From our analyses, we obtain a PGA of 1.021 g in accordance with Figure 22-7 of ASCE 7-10. The F_{PGA} factor for site class D is 1.0. Therefore, the PGA_M = 1.0 x 1.021 g = 1.021 g. The mean event associated with a probability of exceedance equal to 2% over 50 years has a moment magnitude of 6.62 and the mean distance to the seismic source is 4.0 miles.

4.2 STATIC SETTLEMENT

Analyses were performed to estimate the maximum static settlement due to the anticipated maximum foundation loads Results of laboratory tests, materials description, and field sampler penetration resistance (blow counts) were utilized to assign compression characteristics to the various subsurface materials. An assumed maximum column load of 750 kilo pounds (kips) and a maximum wall load of 27 kips per linear foot were used in the settlement analyses. A maximum bearing pressure of 5,000 pounds per square foot (psf) was assumed. Basement finish grade was assumed to be about 10 feet below current grade and the footing was assumed to have an embedment depth of 2 feet.

Based on our results, the existing alluvial soils are slightly to moderately compressible and exhibit the potential for collapse upon wetting. If these materials are left in place, we estimate total settlement due to these materials would likely exceed typical tolerance of the proposed mixed-use structure. Removal of the alluvial soil and placement of engineered fill was also accounted for in our analyses. Once finalized structural loads and details of footing designs are provided to us, static settlements may require re-evaluation.

5.0 CONCLUSIONS

5.1 FEASIBILITY OF PROPOSED DEVELOPMENT

From a geotechnical point of view, the proposed site improvements are considered feasible provided the recommendations presented in this report are incorporated into the design and construction of the project. Furthermore, it is also our opinion that the proposed development will not adversely impact the stability of adjoining properties if the recommendations presented in this report are incorporated into site development. Key issues that could have significant fiscal impacts on the geotechnical aspects of the proposed site development are discussed in the following sections of this report.

5.2 GEOLOGIC HAZARDS

5.2.1 Ground Rupture

No active faults are known to project through the site nor does the site lie within the boundaries of an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act. The closest known active fault is the Raymond Fault located approximately 2.27 miles from the site. As such, the potential for ground rupture due to a fault displacement beneath the sites is considered very low.

5.2.2 Ground Shaking

The site is situated in a seismically active area that has historically been affected by generally moderate to occasionally high levels of ground motion. The site lies in relatively close proximity to several active faults; therefore, during the life of the proposed improvements, the property will probably experience similar moderate to occasionally high ground shaking from these fault zones, as well as some background shaking from other seismically active areas of the Southern California region. Design and construction in accordance with the current California Building Code (CBC) requirements is anticipated to address the issues related to potential ground shaking.

5.2.3 Liquefaction

Engineering research of soil liquefaction potential (Youd, et al., 2001) indicates that generally three basic factors must exist concurrently in order for liquefaction to occur. These factors include:

- A source of ground shaking, such as an earthquake, capable of generating soil mass distortions.
- A relatively loose silty and/or sandy soil.
- A relative shallow groundwater table (within approximately 50 feet below ground surface) or completely saturated soil conditions that will allow positive pore pressure generation.

As discussed in Section 0, groundwater is not anticipated to occur within 50 feet of the ground surface during the design life of the project. As such, risks associated with liquefaction are considered low. Furthermore, the site is not located within a mapped California Geologic Survey liquefaction hazard zone. No mitigation is deemed necessary for mitigation of liquefaction hazards.

5.3 STATIC SETTLEMENT

Our analyses indicate that the alluvium at a depth of 12 feet or more below current grades if left in place would result in settlements beyond tolerable limits of the proposed structures. Therefore, we recommend that the alluvial materials at the basement grade be scarified and compacted. Provided rough grading is performed in accordance with the recommendations provided herein and based on the anticipated relatively light foundation loads, total and differential static settlements are anticipated to be less than approximately 2 inches and 1-inch over 30 feet for footings founded at a depth of 12 feet or more below current grades, respectively, for the proposed structures. These estimates are based on a maximum column load of 750 kips and a maximum wall load of 27 kips per linear foot (maximum localized bearing pressures of under 5,000 psf). Our office should be provided with foundation plans and structural loads as soon as these become available, in order to confirm our assessment of static settlement.

5.4 EARTHWORK AND MATERIAL CHARACTERISTICS

The site is underlain with 2 to 6 feet of undocumented fill that is considered unsuitable for support of improvements at ground level grade. These materials will require removal and recompaction within the areas of the site that support structures. Based on our understanding of proposed site development, the entire building is anticipated to be supported by a subterranean level that is founded at least 10 feet below current grade. As such, cuts for the subterranean level are anticipated to remove a majority of these unsuitable materials.

Existing surficial soils are anticipated to be relatively easy to excavate with conventional heavy earthmoving equipment. Removal and recompaction of the site materials will result in some minor to moderate shrinkage and subsidence. Design of site grading will require consideration of this loss when evaluating earthwork balance issues.

Site materials are generally below optimum to slightly above optimum moisture. As such, the soils will generally require the addition of minor amounts of water in preparation for reuse as compacted fill.

5.5 SHRINKAGE AND SUBSIDENCE

Volumetric changes in earth quantities will occur when excavated onsite soil materials are replaced as properly compacted fill. We estimate the existing near-surface soils will shrink approximately 10 to 20 percent. Materials within the northwest portion of the site may tend to be on the lower spectrum of shrinkage. Reprocessing of removal bottoms is anticipated to result in negligible subsidence. The estimates of shrinkage and subsidence are intended as an aid for project engineers in determining earthwork quantities. However, these estimates should be used with some caution since they are not absolute values. Contingencies should be made for balancing earthwork quantities based on actual shrinkage and subsidence that occurs during the grading process.

5.6 SOIL EXPANSION

Based on the USCS visual manual classification, the alluvial soils within the site are generally anticipated to possess a **Very Low** expansion potential. Additional testing for soil expansion will be required subsequent to rough grading and prior to construction of foundations and other concrete work to confirm these conditions.

6.0 RECOMMENDATIONS

6.1 EARTHWORK

6.1.1 General Earthwork and Grading Specifications

All earthwork and grading should be performed in accordance with all applicable requirements of the grading codes of the City of San Gabriel, California and CAL OSHA, in addition to recommendations presented herein.

6.1.2 Pre-Grade Meeting and Geotechnical Observation

Prior to commencement of earthwork operations and foundation installation, we recommend a meeting be held between City Inspector, general contractor, civil engineer, and geotechnical consultant to discuss proposed earthwork and logistics.

We also recommend that a geotechnical consultant be retained to provide soil engineering and engineering geologic services during site development. This is to observe compliance with the design specifications and recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated. If conditions are encountered during construction that appears to be different than those indicated in this report, the project geotechnical consultant should be notified immediately. Design and construction revisions may be required.

6.1.3 Site Clearing

All vegetation and deleterious materials should be removed from areas to receive fill placement. The project geotechnical consultant should be notified at the appropriate times to provide observation services during clearing operations to verify compliance with the above recommendations. Voids created by clearing should be left open for observation by the geotechnical consultant. Any unusual soil conditions or subsurface structures encountered during site clearing and/or grading should be brought to the immediate attention of the project geotechnical consultant for corrective recommendations.

6.1.4 Site Preparation (Removals and Overexcavations)

In general, all artificial fill is considered unsuitable for support of proposed engineered fill and site improvements at street grade. These materials should be removed from proposed “structural” areas, and replaced as engineered compacted fill. The artificial fill removal depth is anticipated to be up to 6 feet and existing soils should be over-excavated to a depth of 4 feet below the bottom of footings for structures supported by conventional spread footings at street grade. Locally deeper removal may be required in the areas of previously existing improvements. The actual depth of removal should be determined by the geotechnical consultant during grading.

Within the limits of pavement and free-standing retaining walls over 3 feet in height, the existing undocumented fill soils or the upper 2 feet of alluvial soils should be removed or to a minimum depth of 1 foot below subgrade or footing, whichever is deeper.

Removal of unsuitable materials should extend laterally beyond the limits of proposed buildings a distance equal to the depth of removal (i.e. 1:1, H:V projection). Removals for retaining walls and pavement may be limited to the edge of the foundations or pavement where lateral restrictions to removals are present such as property lines.

All removal excavations should be evaluated by the geotechnical consultant during grading to confirm the exposed conditions are as anticipated and to provide supplemental recommendations if required.

Offsite improvements exist near the property lines. The presence of the existing improvements may limit removals of unsuitable materials adjacent the property lines. Special grading techniques such as slot cutting, underpinning, or other acceptable criteria may be required when grading adjacent the property lines. Specific recommendations should be developed by the geotechnical consultant based on review of detailed grading plans.

6.1.5 Fill Placement

In general, materials excavated from the site may be reused as fill provided they are free of deleterious materials and particles greater than 4 inches in maximum dimension (oversized materials). Asphaltic and concrete debris generated during site demolition can likely be reduced to no more than 4 inches in maximum dimension and incorporated within fill soils during earthwork operations. Such materials should be mixed thoroughly with fill soils to prevent nesting. All fill should be placed in lifts no greater than 8 inches in loose thickness, moisture conditioned to a uniform moisture of at least 110 percent of the optimum moisture content, then compacted in place to at least 90 percent of the laboratory standard. Each lift should be treated in a similar manner. Subsequent lifts should not be placed until the project geotechnical consultant has approved the preceding lift.

6.1.6 Import Materials

If import materials are required to achieve the proposed finish grades, the proposed import soils should have an Expansion Index (EI, ASTM D 4829) less than 21 and possess negligible soluble sulfate concentrations. Import sources should be indicated to the geotechnical consultant prior to hauling the materials to the site so that appropriate testing and evaluation of the fill materials can be performed in advance.

6.1.7 Temporary Excavations

Temporary construction slopes or trench excavation in site materials may be cut vertically up to a height of 4 feet provided that no surcharging of the excavations is present. Temporary slopes over 4 feet in height but no more than 10 feet in height should be laid back at a maximum gradient of 1:1 (H:V). Sandy materials were observed at deeper depths that are friable and prone to caving. Excavations within these sandy materials may have to be limited gradients of 1½ :1 (H:V) with no allowances of a vertical height.

Excavations should not be left open for prolonged periods of time. The project geotechnical consultant should observe all temporary cuts to confirm anticipated conditions and to provide alternate recommendations if conditions dictate. All excavations should conform to the requirements of CAL OSHA.

Where temporary excavations cannot accommodate a 1½:1 (H:V) layback or where surcharging occurs, shoring, slot cutting, underpinning, or other methods should be used. Specific recommendations for other options if considered should be provided by the geotechnical consultant based on review of the final design plans.

6.1.8 Shoring

Excavation for the subterranean portion of the building is anticipated to require shoring due to insufficient space to lay back excavations in certain portions of the site. Particularly along the north, east and south property lines, the planned basement will be less than 10 feet from the property line. Shoring can be provided using various methods such soldier piles/H-beams and lagging, or slide rail systems.

The active pressure for shoring design should be computed based on equivalent fluid pressure EFP=32 pounds per cubic foot (pcf) for level backfill. If surcharge is to be considered, coefficient of lateral pressure 0.26 should be applied to the surcharge. Passive capacity should be computed using ultimate passive pressure based on EFP=480 pcf. The structural engineer should apply appropriate factors of safety to the ultimate passive pressure based on the allowable deflection. Where shoring will support no sensitive structures, a factor of safety equal to 2 is typical. Where the shoring will support structures sensitive to deflection, a factor of safety equal to 3 or more is typically used. To take into consideration the three-dimensional (3-D) effect, up to three times the resulting allowable pressure can be used. If the shoring faces a descending slope, passive pressure should be reduced by 50%. If the procedure used for design of shoring system requires a point of fixity, this point should be considered at depth 2.5 times the diameter of the pile, measured from the lowest grade in front of the shoring system.

All components of the shoring system should be designed by the project shoring engineer. Surcharge loads from construction activities, traffic, and existing offsite developments should be taken into account.

As discussed in Section 3.2 of the present report, shallow groundwater is not expected at the site. However, the potential for seepage due to thin perched zones cannot be precluded

Shafts for solider piles will be prone to caving. As such, casing or drilling fluid will likely be required to advance the shafts. Due to the friable nature of underlying natural soils, lagging should be installed at increments of no more than 2 vertical feet. If the cuts are prone to sloughing before lagging can be installed, then lagging should be installed at more frequent intervals. The entire height of the cut should be lagged once completed.

Shoring plans should be reviewed by the geotechnical consultant to verify their compliance with the information and recommendations provided in the present report. Representatives of the geotechnical consultant should observe the construction of the shoring system.

6.2 SEISMIC DESIGN PARAMETERS

For design of the project in accordance with Chapter 16 of the 2016 CBC, seismic design factors are provided in Table 6.2

6.3 PRELIMINARY FOUNDATION DESIGN

6.3.1 General

The following recommendations are provided for preliminary design purposes. These recommendations have been based on the site materials exposed during our investigation, our understanding of the proposed development, and the assumption that the recommendations presented herein are incorporated into the design and construction of the project. Final recommendations should be provided by the project geotechnical consultant following review of final foundation plans as well as observation and testing of site materials during grading. Depending upon the design plans and actual site conditions, the recommendations provided herein may require modification.

TABLE 6.2
2016 CBC Seismic Design Parameters

	Value
Site Class	D
Mapped MCE Spectral Response Acceleration, short periods, S_S	2.714
Mapped MCE Spectral Response Acceleration, at 1-sec. period, S_1	0.938
Site Coefficient, Fa	1.0
Site Coefficient, Fv	1.5
Adjusted MCE Spectral Response Acceleration, short periods, S_{MS}	2.714
Adjusted MCE Spectral Response Acceleration, at 1-sec. period, S_{M1}	1.407
Design Spectral Response Acceleration, short periods, S_{DS}	1.81
Design Spectral Response Acceleration, at 1-sec. period, S_{D1}	0.938

MCE = Maximum Considered Earthquake

6.3.2 Soil Expansion

Expansion potential of existing site materials is expected to be **Very Low** (EI<21). Following site grading, additional testing of site soils should be performed by the project geotechnical consultant to confirm the basis of these recommendations. If site soils with higher expansion potentials are encountered or imported to the site, the recommendations contained herein may require modification.

6.3.3 Settlement

Foundations should be designed for total and differential static settlement up to 2 inches and 1 inch over 30 feet, respectively. These estimated magnitudes of settlement should be considered by the structural engineer in design of the proposed structures at the site.

6.3.4 Allowable Bearing Value

Provided foundations are bearing into engineered fill or competent alluvial soils, a bearing value of 3,000 pounds per square foot (psf) may be used for continuous and isolated footings founded at a minimum depth of 12 inches below the lowest adjacent grade and having a minimum width of 12 inches and 24 inches, respectively. This value may be increased by 350 psf and 750 psf for each additional foot in width and depth, respectively, up to a maximum value of 5,000 psf. Recommended allowable bearing values include both dead and live loads, and may be increased by one-third for wind and seismic forces.

6.3.5 Lateral Resistance

Provided site grading is performed and that foundations are founded in engineered fill or competent native soils, a passive earth pressure of 250 pounds per square foot per foot of depth (psf/ft) up to a maximum value of 2,250 pounds per square foot (psf) may be used to determine lateral bearing for footings. This value may be increased by one-third when designing for wind and seismic forces. A coefficient of friction of 0.4 times the dead load forces may also be used between concrete and the supporting soils to determine lateral sliding resistance. No increase in the coefficient of friction should be used when designing for wind and seismic forces.

The above values are based on footings placed directly against compacted fill or competent native soils. In the case where footing sides are formed, all backfill against the footings should be compacted to at least 90 percent of the laboratory standard.

6.3.6 Footings and Slabs-on-Grade

Exterior continuous building footings should be founded at a minimum depth of 12 inches. Interior bearing wall footings should be founded at a minimum depth of 12 inches below the lowest adjacent finish grade. Continuous footings should be reinforced with a minimum of two No. 4 bars, one (1) near the top and one (1) near the bottom. The structural engineer may require different reinforcement and should dictate if greater than the recommendations presented herein.

Isolated pad footings should be a minimum of 24 inches square and founded at a minimum depth of 12 inches below the lowest adjacent final grade.

Interior concrete slabs constructed on grade should have a minimum thickness of 4 inches. Interior slabs subject to vehicular loading should have a minimum thickness of 5 inches and should be reinforced with No. 3 bars spaced 18 inches both ways. Care should be taken to ensure the placement of reinforcement at mid-slab height. The structural engineer may recommend a greater slab thickness and reinforcement based on proposed use and loading conditions and such recommendations should govern if greater than the recommendations presented herein.

Concrete floor slabs in areas to receive carpet, tile, or other moisture sensitive coverings should be underlain with a minimum of 10-mil moisture vapor retarder conforming to ASTM E 1745, Class A. The membrane should be properly lapped, sealed, and underlain with at least 2 inches of sand having a sand equivalent (SE) no less than 30. One inch of the sand may be placed over the vapor barrier for protection during construction. This vapor retarder system is anticipated to be suitable for most flooring finishes that can accommodate some vapor emissions. However, this system may emit more than 4 pounds of water per 1,000 sq. ft. and therefore, may not be suitable for all flooring finishes. Additional steps should be taken if such vapor emission levels are too high for anticipated flooring finishes.

Special consideration should be given to slabs in areas to receive ceramic tile or other rigid, crack-sensitive floor coverings. Design and construction should mitigate hairline cracking through the use of additional reinforcing and careful control of concrete slump.

Block-outs should be provided around interior columns to permit relative movement and mitigate distress to the floor slabs due to differential settlement that will occur between column footings and adjacent floor subgrade soils as loads are applied.

Prior to placing concrete, subgrade soils below slab-on-grade areas should be thoroughly moistened to at least 110 percent of optimum moisture content to a depth of 12 inches.

6.3.7 Foundation Observations

Foundation excavation should be observed by the project geotechnical consultant to verify that they have been excavated into competent bearing soils and to the minimum embedment recommended above. These observations should be performed prior to placement of forms or reinforcement. The excavations should be trimmed neat, level and square. Loose, sloughed or moisture-softened materials and debris should be removed prior to placing concrete.

6.4 RETAINING/SCREEN WALLS

6.4.1 General

The following preliminary design and construction recommendations are provided for general retaining and screen walls. Final wall designs specific to the site development should be provided for review once completed. The structural engineer and architect should provide appropriate recommendations for sealing at all joints and applying moisture-proofing material on the back of the walls.

6.4.2 Allowable Bearing Value and Lateral Resistance

Design of retaining and screen walls may utilize the bearing and lateral resistance values provided in Section 6.3.4 and 6.3.5. Lateral resistance for walls along property lines, where lateral removals are restricted should be reduced by 50%.

6.4.3 Earth Pressures

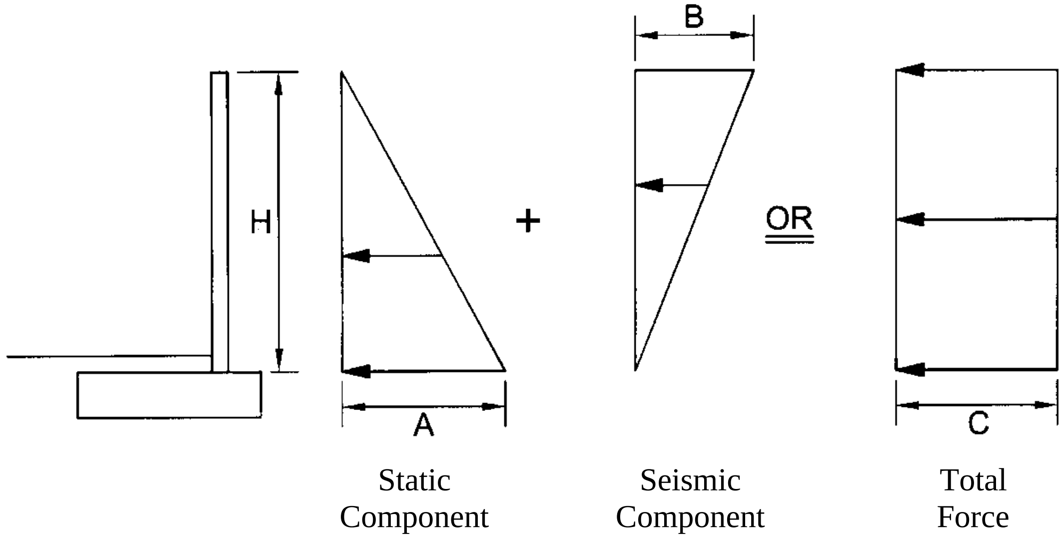
Static and seismic earth pressures for level and 2:1 (H:V) backfill conditions are provided in Table 6.3. Seismic earth pressures provided herein are based on the method provided by Seed & Whitman (1970) for active condition and Wood (1973) for at-rest condition, both using a peak ground acceleration (PGA) of 0.54g for probability of exceedance of 10% in 50 years. Active condition relates to the un-restrained retaining wall condition where the wall is free to rotate about its base. The at-rest condition should apply to cases where the wall is restrained from rotation, such as the subterranean walls where the movement is restricted by the structural floor members. As indicated in Section 1803.5.12 of the 2016 CBC, retaining walls supporting 6 feet of backfill or less are not required to be designed for seismic earth pressures. In addition, the values are based on drained backfill conditions and do not consider hydrostatic pressure. Furthermore, retaining walls should be designed to support adjacent surcharge loads imposed by other nearby footings or traffic loads in addition to the earth pressure.

6.4.4 Footing Reinforcement

All continuous footings should be reinforced with a minimum of two No. 4 bars, one top and one bottom. The structural engineer may require different reinforcement and should dictate if greater than the recommendations provided herein. Where removal of unsuitable soils is limited, additional reinforcing may by required. Specific recommendations should be provided by the geotechnical consultant after review of the final grading plans or as may be recommended after completion of site grading.

TABLE 6.3

SEISMIC EARTH PRESSURES
Pressure Diagram



Earth Pressure Values

Value	Active Condition (Unrestrained)		At-Rest Condition (Restrained)
	Level	2H:1V Slope	Level
A	39H	72H	65H
B	17H	17H	30H
C	28H	45H	48H

Note:
H is in feet and resulting pressure is in psf. Design may utilize either the sum of the static component and the seismic component force diagrams or the total force diagram above. SEAOSC has suggested using a load factor of 1.7 for the static component and 1.0 for the seismic component. The actual load factors should be determined by the structural engineer.

6.4.5 Footing Observations

Footing excavations should be observed by the project geotechnical consultant to verify that they have been excavated into competent bearing soils and to the minimum embedment recommended herein. These observations should be performed prior to placement of forms or reinforcement. The excavations should be trimmed neat, level, and square. Loose, sloughed or moisture-softened materials and debris should be removed prior to placing concrete.

6.4.6 Drainage and Moisture-Proofing

Exterior retaining walls that may be affected by hydraulic surcharge from rainfall, irrigation or uncontrolled surface runoff and supporting more than 3 feet of fill should be constructed with a perforated pipe and gravel subdrain to prevent entrapment of water in the backfill. The perforated pipe should consist of 4-inch-diameter, ABS SDR-35 or PVC Schedule 40 with the perforations laid down. The pipe should be embedded in ¾- to 1½-inch open-graded gravel wrapped in filter fabric. The gravel should be at least one foot wide and extend at least one foot up the wall above the footing and drainage outlet. Drainage gravel and piping should not be placed below outlets and weepholes. Filter fabric should consist of Mirafi 140N, or equal. Outlet pipes should be directed to positive drainage devices.

The use of weepholes may be considered in locations where aesthetic issues from potential nuisance water are not a concern. Weepholes should be 2 inches in diameter and provided at least every 6 feet on center. Where weepholes are used, perforated pipe may be omitted from the gravel subdrain.

Retaining walls supporting backfill should also be coated with a moisture-proofing compound or covered with such material to inhibit infiltration of moisture through the walls. Moisture-proofing material should cover any portion of the back of wall that will be in contact with soil and should lap over and cover the top of footing. A drainage blanket such as Mirafi Miradrain should be provided between the soil and the moisture-proofing materials. The drainage blanket should extend from the top of the gravel to within about 12 inches of finish grade. The top of footing should be finished smooth with a trowel to inhibit the infiltration of water through the wall. The project structural engineer should provide specific recommendations for moisture-proofing, water stops, and joint details.

6.4.7 Retaining Wall Backfill

Onsite soils may generally be used for backfill of retaining walls provided they are free of deleterious materials and particles greater than 4 inches in maximum dimension. The project geotechnical consultant should approve all backfill used for retaining walls. Wall backfill should be moisture-conditioned to slightly over the optimum moisture content; placed in lifts no greater than 12 inches in thickness, and then mechanically compacted with appropriate equipment to at least 90 percent of the laboratory standard. Hand-operated compaction equipment should be used to compact the backfill placed immediately adjacent the wall to avoid damage to the wall. Flooding or jetting of backfill material is not recommended.

6.5 EXTERIOR FLATWORK

Exterior flatwork should have a nominal thickness of 4 inches. Cold joints or saw cuts should be provided at least every 15 feet in each direction. Special jointing detail should be provided in areas of block-outs, notches, or other irregularities to avoid cracking at points of high stress. Subgrade soils below flatwork should be thoroughly moistened to a moisture content of at least 110 percent of the optimum moisture content to a depth of 12 inches. Moistening should be accomplished by lightly spraying the area just prior to placing concrete.

Drainage from flatwork areas should be directed to local area drains and/or other appropriate collection devices designed to carry runoff water to the street or other approved drainage structures. The concrete flatwork should also be sloped at a minimum gradient of 0.5 percent away from building foundations and retaining walls.

6.6 CONCRETE MIX DESIGN

Laboratory testing of onsite soil indicates **negligible** soluble sulfate content. Concrete designed to follow the procedures provided in ACI 318, Section 4.3, Table 4.3.1 for negligible sulfate exposure are anticipated to be adequate for mitigation of sulfate attack on concrete. Upon completion of rough grading, an evaluation of as-graded conditions and further laboratory testing will be required for the site to confirm or modify the conclusions provided in this section.

6.7 PRELIMINARY PAVEMENT DESIGN

6.7.1 Pavement Structural Sections

Based on the soil conditions present at the site and estimated traffic index, preliminary pavement structural sections are recommended in Table 6.4 below. Soil conditions vary significantly with respect to R-value. An assumed "R-value" of 30 was used for this preliminary pavement design to represent the typical condition we anticipate to be present following site grading. The sections provided below are for planning purposes only and should be re-evaluated subsequent to site grading. Final pavement sections should be based on actual R-value testing of in-place soils and analysis of anticipated traffic.

TABLE 6.4
PRELIMINARY PAVEMENT STRUCTURAL SECTIONS

Location	Traffic Index	AC (inches)	Concrete Pavers (mm)	PCC (inches)	AB (inches)
Parking Level Entry Way	6.0	3.0	--	--	9.0
		--	--	7.0	--
		--	80.0	--	10.0
Pick up – Drop Off	5.5	3.0	--	--	8.0
		--	80.0	--	8.0
		--	--	6.0	--
Parking Stalls	--	3.0	--	--	4.0

6.7.1 Subgrade Preparation

Prior to placement of paving elements, subgrade soils should be scarified 6 inches, moisture-conditioned to at least 110 percent of the optimum moisture content then compacted to at least 90 percent of the maximum dry density determined in accordance with ASTM D1557. Areas observed to pump or yield under vehicle traffic should be removed and replaced with firm and unyielding engineered compacted soil or aggregate base materials.

6.7.2 Aggregate Base

Aggregate base materials should be Crushed Aggregate Base or Crushed Miscellaneous Base conforming to Section 200-2 of the Standard Specification for Public Works Construction (Greenbook) or Class 2 Aggregate Base conforming to the Caltrans' Standard Specifications. The materials should be moisture conditioned to slightly over the optimum moisture content then compacted to at least 95 percent of ASTM D 1557.

6.7.3 Asphaltic Concrete

Paving asphalt should be PG 64-10 conforming to the requirements of Section 203-1 of the Greenbook. Asphalt concrete materials should conform to Section 203-6 and construction should conform to Section 302 of the Greenbook.

6.7.4 Concrete Paver

Concrete pavers should conform to the requirements of ASTM C 936. Construction of the pavers, including bedding sand, should follow manufacturer's specifications. Typical thickness of bedding sand is about 1 inch. The gradation of bedding sand should meet the requirement in Table 6.5.

TABLE 6.5
Gradation for Sand Bedding

Sieve Size	Percent Passing
⅜"	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 - 30
No. 100	0 - 10
No. 200	0 - 1

6.7.5 Portland Cement Concrete

Portland cement concrete used to construct concrete paving should conform to Section 201 of the Greenbook and should have a minimum compressive strength of 3250 pounds per square inch (psi) at 28 days. Reinforcement and jointing of concrete pavement sections should be designed according to the minimum recommendations provided by the Portland Cement Association (PCA). For rigid pavement, transverse and longitudinal contraction joints should be provided at spacing no greater than 15 feet. Score joints may be constructed by saw cutting to a depth of ¼ of the slab thickness. Expansion/cold joints may be used in lieu of score joints. Such joints should be properly sealed. Where traffic will traverse over cold joints without keyways or dowels or edges of concrete paving, the edges should be thickened by 20% of the design thickness toward the edge over a horizontal distance of 5 feet.

6.8 POST GRADING CONSIDERATIONS

6.8.1 Site Drainage and Irrigation

The ground immediately adjacent to foundations should be provided with positive drainage away from the structures in accordance with 2016 CBC, Section 1804.3. The gradient of the ground surface may be reduced to 2% for soils and climatic reasons. No rain or excess water should be allowed to pond against structures such as walls, foundations, flatwork, etc.

Excessive irrigation water can be detrimental to the performance of the proposed site development. Water applied in excess of the needs of vegetation will tend to percolate into the ground. Such percolation can lead to nuisance seepage and shallow perched groundwater. Seepage can form on slope faces, on the faces of retaining walls, in streets, or other low-lying areas. These conditions could lead to adverse effects such as the formation of stagnant water that breeds insects, distress or damage of trees, surface erosion, slope instability, discoloration and salt buildup on wall faces, and premature failure of pavement. Excessive watering can also lead to elevated vapor emissions within buildings that can damage flooring finishes or lead to mold growth inside the home.

Key factors that can help mitigate the potential for adverse effects of overwatering include the judicious use of water for irrigation, use of irrigation systems that are appropriate for the type of vegetation and geometric configuration of the planted area, the use of soil amendments to enhance moisture retention, use of low-water demand vegetation, regular use of appropriate fertilizers, and seasonal adjustments of irrigation systems to match the water requirements of vegetation. Specific recommendations should be provided by a landscape architect or other knowledgeable professional.

6.8.2 Utility Trenches

Trench excavations should be constructed in accordance with the recommendations contained in Section 6.1.7 of this report. Trench excavations must also conform to the requirements of Cal/OSHA.

Trench backfill materials and compaction criteria should conform to the requirements of the local municipalities. As a minimum, utility trench backfill should be compacted to at least 90 percent of the laboratory standard. Materials placed within the pipe zone (6 inches below and 12 inches above the pipe) should consist of particles no greater than ¾ inches and have a SE of at least 30. The materials within the pipe zone should be moisture-conditioned and compacted by hand-operated compaction equipment. Above the pipe zone (>1 foot above pipe), the backfill may consist of general fill materials. Trench backfill should be moisture-conditioned to slightly over the optimum moisture content, placed in lifts no greater than 12 inches in thickness, and then mechanically compacted with appropriate equipment to at least 90 percent of the laboratory standard. For trenches with sloped walls, backfill material should be placed in lifts no greater than 8 inches in loose thickness, and then compacted by rolling with a sheepsfoot roller or similar equipment. The project geotechnical consultant should perform density testing along with probing to verify that adequate compaction has been achieved.

Within shallow trenches (less than 18 inches deep) where pipes may be damaged by heavy compaction equipment, imported clean sand having a SE of 30 or greater may be utilized. The sand should be placed in the trench, thoroughly watered, and then compacted with a vibratory compactor. For utility trenches located below a 1:1 (H:V) plane projecting downward from the outside edge of the adjacent footing base or crossing footing trenches, concrete or slurry should be used as trench backfill.

6.9 PLAN REVIEW AND CONSTRUCTION SERVICES

We recommend ***Albus-Keefe & Associates, Inc.*** be engaged to review any future development plans, including foundation plans prior to construction. This is to verify that the assumptions of this report are valid and that the preliminary conclusions and recommendations contained in this report have been properly interpreted and are incorporated into the project plans and specifications. If we are not provided the opportunity to review these documents, we take no responsibility for misinterpretation of our preliminary conclusions and recommendations.

We recommend that a geotechnical consultant be retained to provide soil engineering services during construction of the project. These services are to observe compliance with the design, specifications or recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

If the project plans change significantly from the assumed development described herein, the project geotechnical consultant should review our preliminary design recommendations and their applicability to the revised construction. If conditions are encountered during construction that appear to be different than those indicated in this report or subsequent design reports, the project geotechnical consultant should be notified immediately. Design and construction revisions may be required.

7.0 LIMITATIONS

This report is based on the proposed development and geotechnical data as described herein. The materials encountered on the project site, described in other literature, and utilized in our laboratory testing for this investigation are believed representative of the total project area, and the conclusions and recommendations contained in this report are presented on that basis. However, soil and bedrock materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions and recommendations contained herein. As such, observation and testing by a geotechnical consultant during the grading and construction phases of the project are essential to confirming the basis of this report.

This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and time period. The contents of this report are professional opinions and as such, are not to be considered a guaranty or warranty.

This report should be reviewed and updated after a period of one year or if the site ownership or project concept changes from that described herein.

This report has been prepared for the exclusive use of **Pacific Plaza Premier Development Group** and their project consultants in the planning and design of the proposed development. This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

This report is subject to review by the controlling governmental agency.

Respectfully submitted,

ALBUS-KEEFE & ASSOCIATES, INC

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STATE OF CALIFORNIA

8.0 REFERENCES

Publications

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Plans

Pacific Square San Gabriel, Mixed Use Development, 700-800 San Gabriel Blvd., San Gabriel, CA 91776, prepared by Media Portfolio

EXPLANATION
(Locations Approximate)

- Exploratory Boring
- Exploratory Percolation Well

ALBUS-KEEFE & ASSOCIATES, INC.
GEOTECHNICAL CONSULTANTS

GEOTECHNICAL MAP

Job No.: 2798.00	Date: 03/20/19	Plate: 1

APPENDIX A

EXPLORATION BORING LOGS

E X P L O R A T I O N   L O G

Project:		Location:
Address:		Elevation:
Job Number:	Client:	Date:
Drill Method:	Driving Weight:	Logged By:

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests

EXPLANATION

Solid lines separate geologic units and/or material types.

Dashed lines indicate unknown depth of geologic unit change or material type change.

Solid black rectangle in Core column represents California Split Spoon sampler (2.5in ID, 3in OD).

Double triangle in core column represents SPT sampler.

Vertical Lines in core column represents Shelby sampler.

Solid black rectangle in Bulk column respresents large bag sample.

Other Laboratory Tests:

Max = Maximum Dry Density/Optimum Moisture Content
EI = Expansion Index
SO4 = Soluble Sulfate Content
DSR = Direct Shear, Remolded
DS = Direct Shear, Undisturbed
SA = Sieve Analysis (1" through #200 sieve)
Hydro = Particle Size Analysis (SA with Hydrometer)
200 = Percent Passing #200 Sieve
Consol = Consolidation
SE = Sand Equivalent
Rval = R-Value
ATT = Atterberg Limits

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-1
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 376.5
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Core	Bulk	Laboratory Tests: Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) <u>Silty Sand (SM):</u> Brown, very moist, loose, fine and coarse grained sand, trace pores							
				11			17.8	110.5	
		@ 4 ft, trace clay		14			15.5	110	
5		**ALLUVIUM (Qal)** <u>Silty Sand (SM):</u> Light brown, very moist, medium dense, medium to coarse grained sand		17			6.8	100.6	
		<u>Sand with Silt (SP-SM):</u> Light brown, moist, medium dense, medium to coarse grained sand, trace mica							
10		<u>Silty Sand (SM):</u> Brown, very moist, very loose, fine grained sand, trace coarse gravel, with clay, sandy silt layers		4			22.8	94.6	Consol
15		@ 15 ft, loose		4					SA Hydro
20		@ 20 ft, light brown, medium dense, clayey silt nodules, no coarse sand, decreased fines		15					

Albus-Keefe & Associates, Inc.

Plate A-2

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-1
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 376.5
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 25 ft, light reddish brown, some clay, increased fines		15					
30		@ 30 ft, dense, trace coarse grained sand, decreased fines		18					
		<u>Sand with Silt (SP-SM):</u> Reddish brown, damp, dense, fine to medium grained sand							
35				19					
40		@ 40 ft, light brown, medium dense, fine grained sand		16					
45		@ 45 ft, dense, silt nodules		23					

Albus-Keefe & Associates, Inc.

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-1
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 376.5
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 50 ft, medium brown, increased fines		18					
		End of boring at 51.5 feet. No groundwater encountered. Percolation test well (P-1) installed 10 feet away from boring. Backfilled with soil cuttings.							

Albus-Keefe & Associates, Inc.

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-2
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 378.7
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith- ology	Material Description	Water	Samples: Blows Per Foot	Core	Bulk	Laboratory Tests: Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
0–2		**ARTIFICIAL FILL (Af)** Silty Sand (SM): Brown, moist, fine to coarse grained sand, some clay				■			
2		**ALLUVIUM (Qal)** Silty Sand (SM): Brown, moist, loose, fine and coarse grained sand, some clay		6	■	■	12.9	110.5	
4		@ 4 ft, reddish brown, fine to coarse gravel		8	■	■	8.5	117.2	
6		@ 6 ft, bedrock fragments		12	■				
7		@ 7 ft, brown, fine to medium grained sand, trace clay, no gravel					10.6	118.2	DS
10				14	■		5.2	107.2	SO4 pH Ch
11		@ 10 ft, light brown, fine to coarse gravel, possible cobbles, decreased fines							
15				26	⧗				
16		@ 15 ft, dense, no gravel							
18		Clay (CL): Reddish brown, damp, very stiff, trace fine grained sand, with silt							
20				15	⧗				

Albus-Keefe & Associates, Inc.

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-2
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 378.7
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Core	Bulk	Laboratory Tests: Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				11					
30		Sandy Silt (ML): Light brown, damp, very stiff, fine grained sand		12					
35		Silty Sand (SM): Light brown, damp, dense, fine grained sand		19					
40		@ 40 ft, damp, very dense, fine to coarse gravel, fine to coarse grained sand		53					
		End of boring at 41.5 feet. No groundwater encountered. Backfilled with soil cuttings.							

Albus-Keefe & Associates, Inc.

Plate A-6

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-3
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 385.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
0	**ARTIFICIAL FILL (Af)** Silty Sand (SM): Medium brown, moist, loose, fine grained sand							
			9	■		13.7	100.6	
5			11	■		9.8	111.6	
	@ 5.5 ft, increased medium grained sand							
	ALLUVIUM (Qal) Sand with Silt (SP-SM): Light brown, damp, medium dense, medium to coarse grained sand, trace fine gravel, trace silt		21	■		3.5	105.5	
10	Silty Sand / Sandy Silt (SM/ML): Medium brown, moist, medium dense / stiff, fine grained sand, trace medium grained sand		7	■		12.6	94.8	Consol
15	@ 15 ft, medium reddish brown, trace course grained sand		7	⧗				
	Silty Sand/ Sand with Silt (SM/ SP-SM): Light gray brown, damp, dense, fine to coarse grained sand, little fine to coarse gravel							
20			30	⧗				
	Clay (CL): Reddish brown, moist, hard, trace fine grained sand, with silt							
	Sandy Silt (ML): Reddish brown, moist, hard, fine to coarse grained sand, trace clay							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-3
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 385.1
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
				26					
30				13					
		Silty Sand/Sandy Silt (SM/ML): Reddish yellow, moist, medium dense/stiff, fine grained sand							
		Silty Sand (SM): Reddish brown, moist, dense, fine grained sand							
35				22					
40		@ 40 ft, medium dense		17					
45		@ 45 ft, dense		18					

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-3
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 385.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 50 ft, trace fine gravel		23					
		End of boring at 51.5 feet. No groundwater encountered. Backfilled with soil cuttings.							

Albus-Keefe & Associates, Inc.

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-4
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 375.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, moist, medium dense, fine to medium grained sand, trace pores							
				20			6.7	107.4	
		ALLUVIUM (Qal) Sand (SP): Light grayish brown, damp, medium dense, fine to coarse grained sand, few fine to coarse gravel		22			1.7		
5									
				28			4.6	104.9	DS
10				18					SO4 pH Ch
		Silty Sand (SM): Medium reddish brown, moist, fine to medium grained sand, trace fine gravel							
15				9					
20		@ 20 ft, light reddish brown, damp, dense, fine to medium grained sand, decreased fines, some fine gravel		28					

Albus-Keefe & Associates, Inc.

Plate A-10

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-4
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 375.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 25 ft, reddish brown, moist, fine grained sand, increased fines, no gravel, some clay		21					
30		@ 30 ft, damp, very dense, fine grained sand, decreased fines, trace medium grained sand		32					
		<u>Sand (SP-SM):</u> Reddish brown, damp, dense, fine to medium grained sand, with silt							
35				19					
40		@ 40 ft, very dense		34					SA Hydro
45		@ 45 ft, medium to coarse grained sand, decreased fines, trace fine gravel		62					

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-4
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 375.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 50 ft, light grayish brown		38					
		End of boring at 51.5 feet. No groundwater encountered. Backfilled with soil cuttings. Percolation test well (P-2) installed 10 feet away from boring.							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-5
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 374.3
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand/ Sandy Silt (SM/ML): Light brown, damp, loose, fine grained sand, trace pores							
				11			8.6	97	
		Silty Sand (SM): Light brown, damp, medium dense, fine grained sand, trace pores		20			4.5	106.6	
5									
		ALLUVIUM (Qal) Sand (SP): Light gray brown, damp, medium dense, fine to medium grained sand, trace fine gravel, friable		16			1.7		
10		@ 10 ft, loose, increased medium grained sand		12			7.2	105.8	Consol
15		@ 15 ft, dense		26					
20				30					

Albus-Keefe & Associates, Inc.

Plate A-13

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-5
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 374.3
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/20/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		@ 25 ft, increased fines		31					
30		Sandy Silt (ML): Reddish brown, wet, hard, fine to medium grained sand		26					
35		Silt Sand (SM): Reddish brown, damp, dense, fine grained sand, trace medium grained sand		23					
40		Sand with Silt (SP-SM): Light reddish brown, very dense, fine to coarse grained sand, trace fine gravel		41					
		End of boring at 41.5 feet. Perched groundwater observed at 28 feet. Backfilled with soil cuttings.							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-6
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 372.9
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, very moist, medium dense, fine grained sand, few medium grained sand, trace clay							
		ALLUVIUM (Qal) Sand (SP): Light reddish brown, damp, medium dense, fine to coarse grained sand, trace fine gravel		16			9.9	127.4	
				26			5.8	101.7	
5									
				29			7.7	102.8	
		Silty Sand (SM): Brown, moist, medium dense, fine to medium grained sand, trace fine gravel							
10				18			14.3	109	Consol
		Sand with Silt (SP-SM): Light reddish brown, dense, fine to coarse grained sand, trace fine gravel							
15				23					
		Silty Sand (SM): Light reddish brown, damp, medium dense, fine grained sand, trace medium grained sand, trace fine gravel							
20				19					

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-6
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 372.9
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		Sandy Silt (ML): Reddish brown, damp, dense, trace fine to course grained sand, iron oxide stain, trace clay							
				20					
		Silty Sand (SM): Light reddish brown, damp, dense, fine to medium grained sand, trace clay							
30				27					
35		@ 35 ft, fine grained sand, increased fines		24					
		Sand with Silt (SP-SM): Light brown, damp, very dense, fine to coarse sand, few fine gravel							
40				52					
45		@ 45 ft, increased fine gravel		67					

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-6
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 372.9
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
50		@ 50 ft, dense, fine grained sand, trace fine gravel, thin layers of sandy silt, increased fines		21					
		End of boring at depth of 51.5 feet. No groundwater encountered. Backfilled with soil cuttings.							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-7
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 385.1
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, very moist, medium dense, fine to medium grained sand, trace clay							
				15			8.4	105.3	
		@ 3 ft, decreased fines, trace fine gravel							
		ALLUVIUM (Qal) Sand with Silt (SP-SM): Brown, damp, medium dense, fine to coarse grained sand, trace fine to coarse gravel		19			4.5	107.2	
5									
				34			2.1		
		@ 6 ft, increased gravel							
		Silty Sand (SM): Brown, damp, medium dense, fine grained sand							
10				14			9.4	97	Consol
15		@ 15 ft, reddish brown, dense, thin silt layers		31					
		Sand with Silt (SP-SM): Light brown, damp, dense, fine to coarse grained sand, few fine gravel							
20				23					
		Sandy Silt (ML): Reddish brown, hard, fine grained sand, with clay							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel	Location: B-7
Address: 815 S Gladys Ave, San Gabriel, CA 91776	Elevation: 385.1
Job Number: 2798.00 / Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger / Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Core	Bulk	Laboratory Tests: Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				22					
		Silty Sand (SM): Light brown, dense, fine grained sand							
30				21					
35		@ 35 ft, silty clay nodules		24					
40				20					
		End of the boring at 41.5 feet. No groundwater encountered. Backfilled with soil cuttings.							

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-8
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 377.7
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Material Description	Water	Blows Per Foot	Sample	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
0	**ARTIFICIAL FILL (Af)** Silty Sand (SM): Brown, moist, medium dense, fine to medium grained sand, few clay, trace fine gravel, trace pores			Bulk (0–5 ft)			
2			16	Core	11.4	108.1	
4	@ 4 ft, light brown, damp, loose, fine grained sand, possible cobbles		11	Core	6.1	98.9	
5	@ 5 ft, brown, moist, fine to medium grained sand						
6	**ALLUVIUM (Qal)** Silty Sand (SM): Light brown, moist, medium dense, fine to medium sand, trace fine gravel		14	Core	3.3	99.7	
10	@ 10 ft, reddish brown, loose, increased fines, no gravel, trace coarse grained sand		10	Core	6.5	96.4	Consol
13	Silt (ML): Reddish brown, moist, medium stiff, fine to medium grained sand, trace coarse gravel, with clay						
15			4	SPT			
18	Silty Sand (SM): Light brown, damp, very dense, fine to coarse grained sand, few coarse gravel						
20			36	SPT			
23	Sandy Silt (ML): Reddish brown, damp, dense, fine grained sand						

Albus-Keefe & Associates, Inc.

EXPLORATION LOG

Project: Pacific Plaza Premier Development Group - San Gabriel		Location: B-8
Address: 815 S Gladys Ave, San Gabriel, CA 91776		Elevation: 377.7
Job Number: 2798.00	Client: Pacific Plaza Premier Development Grou	Date: 2/21/2019
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: MP

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Core	Bulk	Laboratory Tests: Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				21					
		Sand with Silt (SP-SM): Light brown, damp, very dense, fine to medium grained sand, trace coarse grained sand, few coarse gravel, possible cobbles							
30				59					
35		@ 35 ft, no cobbles		53					
40				73/ 11"					
		End of boring at 41.5 feet. No groundwater encountered. Backfilled with soil cuttings.							

APPENDIX B

LABORATORY TEST PROGRAM

LABORATORY TESTING PROGRAM

Soil Classification

Soils encountered within the exploratory borings were initially classified in the field in general accordance with the visual-manual procedures of the Unified Soil Classification System (ASTM D2488). The samples were re-examined in the laboratory and classifications reviewed and then revised where appropriate. The assigned group symbols are presented in the Boring Logs provided in Appendix A.

In Situ Moisture and Density

Moisture content and dry density of in-place soil materials were determined in representative strata. Test data are summarized on the Boring Logs provided in Appendix A.

Maximum Dry Density and Optimum Moisture Content

Maximum dry density and optimum moisture content of onsite soils were determined for one selected sample in general accordance with Method A of ASTM D1557. Pertinent test values are given on Table B-1.

Direct Shear

Direct shear tests were performed for a undisturbed sample and a sample remolded to 90 percent of the maximum dry density. These tests were performed in general accordance with ASTM D3080. Three specimens were prepared for each test. The test specimens were artificially saturated, and then sheared under varied normal loads at a constant rate. Results are graphically presented on Plates B-9 and B-10.

Consolidation

Consolidation tests were performed for selected soil samples in general conformance with ASTM D 2435. Axial loads were applied in several increments to a laterally restrained 1-inch-high sample. Loads were applied in geometric progression by doubling the previous load, and the resulting deformations were recorded at selected time intervals. The test samples were inundated at selected loads to evaluate the effects of a sudden increase in moisture content (hydro-consolidation potential). Results of the tests are graphically presented on Plates B-3 through B-8.

Expansion Potential

Expansion index testing was performed on a selected sample. The test was performed in conformance with ASTM D-4829. The test result is presented on Table B-1.

Soluble Sulfate Content

A chemical analysis was performed on a selected soil sample to determine soluble sulfate content. The test was performed in accordance with California Test Method (CTM) 417. The test result is included in Table B-1.

Corrosion

Select samples were tested for minimum resistivity, chloride content, and pH in accordance with California Test Method 643. Results of these tests are provided in Table B-1.

Particle-Size Analyses

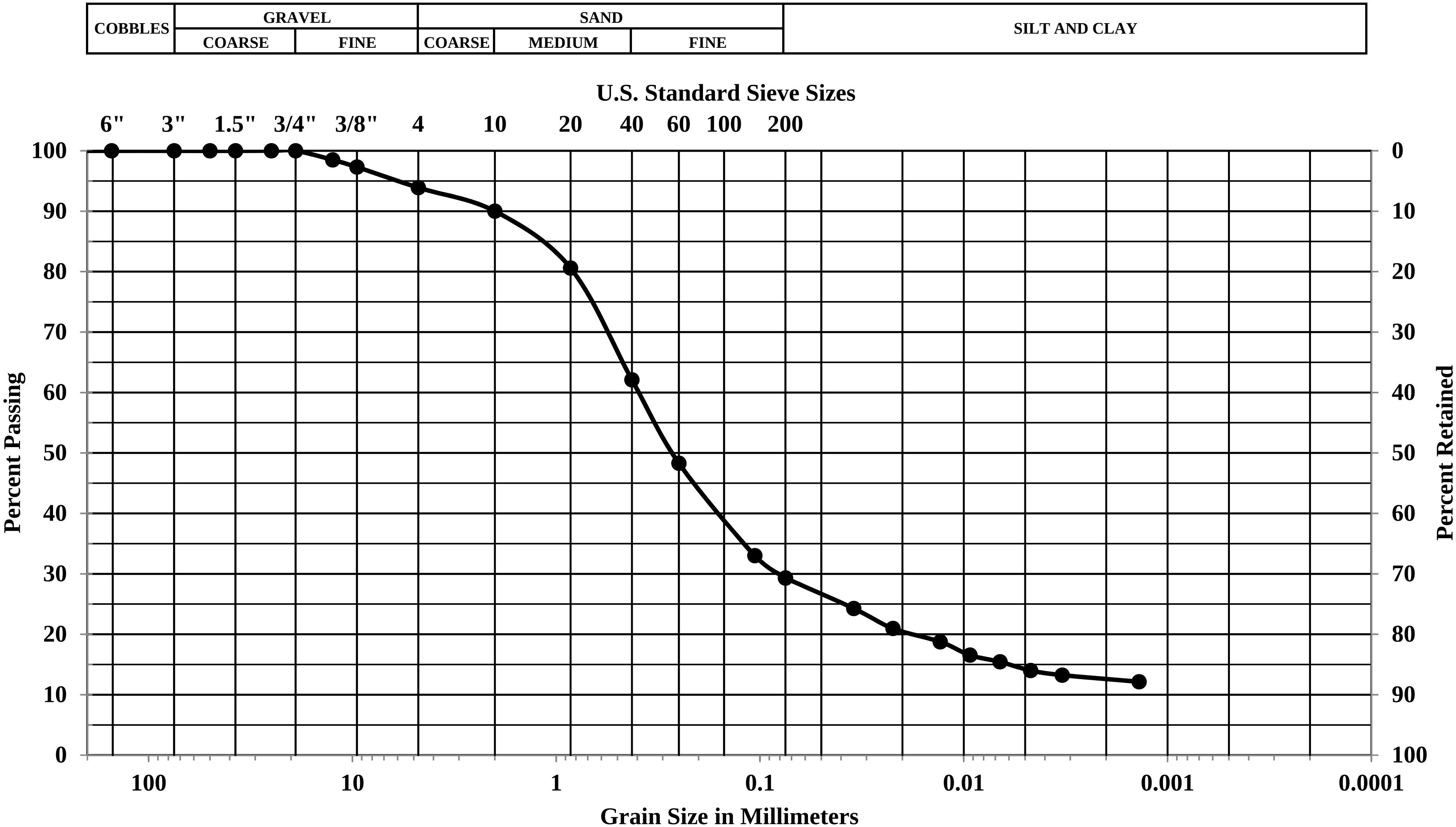
Particle-size analyses were performed on selected samples in accordance with ASTM D-422. The results are presented graphically on the attached Plates B-1 and B-2.

TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Depth (feet)	Soil Type	Test Results	
B-1	0-5	Silty Sand (SM)	Maximum Dry Density: Optimum Moisture Content:	127.0% 11.0%
B-2	10	Silty Sand (SM)	Soluble Sulfate: Sulfate Exposure: pH: chloride:	0.000% Negligible 7.09 13.3 ppm
B-4	10	Sand (SP)	Soluble Sulfate: Sulfate Exposure: pH: chloride:	0.000% Negligible 6.89 12.0 ppm

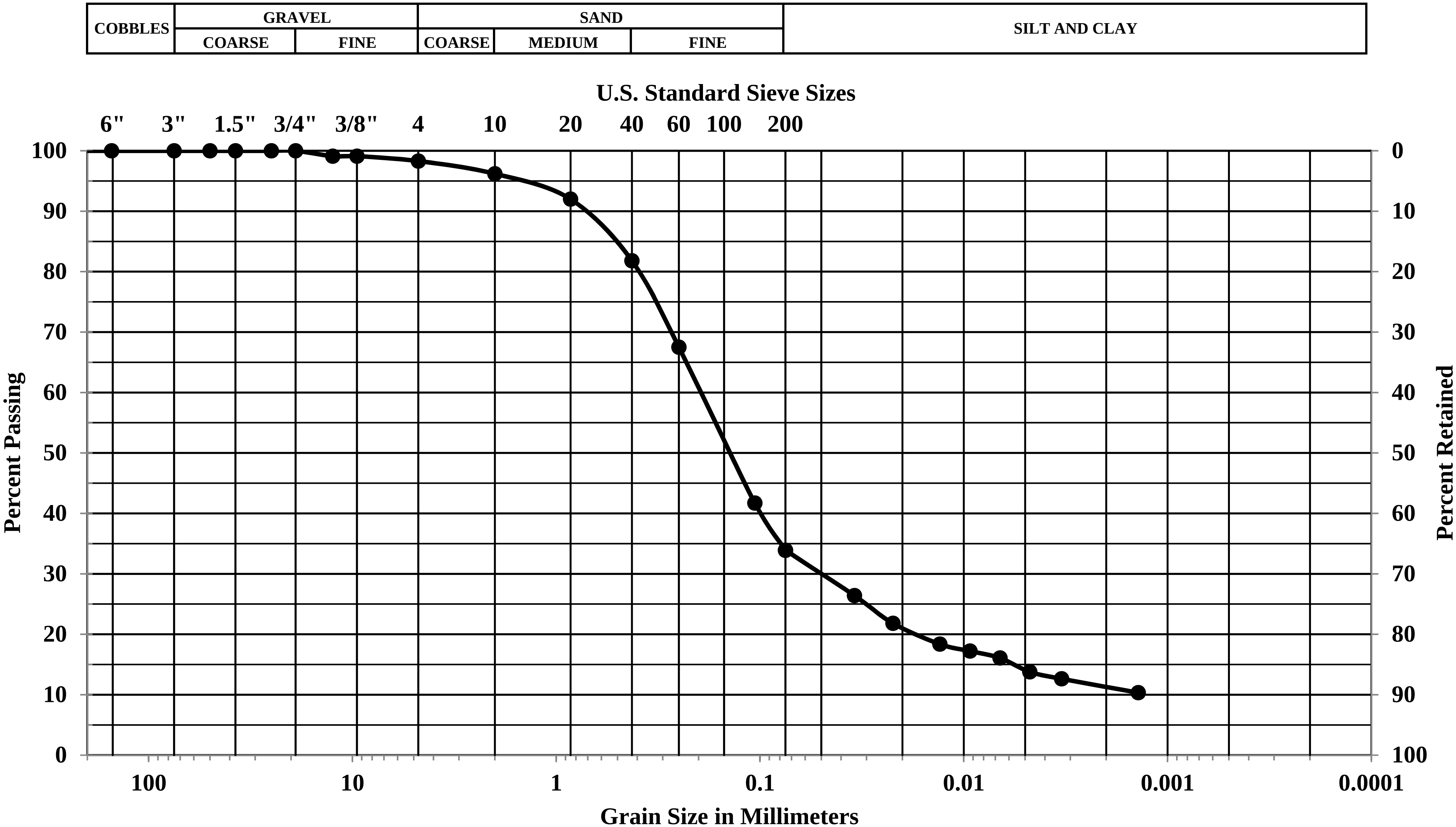
Additional laboratory test results are provided on the boring logs provided in Appendix A and on the Plates that follow.

GRAIN SIZE DISTRIBUTION



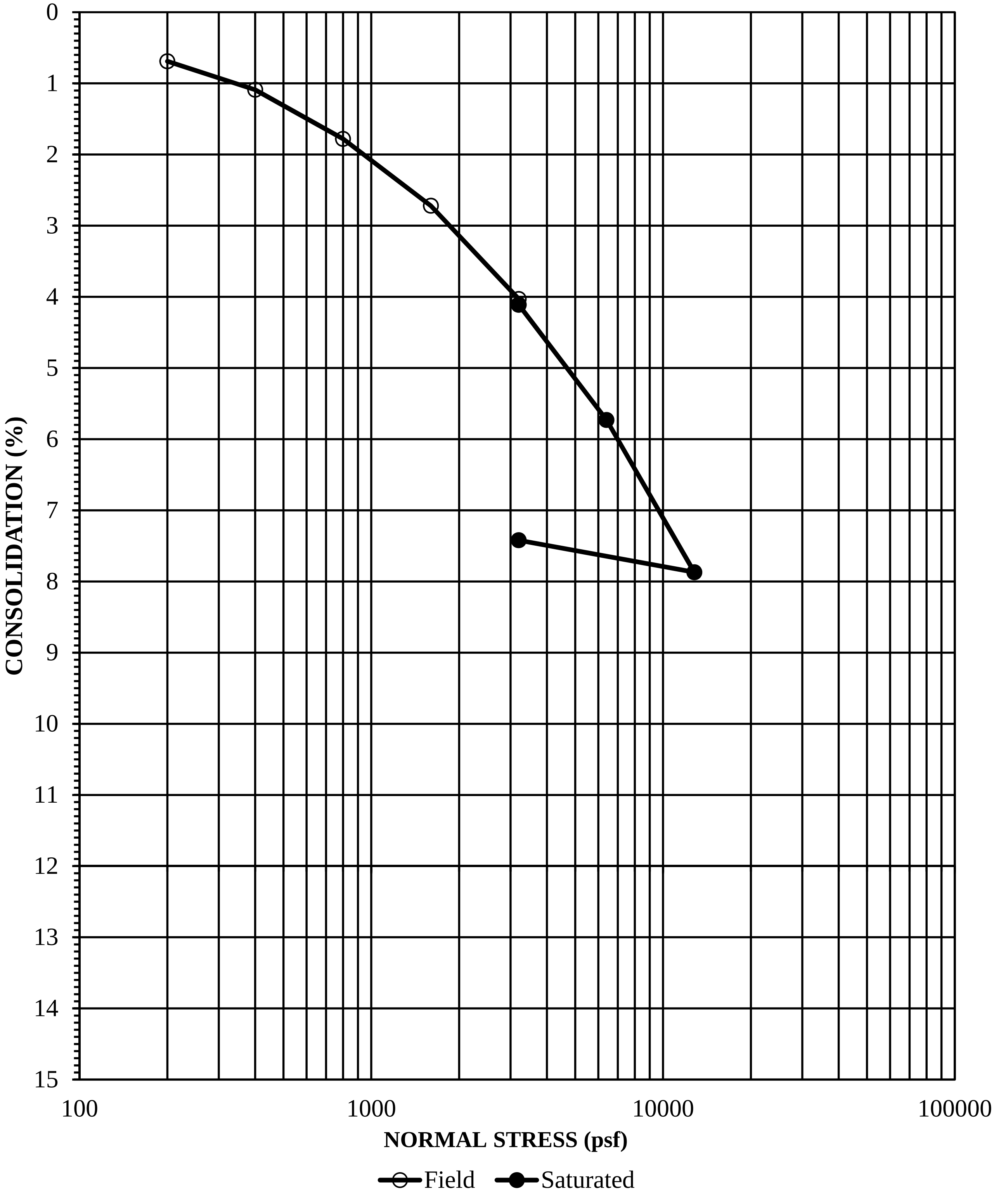
Job Number	Location	Depth	Description
2798.00	B-1	15	Silty Sand (SM)

GRAIN SIZE DISTRIBUTION



Job Number	Location	Depth	Description
2798.00	B-4	40	Silty Sand (SM)

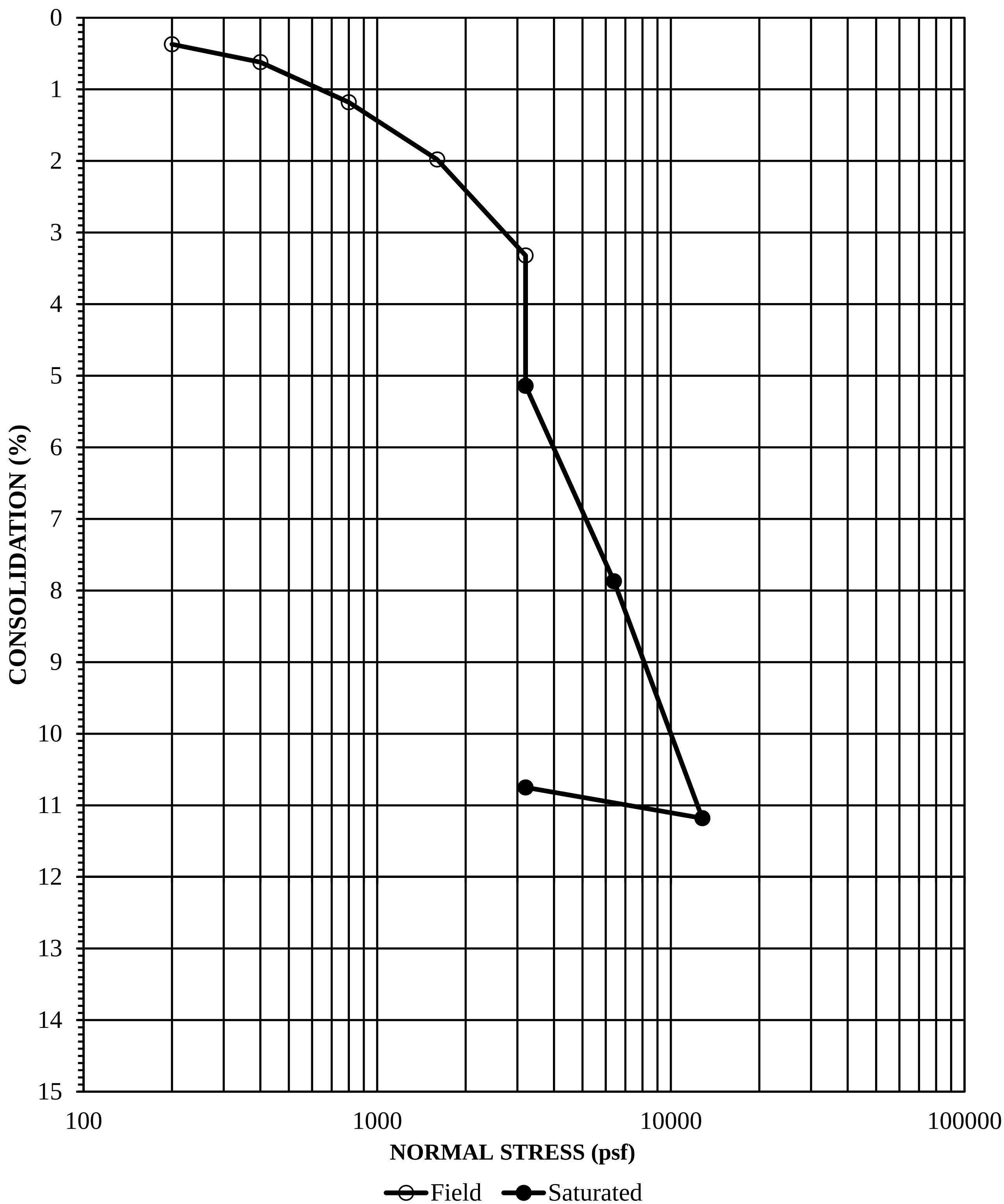
CONSOLIDATION



Job Number	Location	Depth	Description
2798.00	B-1	10	Silty Sand (SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
95.6	22.5	21.2

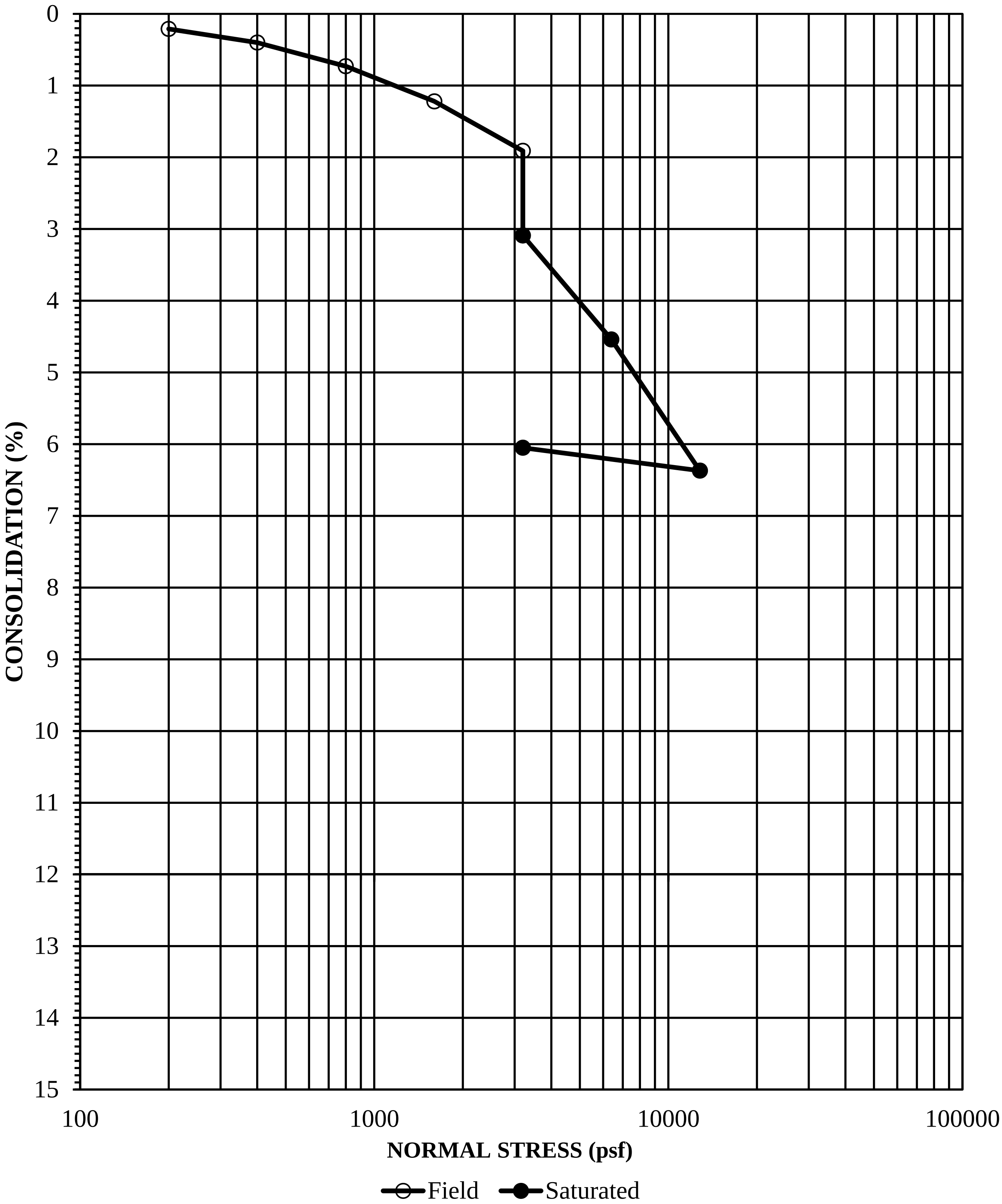
CONSOLIDATION



Job Number	Location	Depth	Description
2798.00	B-3	10	Silty Sand (SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
90.3	12.5	22.3

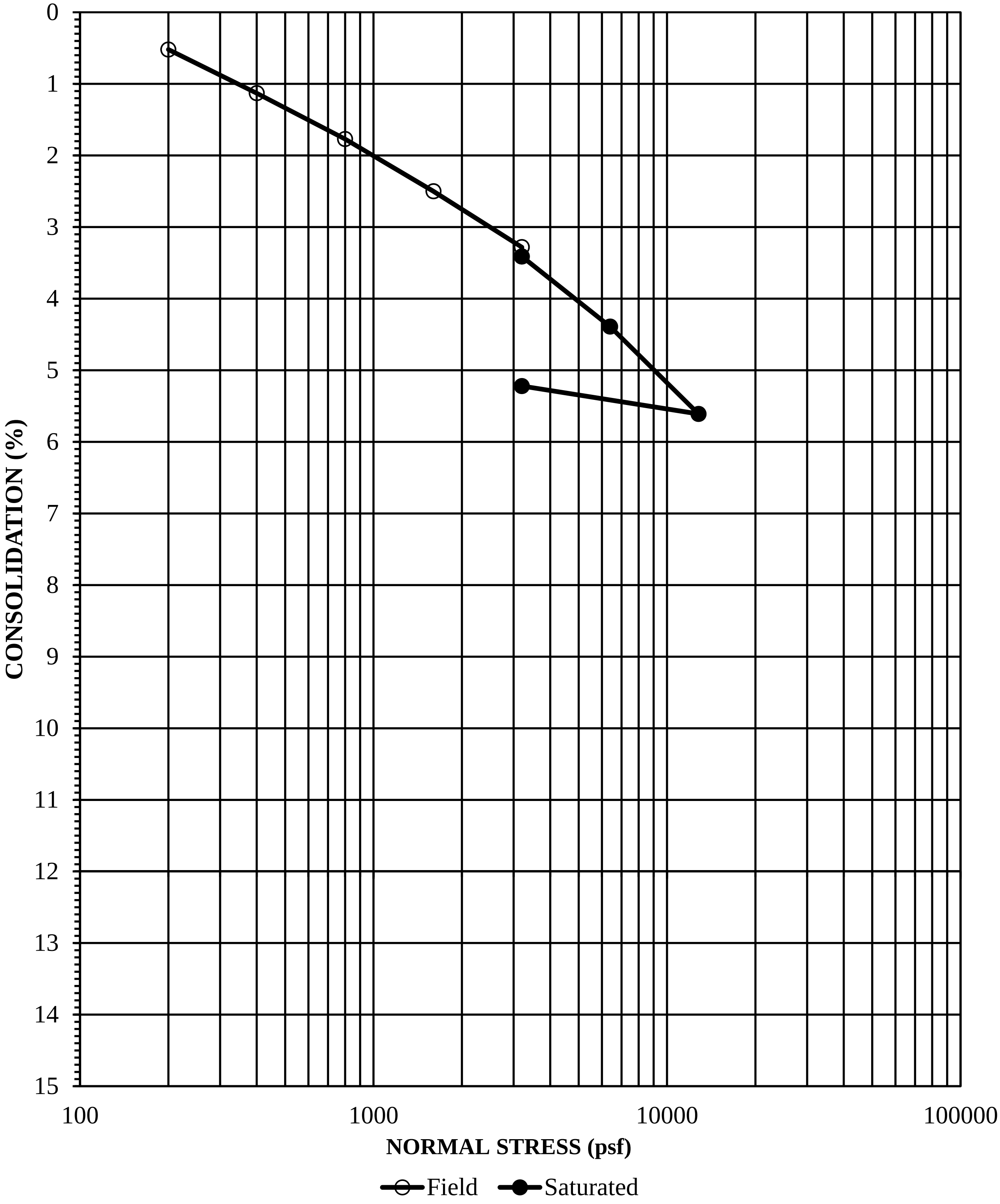
CONSOLIDATION



Job Number	Location	Depth	Description
2798.00	B-5	10	Sand/Silty Sand (SP/SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
105	9.1	15.3

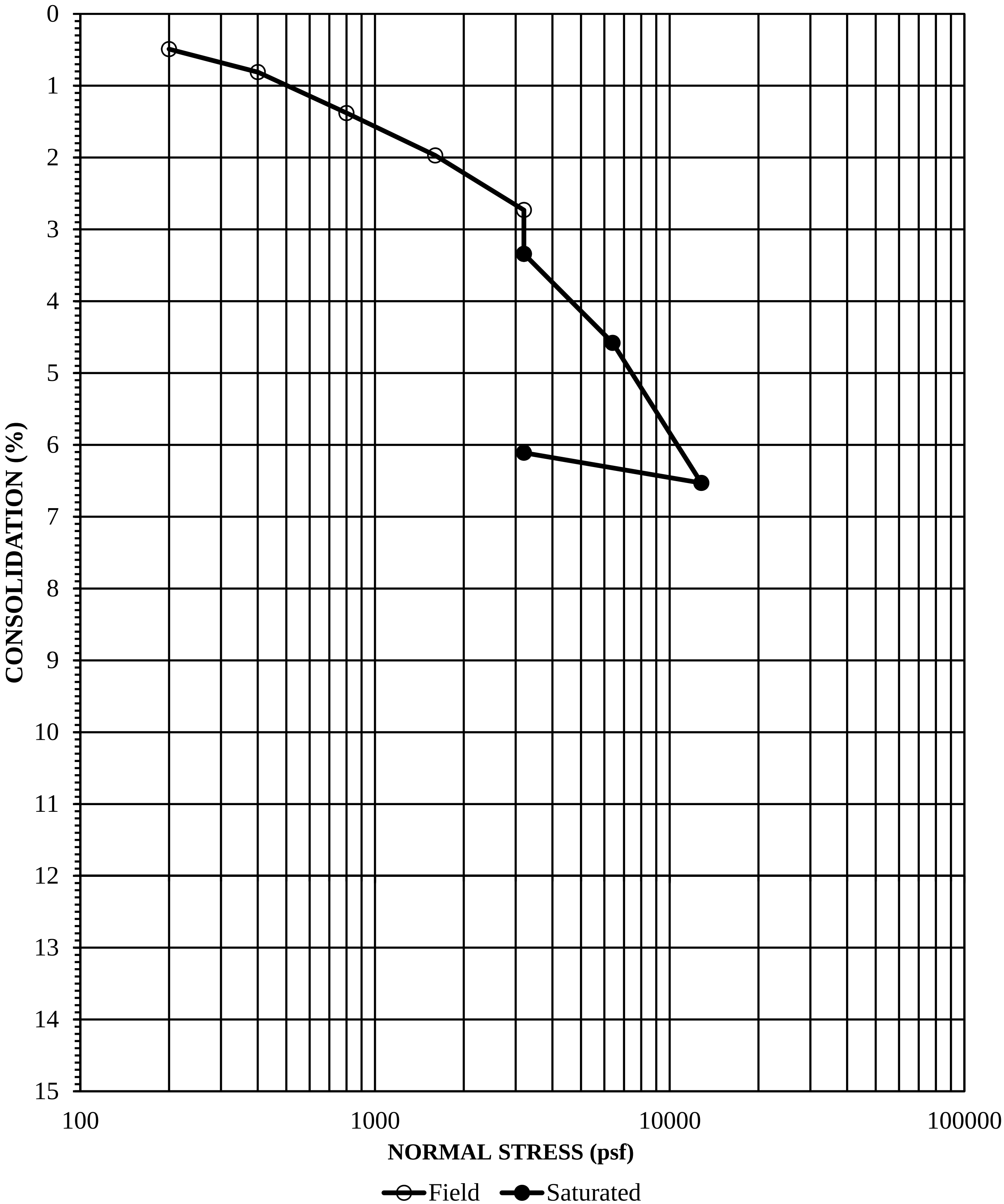
CONSOLIDATION



Job Number	Location	Depth	Description
2798.00	B-6	10	Silty Sand (SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
109	16.5	16.7

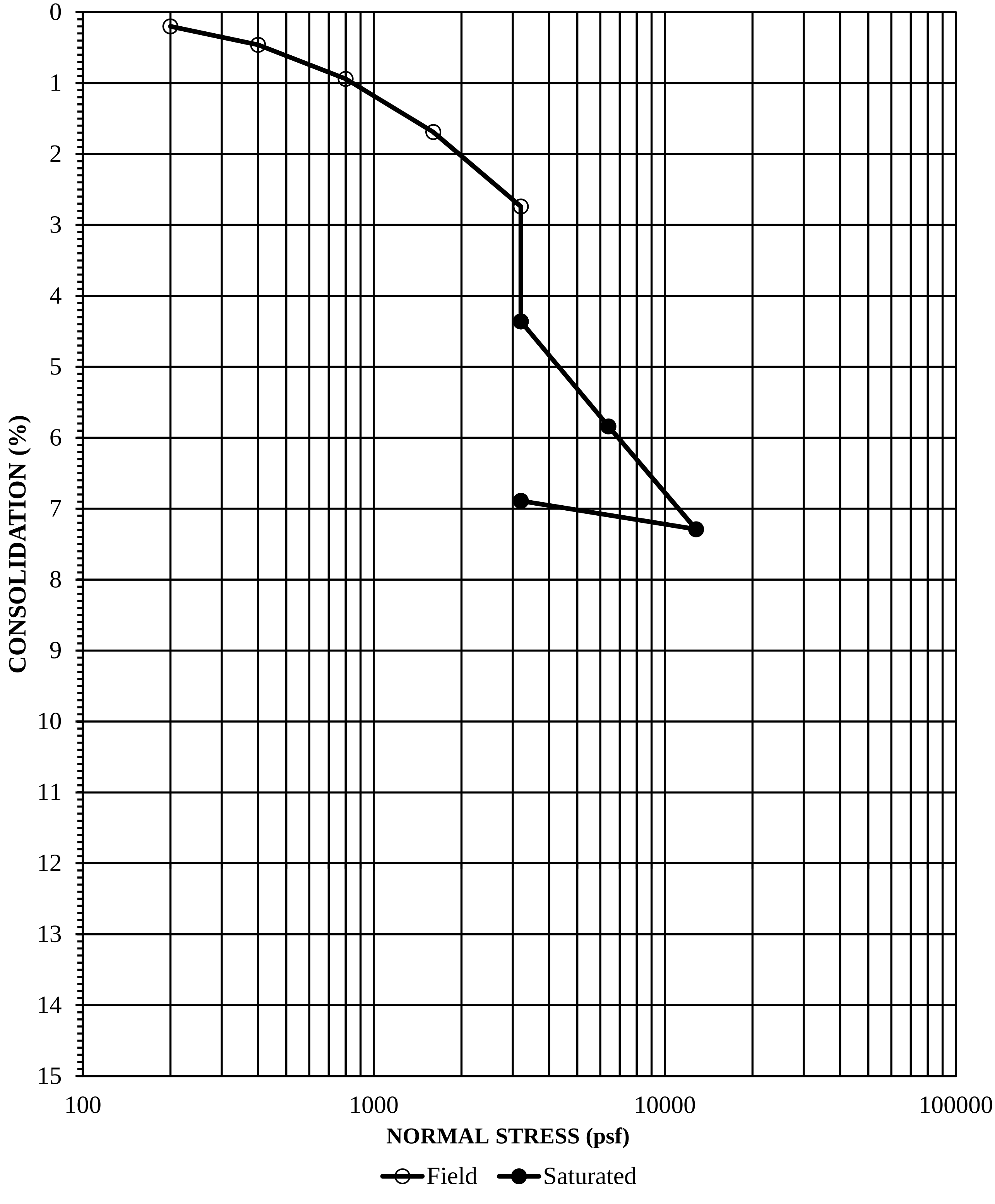
CONSOLIDATION



Job Number	Location	Depth	Description
2798.00	B-7	10	Silty Sand (SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
94.1	9.6	22.3

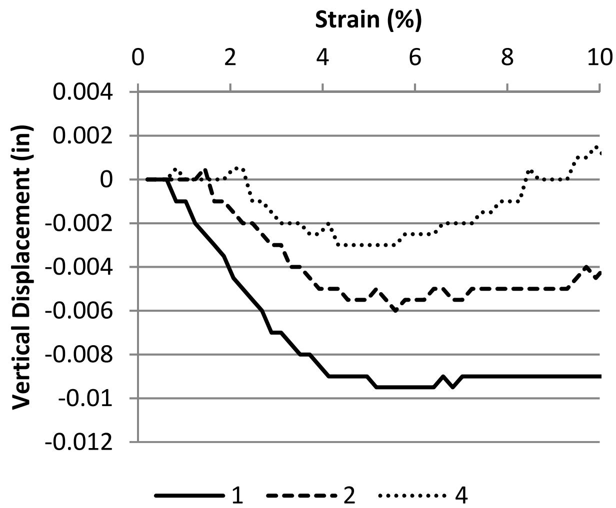
CONSOLIDATION

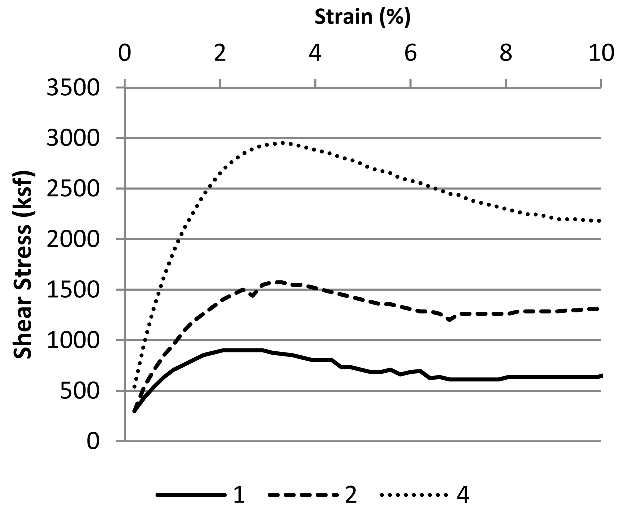


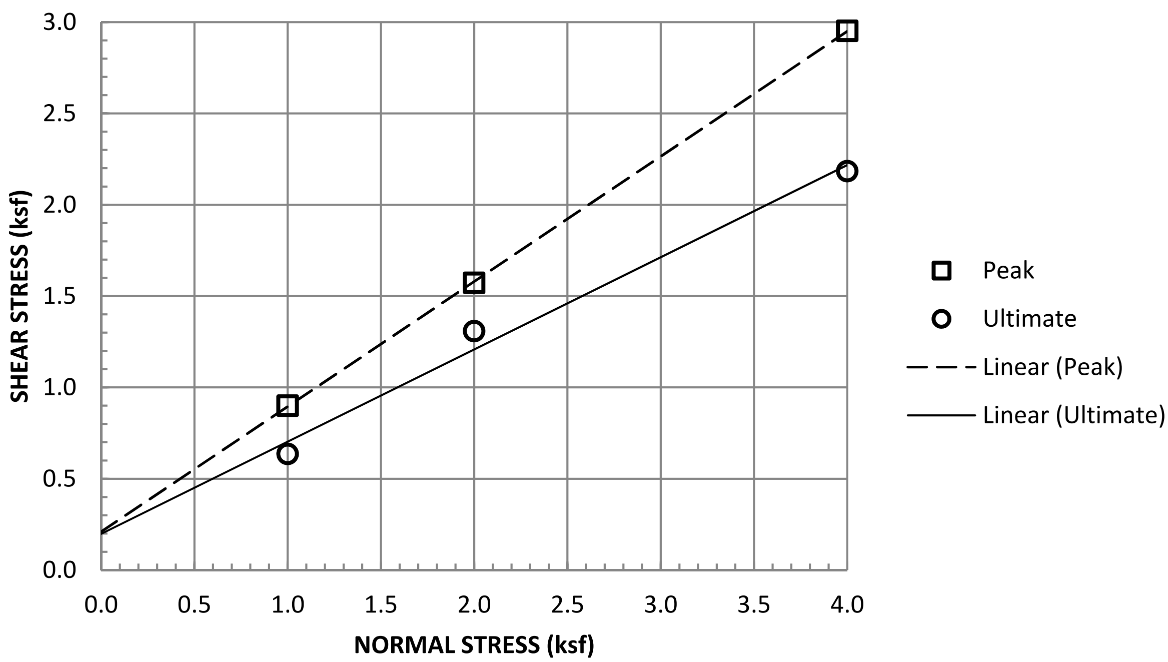
Job Number	Location	Depth	Description
2798.00	B-8	10	Silty Sand (SM)

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
92.9	7.9	21.2

DIRECT SHEAR



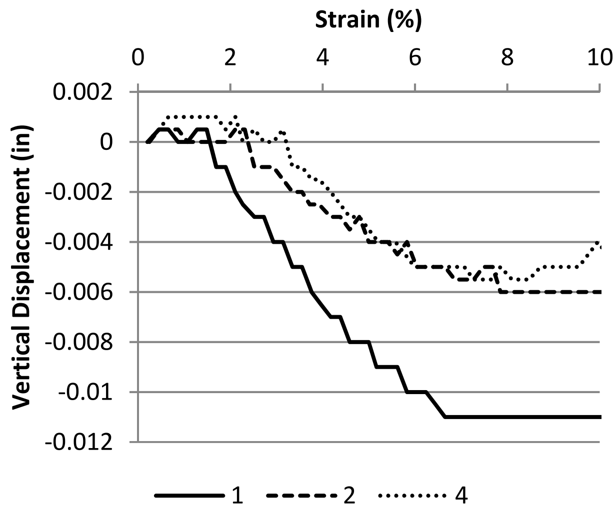


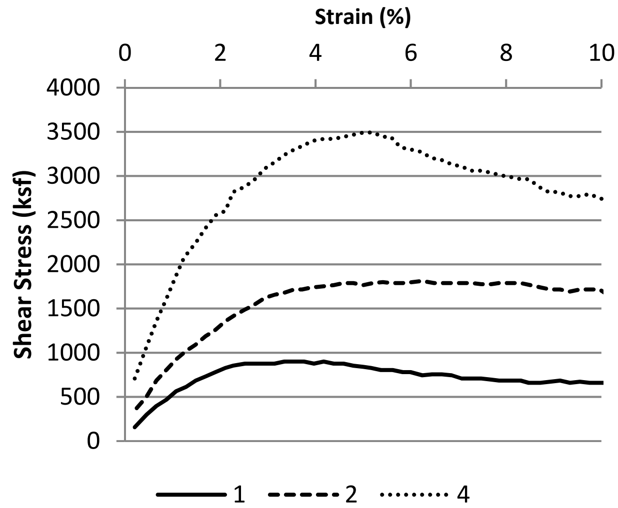


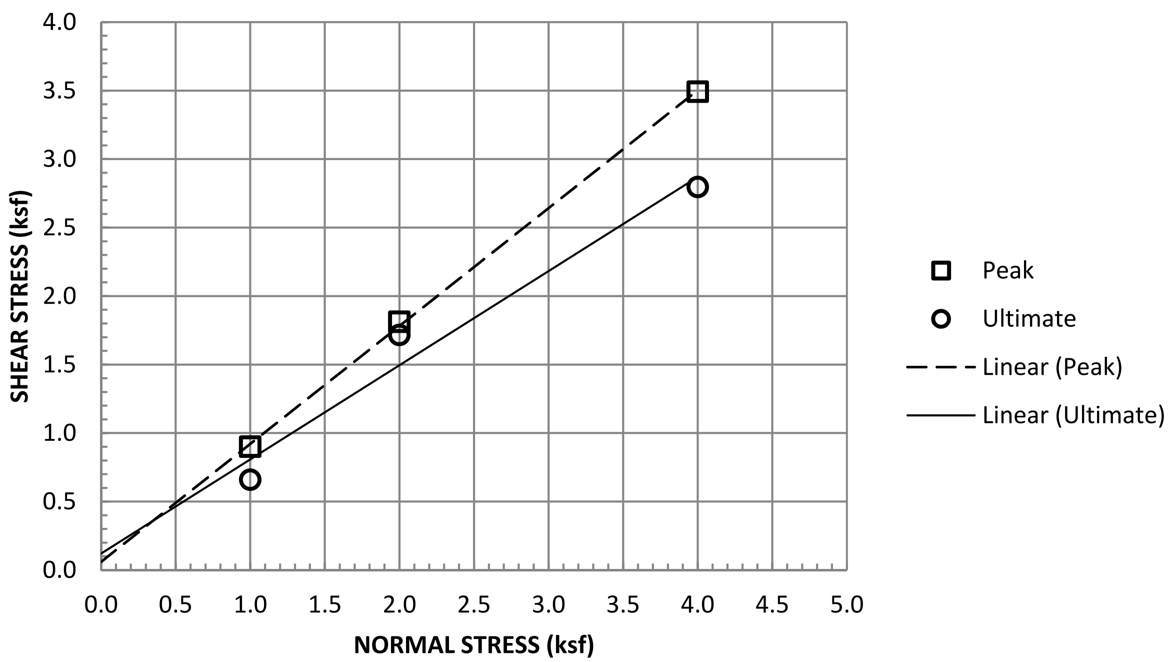
Sample Type:	Undisturbed, Saturated		
Normal Stress (ksf)	1	2	4
Peak Shear Stress (ksf)	0.9	1.572	2.952
Peak Displacement (in)	0.01	0.006	0.003
Ultimate Shear Stress (ksf)	0.636	1.308	2.184
Ultimate Displacement (in)	0.25	0.25	0.25
Initial Dry Density (pcf)	119.3	116	116.5
Initial Moisture Content (%)	10.6	10.6	10.6
Final Moisture Content (%)	10.8	12.2	11.5
Strain Rate (in/min)	.01		

Job Number	Location	Depth	Description
2798.00	B-2	7	Silty Sand / Clayey Sand (SM/SC)

DIRECT SHEAR







Sample Type:	Undisturbed, Saturated		
Normal Stress (ksf)	1	2	4
Peak Shear Stress (ksf)	0.9	1.812	3.492
Peak Displacement (in)	0.011	0.006	0.006
Ultimate Shear Stress (ksf)	0.66	1.716	2.796
Ultimate Displacement (in)	0.25	0.25	0.25
Initial Dry Density (pcf)	104.2	106.3	103.8
Initial Moisture Content (%)	4.7	4.7	4.7
Final Moisture Content (%)	16.7	13.5	15
Strain Rate (in/min)	0.04		

Job Number	Location	Depth	Description
2798.00	B-4	6	Sand (SP)

September 18, 2019
J.N.: 2798.00

Mr. Ken Lee
Pacific Plaza Premier Development Group
9661 E Las Tunas Dr., Suite A
Temple City, California 91780

Subject: **Response to City Comments, Proposed Development, 700 and 800 San Gabriel Boulevard, San Gabriel, California.**

Reference: *Preliminary Geotechnical Investigation, Proposed Mixed-Use Development, 700 and 800 San Gabriel Boulevard, San Gabriel, CA, 91776*, prepared by Albus-Keefe & Associates, Inc., dated March 25, 2019 (J.N. 2798.00)

Dear Mr. Lee,

We have prepared this correspondence in response to the comments provided by Environmental Science Associates (ESA) on behalf of the City of San Gabriel pertaining to our referenced report dated March 25, 2019. No official letterhead was provided. Instead, comments were electronically placed on pdf copies of our referenced report. The comments and the section of the report they were placed against are reiterated below.

#1 Original Text
Based on the architectural site plans by Media Portfolio, the proposed development for the site will consist of two mixed use buildings with a total of 243 residential units and approximately 1,315,150 ft2 of commercial space.

Comment
Per Draft EIR Project Description - 79,987 sf of commercial land uses. Also revise ft2 to spell out (square feet).

Response to Comment
Acknowledged. Based on the information provided, the proposed development for the site will consist of two mixed use buildings with a total of 243 residential units and approximately 79,987 square feet of commercial space.

#2 Original Text
Results of our percolation testing will be discussed under a separate cover.

Comment
Should probably cite the report more directly since it is already written.

Response to Comment
Acknowledged. Results of our percolation testing is discussed our report "Infiltration Study for Storm Water Quality, Proposed Mixed-Use Development, 700 and 800 San Gabriel Boulevard, San Gabriel, CA, 91776, dated on March 22, 2019.

#3 Original Text
No active faults are known to project through the site nor does the site lie within the boundaries of an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act. The closest known active fault is the Raymond Fault located approximately 2.27 miles from the site.

Comment
Why isn't this referring to Elysian Park fault instead? It seems as though this fault line is closer than Raymond, per table above.

Response to Comment
An active fault, as defined by the Alquist-Priolo (AP) Act is an earthquake fault which is active (within the last 11,000 years) and breaks/nearly breaks the ground surface. There are maps depicting the Earthquake Fault Zones issued by the California Department of Conservation, California Geological Survey (CGS). These maps indicate that the Raymond Fault is the closest active fault.

It should be noted that Table 3.1 lists seismically active faults capable of producing ground motion as designated by the USGS. The table lists the Elysian Park fault with a rupture approximately 3 km from the surface. This is not considered an active fault according to the AP Act.

#4 Original Text
As discussed in Section 0, groundwater is not anticipated to occur within 50 feet of the ground surface during the design life of the project. As such, risks associated with liquefaction are considered low. Furthermore, the site is not located within a mapped California Geologic Survey liquefaction hazard zone. No mitigation is deemed necessary for mitigation of liquefaction hazards.

Comment
Does this need to add some explanation regarding perched ground water found at 28 feet? I understand that the excavation will only go down to 12 feet anyway, but could be a question that the public could ask.

Response to Comment
As indicated in the referenced report, the alluvial deposits are comprised of predominantly coarse-grained soils with occasional fine-grained layers typically encountered at depths of 20 to 30 feet below the ground surface. The fine-grained layers varied in thickness and were generally not consistent throughout the site. Groundwater was encountered only within boring B-5 at a depth of 28 feet within the silt layer. Groundwater was not observed within the sand layers below. Therefore, a perched water condition was observed. The water encountered is thought to be a result of percolation of rainfall into the subsurface, rather than representing a groundwater table.

#5 Original Text

Our office should be provided with foundation plans and structural loads as soon as these become available, in order to confirm our assessment of static settlement.

Once finalized structural loads and details of footing designs are provided to us, static settlements may require re-evaluation.

Comment
Not sure how the team feels about this type of language. It is used a couple of times in the report. Makes it almost seem like it is deferred analysis. Highlighted in different spots throughout report.

Response to Comment
Our analyses are based on assumed loads indicated in the referenced report. Once developmental plans and structural loads become available, we can compare those loads to the assumed loads in the report. Additional analysis may be necessary.

#6 Original Text
Based on our understanding of proposed site development, the entire building is anticipated to be supported by a subterranean level that is founded at least 10 feet below current grade. As such, cuts for the subterranean level are anticipated to remove a majority of these unsuitable materials.

Comment
The Project Description states 12 feet.

Response to Comment
Acknowledged. The information presented in this section is still considered applicable to depths of 12 feet below current grade.

Closing

We appreciate this opportunity to be of service to you. If you should have any questions regarding the contents of this correspondence, please do not hesitate to call.

Sincerely,

ALBUS-KEEFE & ASSOCIATES, INC.

Paul Hyun Jin Kim
Associate Engineer
GE 3106

D-2 Limited Geologic Evaluation

Prepared for:

ENVIRONMENTAL SCIENCE ASSOCIATES

550 Kearny Street, Suite #800

San Francisco, California 94108-2512

LIMITED GEOLOGIC EVALUATION

PACIFIC SQUARE SAN GABRIEL MIXED-USE PROJECT
700-800 SAN GABRIEL BOULEVARD
SAN GABRIEL, CALIFORNIA

Prepared by:

Geosyntec consultants

engineers | scientists | innovators

2355 Northside Drive, Suite 250
San Diego, CA 92108

Project Number: SC0949

12 September 2018

Geosyntec consultants

LIMITED GEOLOGIC EVALUATION

PROPOSED PACIFIC SQUARE SAN GABRIEL MIXED-USE PROJECT
SAN GABRIEL, CALIFORNIA

This report was prepared by Geosyntec Consultants (Geosyntec) under the supervision of the professionals whose signatures appear hereon. The findings or professional opinions were prepared in accordance with generally accepted professional engineering and geologic practice. No attempt to verify the accuracy of the data provided by others was made. No warranty is expressed or implied.

Dennis A. Kilian, PG, CEG
Project Geologist

Alexander Greene, PG, CEG
Senior Principal Geologist

Date: 12 September 2018

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

1.1 General 1

1.2 Proposed Development 1

1.3 Scope of Services 1

2.0 SITE AND GEOLOGIC CONDITIONS 2

2.1 Site Description 2

2.2 Geologic Setting 2

2.3 Site Geology 3

2.3.1 Quaternary Previously Placed Fill, Topsoil, and Disturbed Soil 3

2.3.2 Quaternary Alluvium 3

2.3.3 Quaternary Elevated (Older) Alluvium 3

2.3.4 Underlying Units 4

2.4 Groundwater 4

3.0 GEOLOGIC HAZARDS 4

3.1 Overview 4

3.1.1 Surface Fault Rupture 5

3.1.2 Local and Regional Faulting 5

3.1.3 Active Faults 6

3.1.4 Ground Shaking 7

3.1.5 Liquefaction and Seismic Settlement 7

3.1.6 Landsliding 8

3.1.7 Tsunamis, Flooding, and Seiche Evaluation 8

3.1.8 Compressible and Expansive Soils 8

3.1.9 Corrosive Soils 9

3.1.10 Subsidence 9

3.1.11 Oil Wells 10

3.1.12 Methane Gas 10

3.1.13 Other Geologic Hazards 10

4.0 THRESHOLDS OF SIGNIFICANCE 10

4.1 Fault Rupture 11

4.2 Seismic Ground Shaking 11

4.3 Seismic Related Ground Failure 11

4.4 Landslides 12
4.5 Soil Erosion or Loss of Topsoil 12
4.6 Soil Stability 12
4.7 Expansive Soils 13
4.8 Septic Tank Suitability 14

5.0 LIMITATIONS 14

LIST OF FIGURES

Figure 1: Site Location Map

Figure 2: Geologic Map

Figure 3 Regional Fault and Historical Earthquake Epicenter Map

LIST OF APPENDICES

Appendix A: References

1.0 INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec)

1.1 General

This report presents the results of the limited geologic evaluation for the proposed Pacific Square San Gabriel mixed-use project in San Gabriel, California. This report was prepared by Dennis Kilian, C.E.G. and has been reviewed by Mr. Alexander Greene, C.E.G. of Geosyntec Consultants Inc. (Geosyntec), in accordance with the peer review policies of the firm. This work is conducted in accordance with the executed Subcontractor Agreement between Geosyntec and Environmental Science Associates (ESA), dated 10 August 2018. ESA is under contract with the City of San Gabriel to prepare an Environmental Impact Report (EIR) in accordance with the California Environmental Quality Act (CEQA) for the mixed-use project. The purpose of this report is to supplement the EIR and address geology and geologic hazards at the site.

1.2 Proposed Development

The proposed development is comprised of two plazas as well as landscaped park and outdoor seating areas. The “700 Plaza” consists of 102 residential condominiums, 4 live/work residential units, and 36,352 square feet of commercial space including the work portion of the live/work units, restaurant, retail space, and fitness center. The “800 Plaza” consists of 141 residential condominium units, 4 live/work residential units, and 36,694 square feet of commercial space including the work portion of the live/work units, restaurant, retail, café, and market spaces. The two building masses are connected by a central park with expansive landscaping and outdoor dining. Proposed improvements total 243 residential units (413,238 square feet), 8 live/work units, and 76,046 square feet of commercial space. The maximum building height is five occupied stories, plus a mezzanine level for a total of six stories, at 65 feet with rooftop appurtenances. A mix of regular and compact parking stalls are provided within one subterranean basement level (with a maximum depth of 12 feet below grade), one level at grade (ground floor), and one level at mezzanine (with a maximum height of 21.5 feet above grade).

1.3 Scope of Services

Geosyntec’s scope of work for the proposed project included performing a limited desktop level geologic evaluation of the general site area. Specific tasks associated with this scope of work included:

- A review of referenced geologic documents and soils report for the subject site;

- Description of the underlying site geology and an evaluation of potential geologic hazards which could potentially impact site development;
- Preparation of this report to summarize our findings from the limited geologic evaluation.

2.0 SITE AND GEOLOGIC CONDITIONS

Our understanding of the site conditions is based on a review of published geologic literature and mapping, available topographic maps, aerial and satellite imagery, and professional experience.

2.1 Site Description

The proposed mixed-use project is situated on an approximately 5.85- acre site generally located at 700-800 South San Gabriel Boulevard. The project site is bounded by East Grand Avenue to the south, South Gladys Avenue to the east, East El Monte Boulevard to the north, and South San Gabriel Boulevard to the west (Figure 1). The site was formerly occupied by the San Gabriel Nursery & Florist, but is currently vacant with no existing structures. We understand that previously existing greenhouses and associated structures were demolished after being destroyed by fire.

Site topography is generally flat with surface elevations descending slightly to the south. Based on data provided by Google Earth™ (imagery date: December 3, 2017), elevations at the site range from approximately 386 feet above Mean Sea Level (MSL) in the northwest corner of the site to approximately 373 feet MSL in the southwest corner.

2.2 Geologic Setting

The site is located in the San Gabriel Valley in the Eastern Los Angeles Basin. San Gabriel is located within the Peninsular Range Geomorphic Province, one of the major geomorphic provinces in Southern California. The province consists of a series of northwest trending mountain ranges, and sub-parallel intervening valleys formed by faults branching from the San Andreas Fault. The San Gabriel Valley is generally underlain by surficial Quaternary-age alluvium and at depth by Tertiary-age marine and non-marine sedimentary deposits and Cretaceous to pre-Cretaceous-age igneous and metamorphic basement rock.

2.3 Site Geology

Based on regional geologic mapping by Diblee and Ehrenspeck (1999), the site is primarily underlain by Quaternary-age, slightly elevated and locally dissected alluvium (Figure 2). However, a queried geologic contact is mapped at the southeast corner of the site indicating the presence of younger alluvium materials. Based on a review of historical aerial photographs and topographic maps dating back to 1940, it appears that significant grading has not occurred at the site and site grades have remained relatively unchanged. Therefore, it is anticipated that only minor, unmapped fill soils, topsoil, and disturbed soils are present at the site overlying the alluvium.

2.3.1 Quaternary Previously Placed Fill, Topsoil, and Disturbed Soil

Based on current site conditions and a review of historical imagery, it is anticipated that minor fill soil, topsoil, and disturbed soil are present at the site. Significant grading does not appear to have been performed at the site and therefore, thicknesses and distribution of these soils are anticipated to be minimal. However, localized zones of deeper fills and disturbed soils may be present due to the previous site use as a nursery/garden and the subsequent demolition of the previous site structures. Fill soils are anticipated to be loose to semi-consolidated, silty to clayey sands and gravels as well as sandy silts and clays.

2.3.2 Quaternary Alluvium

A queried contact is located in the southeast corner of the site, differentiating the older, older alluvium from the younger Holocene-age alluvium. Mapping describes the younger alluvium as alluvial gravel, sands, and silt of valleys and floodplains (Diblee and Ehrenspeck, 1999). Near surface, this material is generally anticipated to consist of semi-consolidated, silty and clayey, fine grained sands with gravel and cobble as well as sandy silts and clays.

2.3.3 Quaternary Elevated (Older) Alluvium

According to Diblee and Ehrenspeck (1999), the majority of the site is underlain by Pleistocene-aged, slightly elevated and locally dissected alluvial deposits consisting of gravel and sands. Near surface, this material is generally anticipated to consist of semi-consolidated, silty and clayey sands with gravel and cobble as well as sandy silts and clays. It is anticipated that these materials will be increasingly consolidated with depth.

2.3.4 Underlying Units

Located at depth beneath the alluvium deposits at the site are Tertiary-age marine and non-marine sedimentary deposits and Cretaceous to Pre-Cretaceous-age crystalline basement complex of metamorphic and igneous rocks. Tertiary units are anticipated to consist of claystone, siltstone, and mudstone with occasional sandstone and conglomerate. Basement rocks are anticipated to consist of gneiss, diorite, and monzonite.

2.4 Groundwater

According to groundwater contour mapping by Main San Gabriel Watermaster (2014, 2018), groundwater at the site is located approximately 230 feet below ground surface (BGS). Although no site specific recorded historical high groundwater data was available at the time of this evaluation, a review of previous documents for the area suggests that groundwater in the San Gabriel Basin has varied in depth up to 120 feet between historic high and historic low levels. However, based on our experience in these settings, it is anticipated that site groundwater elevations may vary, especially during and after periods of sustained precipitation.

Seasonal perched groundwater could be encountered locally. However, given the granular permeable surface conditions, groundwater is not considered an engineering restriction at the site for the anticipated development.

3.0 GEOLOGIC HAZARDS

3.1 Overview

Geologic hazards considered to have potential impacts to the proposed site development were evaluated based on review of published documents and mapping. According to mapping by the California Geological Survey (2017), the site is not located in within an Earthquake Fault Zone as defined by the Alquist-Priolo Earthquake Fault Zone Act (2007). Additionally, the City of San Gabriel General Plan and CGS mapping (2017) does not indicate the site to be located within a seismic hazard zone. . The nearest active Earthquake Fault Zone is along the East Montebello Fault, located approximately 3.5 kilometers south of the site (Figure 3).

The site is situated within a seismically active region and will likely experience moderate to severe ground shaking in response to a large-magnitude earthquake occurring on a local or more distant active fault during the expected lifespan of the Project. As a result, the identified geologic hazards at the site are primarily associated with those caused by shaking from earthquake-generated ground motions.

3.1.1 Surface Fault Rupture

Fault rupture is not considered to be a constraint to the proposed development. The potential for fault surface rupture is generally considered to be significant along "active" faults (defined by the California Geological Survey as exhibiting surface rupture within the past 11,000 years) and to a lesser degree along "potentially active" faults (surface rupture within the past 1.6 million years). These definitions are used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Earthquake Fault Zoning Act (CGS, 2007). The act requires site specific fault investigations on sites located within Earthquake Fault Zones to determine potential hazard from any fault exists with regards to the proposed structures and their occupants.

A review of published geologic maps did not identify the presence of any active or potentially active faults crossing on or projecting near the site. The nearest mapped fault trace is the East Montebello Fault, located approximately 2.4 km to the southwest of the project area (the mapped active Earthquake Fault Zone portion is located 3.5 km south of the site) and generally considered within the Upper Elysian Park Fault Zone. Therefore, it is our opinion that the potential for fault-related surface rupture at the site is low.

3.1.2 Local and Regional Faulting

The California Geological Survey (CGS) and the United States Geological Survey (USGS) broadly groups southern California faults as "Class A" or "Class B" (Cao, 2003; Frankel et al., 2002). Class A faults are identified based upon relatively well-defined paleoseismic activity, and a fault-slip rate of more than 5 millimeters per year (mm/yr). In contrast, Class B faults have comparatively less defined paleoseismic activity and are considered to have a fault-slip rate less than 5 mm/yr. The nearest known Class B fault is the East Montebello fault, which is approximately 2.4 kilometers southwest of the site. The nearest known Class A fault is the Whittier segment of the Elsinore Fault Zone, which is located approximately 10.4 kilometers southeast of the site.

The following Table 3.1.2 presents the known faults near the site, including estimated magnitude and fault classification. A map showing the location of regional faults and historic seismicity with respect to the site is presented on Figure 3.

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TABLE 3.1.2 NEAR-SITE FAULT PARAMETERS			
FAULT NAME	APPROXIMATE DISTANCE FROM SITE (KM)	MAXIMUM ESTIMATED EARTHQUAKE MAGNITUDE	CLASSIFICATION
East Montebello-Upper Elysian Park	2.4	6.4	B
Upper Elysian Park	3.5	6.4	B
Raymond	3.8	6.5	B
Whittier-Elsinore	10.4	6.8	A

The site could be subjected to significant shaking in the event of a major earthquake on any of the faults discussed above or other faults in the southern California or northern Baja California area.

3.1.3 Active Faults

Faults closest to the Project area that are considered "active" (Bryant and Hart, 2007) include the following:

- **Upper Elysian Park:** The upper Elysian Park Fault is a blind thrust fault that does not intersect with the ground surface. The fault is expressed as an elongated group of low hills (Elysian Park Hills, Repetto Hills and Monterey Hills) extending for approximately 12.4 miles from northern Los Angeles to San Gabriel. These hills are Pliocene to Quaternary-aged (approximately 2 million years old) folded sediments that have been uplifted along the fault. The Elysian Park Fault has a slip rate of 0.9 to 1.7 mm/yr and is capable of producing a maximum moment magnitude earthquake of Mw 6.4. The East Montebello portion is located approximately 1.5 miles southwest of the site.
- **Raymond Fault**: The Raymond fault is an east-northeast trending, left-lateral reverse-oblique fault with steep dips (approximately 80 degrees). The structure of the fault forms the western boundary of the San Gabriel Basin with the Raymond Groundwater Basin. The fault has a slip rate of 1.5 +/- 1.0 mm/yr and a maximum moment magnitude earthquake of Mw 6.5. This fault extends a total of 12 to 16.2

miles depending upon the accepted interpretation. The most recent surface rupture was during the Holocene Epoch. Aftershock analysis and seismic evidence indicates that the Pasadena Earthquake of 1988, which occurred at a depth 9.6 miles below ground with a 5.0 magnitude occurred upon the Raymond Fault. The interval between major ruptures is estimated to be 4,500 years. The fault is located approximately 2.4 miles north of the site.

- **Whittier-Elsinore Fault**: The Whittier-Elsinore fault is the northwestern extension of the Elsinore Fault Zone. It is a right-lateral strike-slip fault with a northeastern dip and an estimated slip rate between 2.5 and 3.0 mm/yr. Its estimated length is 25 miles. The most recent surface rupture occurred in the Holocene Epoch. Historical activity has been limited to microseismicity and several Magnitude 4 or less events. The Whittier-Elsinore fault is estimated to have a maximum moment magnitude earthquake of Mw 6.8.

3.1.4 Ground Shaking

The site is situated within a seismically active region and will likely experience moderate to severe ground shaking in response to a large-magnitude earthquake occurring on a local or more distant active fault during the expected lifespan of the Project. The potential for significant seismically induced ground shaking in response to an earthquake occurring along a nearby active fault, such as the East Montebello Fault, or a regional fault, such as the Elsinore fault zone, is relatively high within the site area (CGS, 2017).

The potential for strong seismic shaking is considered high; however, if site design and development is performed as prescribed in a site specific geotechnical investigation, seismic shaking would not likely represent a significant hazard at the site.

3.1.5 Liquefaction and Seismic Settlement

Seismically-induced soil liquefaction can be described as a significant loss of strength and stiffness due to cyclic pore water pressure generation from seismic shaking or other large cyclic loading. The material types considered most susceptible to liquefaction are saturated, loose to medium dense granular soils and low-plasticity fine grained soils. Manifestations of soil liquefaction can include the loss of bearing capacity below foundations, surface settlements and tilting in level ground, and instabilities in areas of sloping ground. Soil liquefaction can also result in increased lateral and uplift pressures on buried structures. Lightweight or unrestrained buried structures may float upward to the ground surface during a liquefaction event. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

According to Chapter 5 of the City of San Gabriel General Plan (2004) as well as CGS seismic hazard mapping (2017), the site is not located in area with potential for liquefaction. Considering the absence of regional groundwater within the upper 50 feet bgs and the relatively dense nature of the alluvial deposits underlying the site, the probability of soil liquefaction or seismic settlement at the site is low.

3.1.6 Landsliding

According to geologic mapping by Diblee and Ehrenspeck (1999) landslides are not present in the site area, and evidence of landsliding was not encountered during our research. In addition, the site is not mapped within an Earthquake-Induced Landslide Zone (CGS, 2017). Based on the low surface gradient and lack of physical features, landsliding is not considered to be a significant geologic hazard at the subject site.

3.1.7 Tsunamis, Flooding, and Seiche Evaluation

According to Federal Emergency Management Agency flood hazard mapping (FEMA, 2012), the site is mapped in Zone X which represents an area of minimal flood hazard. California Emergency Management Agency tsunami inundation mapping does not include the El Monte Quadrangle in its mapping program indicating that the site is not within a tsunami inundation area. Therefore, the risk of flooding or tsunami inundation at the site is considered negligible.

Damage resulting from oscillatory waves (seiches) is considered unlikely due to the absence of nearby confined bodies of water.

3.1.8 Compressible and Expansive Soils

Based on an understanding of site geology, loose or disturbed near surface alluvial soils may be considered compressible under additional loads. Surficial soils are also anticipated to be locally disturbed and weathered, increasing the potential for consolidation. Hydroconsolidation or soil collapse, may occur in Holocene soils deposited in arid or semi-arid conditions. Pore spaces and voids that exist within these materials are generally supported by clays, silts, or carbonates that may be displaced during saturation causing the void spaces to collapse and the grains to be rearranged. Introduction of water and increased loads on potentially collapsible soils may lead to settlement. Dense to very dense alluvium deposits are not considered to be subject to significant compressibility.

Based on reviewed documents and geologic mapping, the near-surface materials at the site are anticipated to be generally granular with occasional silts and clays. Expansive soils are commonly very fine-grained with a high to very high percentage of plastic clays. It is anticipated that site materials possess a very low to low expansion potential (Expansion Index of less than 51 as defined by the California Building Code Table 18-I-B). However, the presence of potentially expansive clays should not be precluded and may be present at the site.

3.1.9 Corrosive Soils

Chemical testing is generally performed to evaluate the potential effects that site soils may have on concrete foundations and various types of buried metallic utilities. Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or pH levels less than 5.5. According to American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO_4) in soil exceed 0.1 percent by weight. These guidelines include low water: cement ratios, increased compressive strength, and specific cement type requirements. Onsite soils are anticipated to generally have a low corrosion potential to Portland cement concrete improvements (ACI Exposure Category S0).

A minimum resistivity value less than approximately 5,000 ohm-cm, and/or soluble chloride levels in excess of 200 ppm generally indicate a corrosive environment to buried metallic utilities and untreated conduits. Onsite soils are anticipated to have a moderate corrosion potential for buried uncoated/unprotected metallic conduits. Based on these results, at a minimum, the use of buried plastic piping or conduits would appear logical, where feasible.

Corrosion potential should be considered site specific and may vary throughout individual geologic units. Soil sampling for corrosion potential evaluation was beyond the scope of work for this report. Therefore, a corrosion engineer or other qualified consultant should be contacted if site specific corrosivity issues are of more significant concern.

3.1.10 Subsidence

The site is not located within an area of known subsidence (ground surface settlement) associated with fluid withdrawal, peat oxidation, or hydrocompaction. The approximate depth to groundwater indicates that dewatering will not be necessary for the proposed development. Therefore, subsidence is not anticipated to be a significant geologic hazard at the site.

3.1.11 Oil Wells

Based on our review of maps prepared by the State of California, Department of Conservation, Division of Oil, Gas, and Geothermal Resources, the site is not located within a designated oil field or area of well development. Therefore, the possibility of encountering an oil well during Site excavation is considered low.

3.1.12 Methane Gas

The site is not located in an area of known methane gas potential or within an area of past or current oil production; therefore, hazards associated with methane gas are considered low.

3.1.13 Other Geologic Hazards

Other geologic hazards, including volcanic activity, are not considered to be a significant hazard given the geologic setting of the site.

4.0 THRESHOLDS OF SIGNIFICANCE

Appendix G of CEQA Guidelines provides an outline of potential impacts with regards to geology and soils, specifically asking:

Would the project:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist–Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area based on other substantial evidence of a known fault? Refer to Division of Mines and Geology16 Special Publication 42. (Addressed in Section 4.1 of this report)
  - Strong seismic ground shaking? (Section 4.2)
  - Seismic-related ground failure, including liquefaction? (Section 4.3)
  - Landslides? (Section 4.4)

- Result in substantial soil erosion or the loss of topsoil? (Section 4.5)

- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse? (Section 4.6)

- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? (Section 4.7)

- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water? (Section 4.8)

Discussion of the potential impacts based on the outline is provided below. Mineral resources are not considered applicable to this site.

4.1 Fault Rupture

According to mapping by the California Geological Survey (2017), the site is not located within an Earthquake Fault Zone as defined by the Alquist-Priolo Earthquake Fault Zone Act (2007). The nearest active Earthquake Fault Zone is along the East Montebello Fault, located approximately 3.5 kilometers south of the site.

Fault rupture is not considered to be a constraint to the proposed development. The potential for fault surface rupture is generally considered to be significant along "active" faults (defined as exhibiting surface rupture within the past 11,000 years) and to a lesser degree along "potentially active" faults (surface rupture within the past 1.6 million years). A review of published geologic maps did not identify the presence of any active or potentially active faults crossing on or projecting near the site. The nearest mapped fault trace is the East Montebello Fault, located approximately 2.4 km to the southwest of the project area (the mapped active Earthquake Fault Zone portion is located 3.5 km south of the site) and generally considered within the Upper Elysian Park Fault Zone. Therefore, no significant impact related to fault rupture is anticipated at the site.

4.2 Seismic Ground Shaking

Southern California is a seismically active area and will be subject to periodic ground shaking resulting from seismic activity on regional faults. Ground shaking associated with nearby and regional faults should be anticipated during the lifespan of the project. Within the City of San Gabriel, potential ground motion levels are considered moderate to high. However, if design and construction is performed in accordance with the current California Building Code (CBC) requirements and the approved geotechnical report, it is anticipated to address the issues related to potential ground shaking. Therefore, no significant impacts will occur due to ground shaking and no mitigation is required.

4.3 Seismic Related Ground Failure

Seismically-induced soil liquefaction can be described as a significant loss of strength and stiffness due to cyclic pore water pressure generation from seismic shaking or other large cyclic loading. The material types considered most susceptible to liquefaction are saturated, loose to medium dense granular soils and low-plasticity fine grained soils. Manifestations of soil liquefaction can include the loss of bearing capacity below foundations, surface settlements and tilting in level ground, and instabilities in areas of sloping ground. Soil liquefaction can also result in increased lateral and uplift pressures on buried structures. Lightweight or unrestrained buried structures may float upward to the ground surface during a liquefaction event. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

According to Chapter 5 of the City of San Gabriel General Plan as well as CGS seismic hazard mapping (2017), the site is not located in area with potential for liquefaction. Considering the absence of regional groundwater within the upper 50 feet BGS and the relatively dense nature of the alluvial deposits underlying the site, the probability of soil liquefaction or seismic settlement at the site is low. Therefore, no significant impact related to seismic ground failure is anticipated at the site and no mitigation is required.

4.4 Landslides

According to geologic mapping by Diblee and Ehrenspeck (1999) landslides are not present in the site area, and evidence of landsliding was not encountered during our research. In addition, the site is not mapped within an Earthquake-Induced Landslide Zone (CGS, 2017). Based on the low surface gradient and lack of physical features or evidence of landsliding, no significant impacts due to landsliding are anticipated and no mitigation is required.

4.5 Soil Erosion or Loss of Topsoil

Proposed improvements at the site will include substantial grading- likely to remove any topsoil remaining at the site, as well as excavation for subterranean parking. Therefore, some soil erosion and sedimentation are expected during project construction. It is anticipated that site activities will be conducted in accordance with an approved Stormwater Pollution Prevention Plan (SWPP) and Best Management Practices (BMPs) will be implemented to prevent erosion and stormwater runoff. If the project construction is performed as detailed in the approved grading and SWPP plans, it is anticipated that there will be no significant impact related to substantial soil erosion or loss of topsoil.

4.6 Soil Stability

The soils underlying the site are primarily alluvium materials, generally consisting of silty to clayey sands, silts, and clays. Although alluvium soils are anticipated to be generally medium dense to dense, loose or disturbed soils are likely to be encountered at the site as a result of demolition, clearing, and grubbing of the surface. It is anticipated that preparatory grading will be performed as prescribed in the project geotechnical report, to remove any loose, disturbed, or otherwise unsuitable materials. Therefore, the proposed improvements will likely bear entirely upon dense, properly placed and compacted fill soils, or competent alluvium, as recommended by the geotechnical report.

As discussed above, the site is generally flat, and no significant slopes are proposed or located nearby. The proposed improvements are therefore, not likely to result in on- or off- site landsliding and no mitigation measures are required.

The site is not located within an area of known subsidence (ground surface settlement) associated with fluid withdrawal, peat oxidation, or hydrocompaction. Groundwater elevations well below the maximum depth of proposed site excavations indicate that dewatering will not be necessary for the proposed development. Therefore, the proposed improvements are not anticipated to cause geologic hazard conditions related to subsidence. Impacts related to subsidence would be less than significant and no mitigation measures are required.

According to Chapter 5 of the City of San Gabriel General Plan as well as CGS seismic hazard mapping (2017), the site is not located in area with potential for liquefaction. Considering the absence of regional groundwater within the upper 50 feet BGS, the relatively medium dense to dense nature of the alluvial deposits underlying the site, and the lack of significant slopes near or proposed at the site, there is no significant impact related to liquefaction, seismic settlement, or lateral spreading, and no mitigation measures are required.

Loose, dry soils at the site would be considered subject to collapse under proposed structural loads and/or if saturated with water. Site grading is anticipated to remove loose or unsuitable soils, and proposed improvements are anticipated to bear entirely in properly placed and compacted fill soils or competent alluvium materials. In addition, site drainage is anticipated to be properly designed and installed such that infiltrated water does not impact proposed improvements or locally saturate subgrade soils. Therefore, no significant impact related to soil collapse is anticipated provided site design and grading is performed per the project geotechnical report.

4.7 Expansive Soils

Based on reviewed documents and mapping, the near-surface materials at the site are anticipated to be generally granular with occasional silts and clays. Expansive soils are commonly very fine-grained with a high to very high percentage of plastic clays. Mitigation of expansive soils generally includes removing clay materials from the area of the proposed improvements and/or moisture conditioning clayey soils to well above optimum moisture content prior to recompaction and/or as recommended by the project geotechnical report. It is anticipated that site materials possess a very low to low expansion potential (Expansion Index of less than 51 as defined by the California Building Code Table 18-I-B). Therefore, no substantial risks to life or property related to expansive soils is anticipated provided mitigation measures (if clay soils are encountered) prescribed in the project geotechnical report are followed.

4.8 Septic Tank Suitability

Soil permeability is generally a consideration for projects that require septic system installation. The proposed improvements are located within the City of San Gabriel and wastewater disposal will be tied into the City sewer system infrastructure. Therefore, no significant risk regarding the handling or treatment of wastewater is anticipated.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Geosyntec's efforts were prepared exclusively for use by ESA in preparing the EIR for the development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only.

Soil deposits may vary in type, strength, and many other important properties across the site due to non-uniformity of the geologic formations or to man-made cut and fill operations. The conclusions drawn in this report are based on a review of published mapping and documentation. A complete geotechnical investigation including subsurface explorations and grading and foundation recommendations was beyond the scope of work for this project.

Our evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers and Engineering Geologists practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

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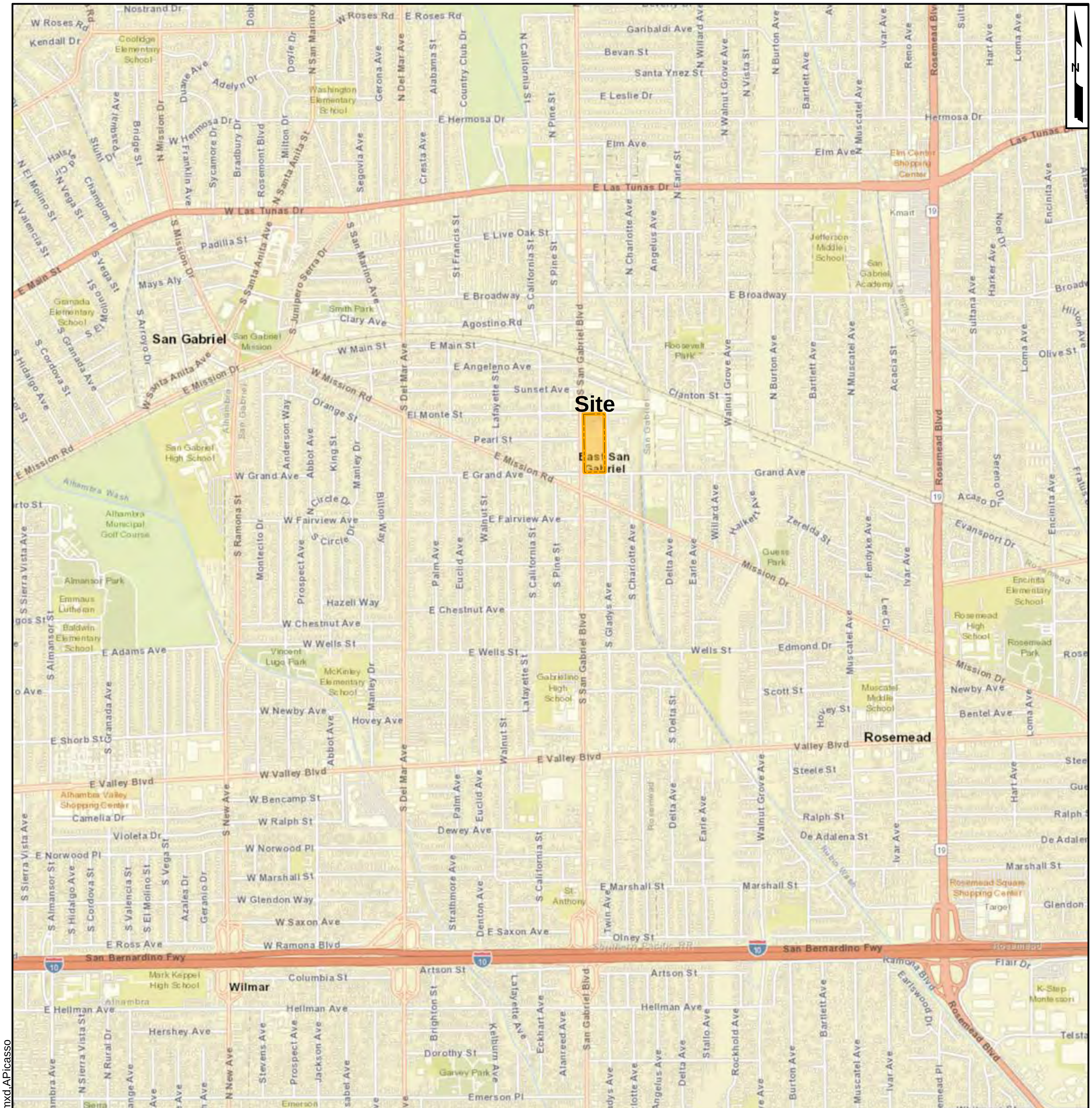
FIGURES



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Site Location Map

Pacific Square San Gabriel Mixed-Use Project
700-800 San Gabriel Boulevard
San Gabriel, CA

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San Diego	September 2018	Figure 1

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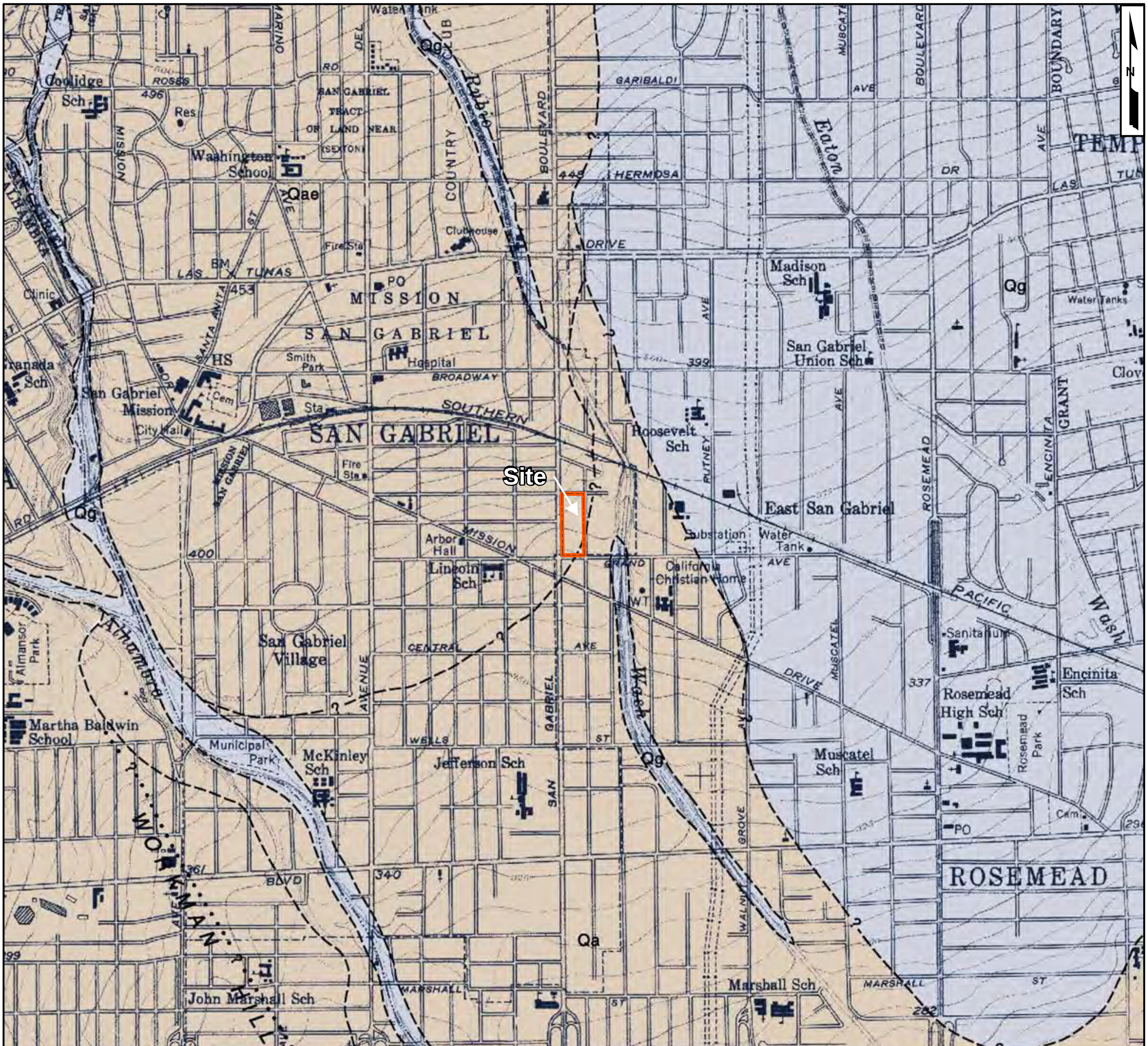

Surficial Sediments
Undissected alluvial deposits
af Artificial fill, and cut and fill area
Qg Gravel and sand of major streams, and alluvial fan detritus from San Gabriel Mountains, grades southward into alluvium (**Qa**) as sizes of clasts decrease
Qa Alluvial gravel, sand and silt of valleys and floodplains

Older Dissected Surficial Sediments
Qae Slightly elevated and locally dissected alluvial gravel and sand at base of hill areas

U D 25 ?

Fault
Dashed where indefinite or inferred, dotted where concealed, Queried where existence is doubtful.

Data Source - Dibblee, T.W., and Ehrenspeck, H.E., 1999, Geologic map of the El Monte and Baldwin Park quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-69, scale 1:24,000.

2,000 1,000 0 2,000 Feet

Geologic Map

Pacific Square San Gabriel Mixed-Use Project
700-800 San Gabriel Boulevard
San Gabriel, CA

Geosyntec consultants

San Diego	September 2018	Figure 2

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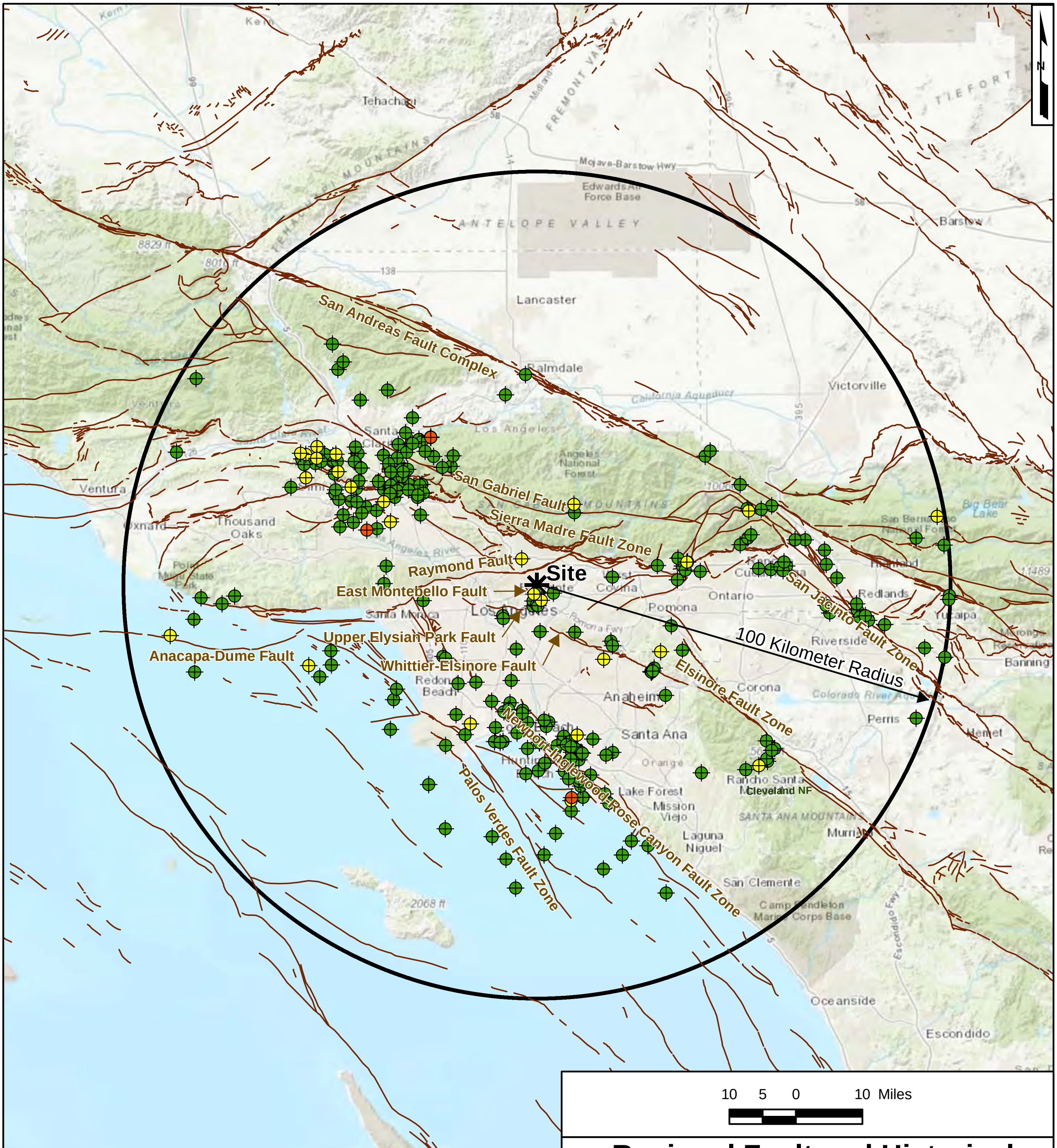

Reported Earthquake Magnitudes 1932 - 2018
Data Source: Southern California Earthquake Data Center

- 6.0 - 6.7
- 5.0 - 5.66
- 4.0 - 4.99
- Fault

Regional Fault and Historical Earthquake Epicenter Map

Pacific Square San Gabriel Mixed-Use Project
700-800 San Gabriel Boulevard
San Gabriel, CA

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San Diego | September 2018

Figure 3

APPENDIX A

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D-3 Paleontological Resources Report

The Paleontological Resources Report is a confidential document that is on file at the City of San Gabriel Planning Division for review by those individuals qualified to review the report (e.g., lead agency staff, cultural resources consultants, tribal representatives, etc.).