APPENDIX C
Geotechnical Investigation

Environmental Geotechnology Laboratory, Inc.

December 10, 2020

Valley SG Landplus, LLC
135 Live Oak Avenue
Arcadia, California 91006

Subject: **Report of Geotechnical Engineering Investigation, Proposed Mixed-Use Apartment with Two-Level Subterranean Parking, 205 East Valley Boulevard, City of San Gabriel, Los Angeles County, California, APN: 5369-018-002 & 020, EGL Project No.: 20-AA-093GE**

Ladies and Gentlemen:

In accordance with your request, Environmental Geotechnology Laboratory, Inc. (EGL) is pleased to submit this Geotechnical Engineering Report for the subject site. The purpose of this report was to evaluate the subsurface conditions and provide recommendations for foundation designs and other relevant parameters of the proposed construction.

Based on the findings of our field exploration, laboratory testing and engineering analysis, the proposed construction of the subject site for the intended use is considered feasible from the geotechnical engineering viewpoints, provided that specific recommendations set forth herein are followed.

This opportunity to be of service is sincerely appreciated. If you have any questions pertaining to this report, please call the undersigned.

Respectfully submitted,

Environmental Geotechnology Laboratory, Inc.

REGISTERED PROFESSIONAL ENGINEER
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REPORT OF GEOTECHNICAL ENGINEERING INVESTIGATION

Proposed

Mixed-Use Apartment
With Two-Level Subterranean Parking

At

APN: 5369-018-002 & 020

205 East Valley Boulevard
San Gabriel, California

Prepared by
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY, INC.

Project No.: 20-AA-093GE

December 10, 2020

TABLE OF CONTENT

1.0 INTRODUCTION

1.1 Purpose

This report presents a summary of our preliminary geotechnical engineering investigation for the proposed development at the subject site. The purpose of this investigation was to evaluate the subsurface conditions at the area of proposed construction and to provide recommendations pertinent to grading, foundation design and other relevant parameters of the proposed development.

1.2 Scope of Services

Our scope of services included:

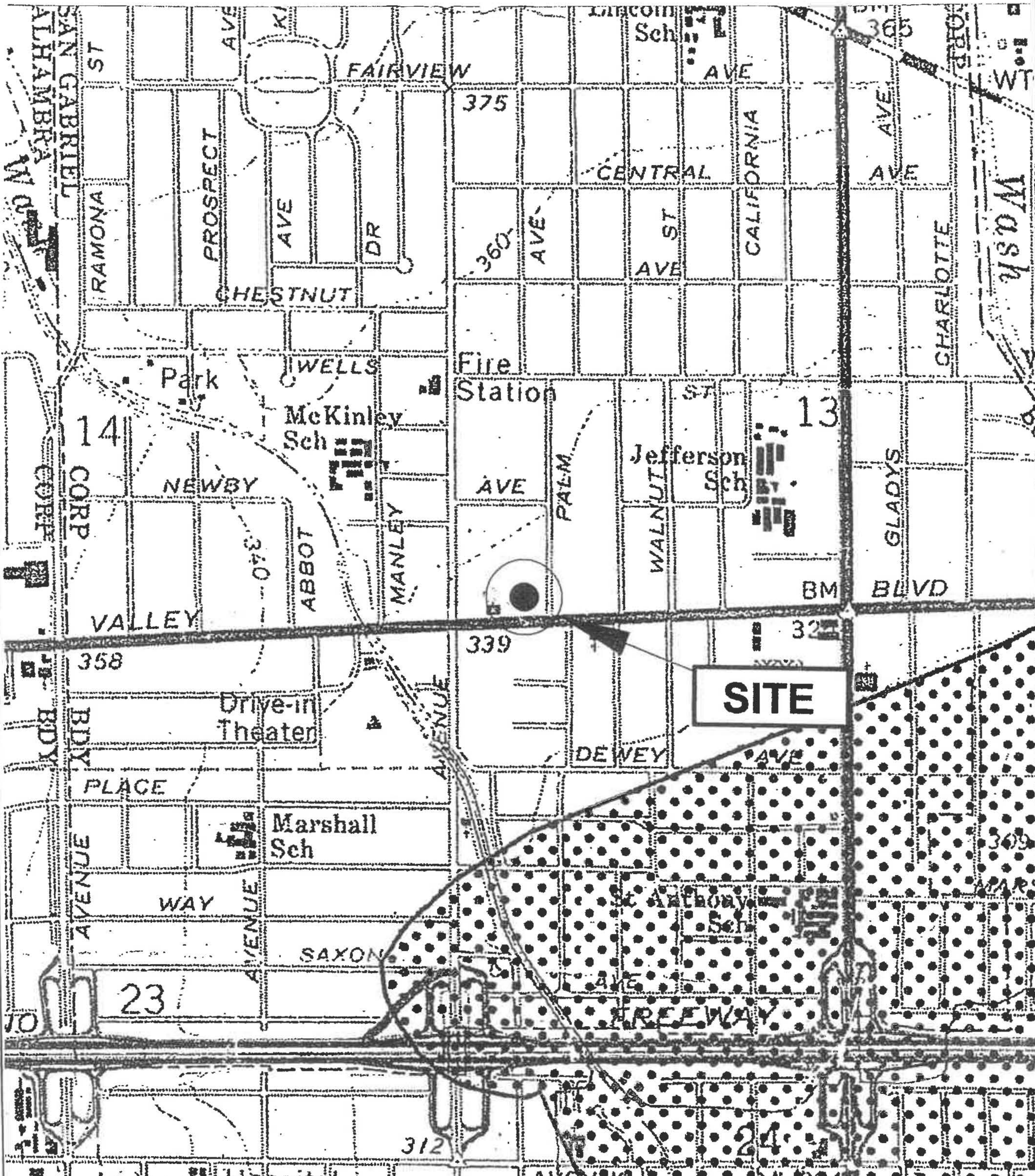
- Review of available soil data of the area.
- Subsurface exploration consisting of logging and sampling of six (6) 8-inch diameter hollow stem auger borings to a maximum depth of 42.0 feet below the existing grade at the subject site. The exploration was logged by an EGL engineer and presented in Appendix A.
- Laboratory testing of representative samples to establish engineering characteristics of the on-site soil. The laboratory test results are presented in Appendix B and on the Boring Logs of Appendix A.
- Engineering analyses of the geotechnical data obtained from our background studies, field investigation, and laboratory testing.
- Infiltration testing on boring (B-1) at a depth of 32.0 feet. Infiltration rate calculations are presented in Appendix C.
- Preparation of this report presenting our findings, conclusions, and recommendations for the proposed construction.

1.3 Site Conditions

The subject site is an "L" shaped property with frontage located on the north side of East Valley Boulevard and on the west side of South Palm Avenue in the City of San Gabriel, County of Los Angeles, California. The approximate regional location is shown on the attached Site Location Map (Figure 1). The project site is currently occupied by a parking lot and associated structures. Topographically, the subject site is relatively flat. Detailed configuration of the site is shown on the Site Plan, Figure 2.

1.4 Proposed Construction

Based on the current *Site Plan* provided by Architech Group, It is our understanding that the proposed development at the site consists of a mixed-use apartment building and associated



Map modified from "Seismic Hazard Zones, El Monte Quadrangle" by California Department of Conservation, Division of Mines and Geology.

Note:

Approximate Scale: 1" = 1000'

Potential Liquefaction Area

Potential Earthquake-Induced Landslide Areas

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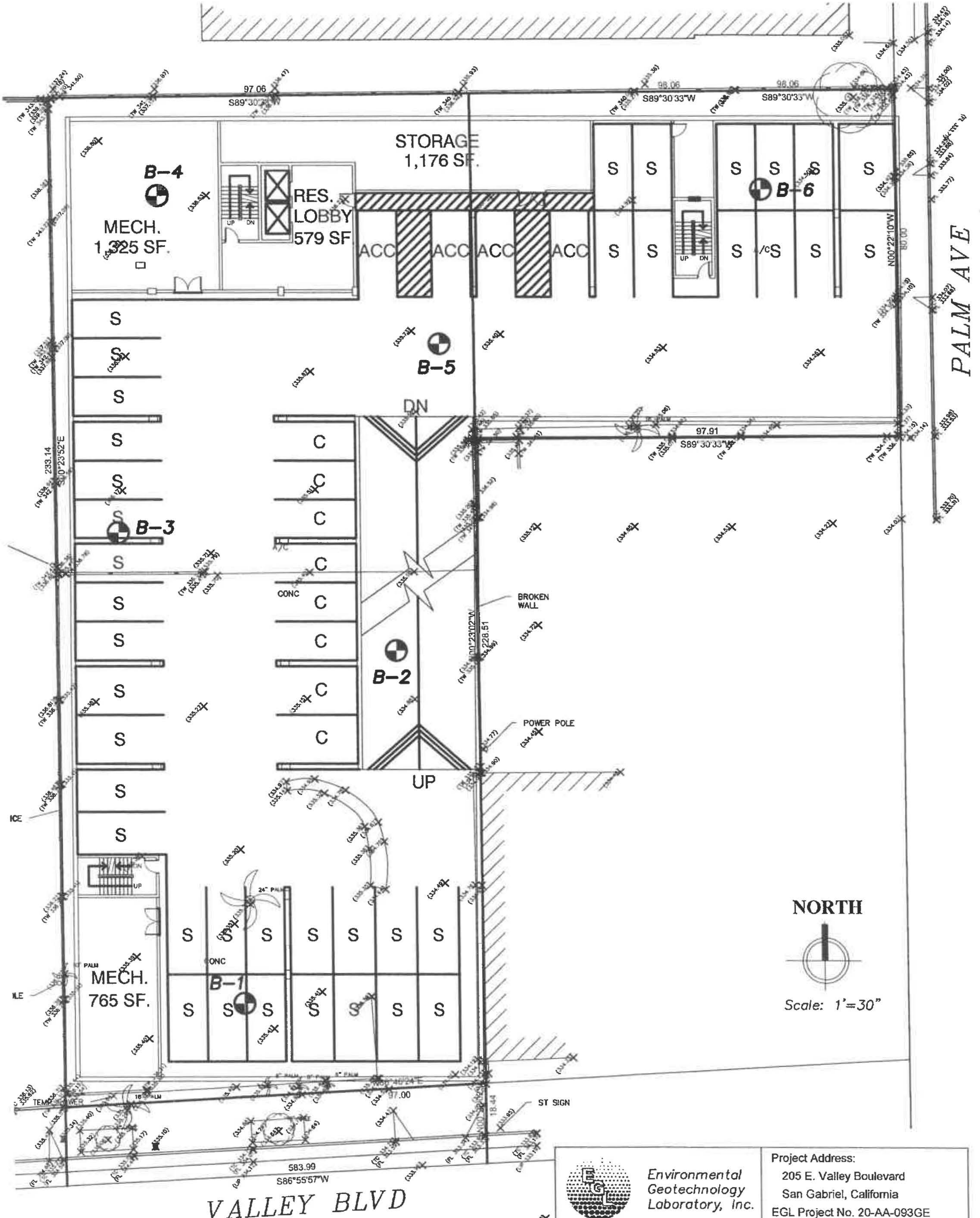
250 E. Valley Boulevard
San Gabriel, California

SITE LOCATION MAP

12/20

Figure 1



LEGEND

B-1 Approximate Location of Hollow Stem Auger Boring No. 1 (EGL, 2020)

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EGL Project No. 20-AA-093GE

Site Plan

12/10/2020

FIGURE 2

structures. The proposed building is anticipated to be four-story wood frame structure and two levels of subterranean parking level with a concrete slab-on-grade. Column loads are unknown at this time, but are expected to be medium to high. An approximate depth of 26' deep excavation is anticipated to reach the desired grades.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration was performed at the subject property on November 16 & 17, 2020 with the aid of a hollow-stem drill rig of ACE Drilling Service. A total of six (6) 8-inch diameter hollow-stem auger borings were drilled to a maximum depth of 42.0 feet below the existing ground surface. Upon completion of drilling and percolation testing, all borings were backfilled with onsite soil removed from excavations and tamped. The purpose of the excavation was to investigate the engineering characteristics of the onsite soils with respect to the proposed development.

The borings were supervised and logged by EGL's engineer. Relatively undisturbed ring samples and bulk samples were collected during drilling for laboratory testing. The approximate locations of these borings are shown on the Site Plan (Figure 2). Logs of borings are presented in Appendix A. Ring samples were taken at frequent intervals. The samples taken by hollow-stem auger were obtained by driving a sampler with successive blows of a 140-pound hammer dropping from a height of 30 inches.

2.2 Laboratory Testing

Representative samples were tested for the following parameters: in-situ moisture content and density, direct shear strength, consolidation, corrosion potential and expansion index. The results of our laboratory testing along with a summary of the testing procedures are presented in Appendix B. In-situ moisture and density test results are presented on the boring logs in Appendix A.

3.0 SUMMARY OF GEOTECHNICAL CONDITIONS

3.1 Soil Conditions

Our subsurface exploration and testing program revealed the existence of alluvial soil to the maximum explored depth of 42 feet. The onsite soils consist predominantly of dark brown and dark yellow/olive brown clayey sand (SC), sandy clay (CL) and silty sand (SM). In general, our boring B-2 encountered dark brown to olive brown, fine to coarse grained, slightly moist and medium dense to stiff clayey sand (SC) and sandy clay (CL) to a depth of approximately 14 feet. Below this, layers of olive brown, fine and fine to medium grained, slightly moist to very moist, and medium dense to dense silty sand with sandy silt (SM/ML) were encountered to the maximum explored depth of 42 feet below the existing ground surface. Presence of small gravels is locally encountered within the exploration. Based on Dibblee (1989), the site is underlain by alluvial gravel, sand and silt of valleys and floodplains (Qa; see Figure 3).

3.2 Groundwater

Static ground water levels were not encountered during our subsurface investigation to the maximum explored depth of 42 feet below the existing ground surface. Based on the historically high groundwater depth map prepared by CDMG Seismic Hazard Zone Report 024 the historic groundwater is approximately 50 feet below ground surface at the subject site (High Ground Water Map El Monte Quadrangle). Based on the surrounding historic well measurement data obtained from Los Angeles County Department of Public Works, the shallowest groundwater depth is 36.6 feet (Well ID: 2902F; Measure Date: 12/15/1944). Groundwater is therefore not expected to be a significant constraint during the construction. However, groundwater may be a significant constraint if grading is completed during the rainy season when perched water is more likely to occur.

4.0 CONCLUSIONS

Based on the results of our subsurface investigation and engineering analyses, it is our opinion that the proposed construction is feasible from a geotechnical standpoint, provided the recommendations contained herein are incorporated in the design and construction. The following is a summary of the geotechnical design and construction factors that may affect the development of the site:

4.1 Seismicity

Our studies of regional and local seismicity indicate that there are no known active faults crossing the property. However, the site is located in a seismically active region and is subject to seismically induced ground shaking from nearby and distant faults, which is a characteristic of all Southern California communities.

Note: Map modified from Geologic Map of the "El Monte and Baldwin Park Quadrangles (MAP DF-69)" by Thomas W. Dibblee, Jr.

Qa: Surficial Sediments: Alluvial gravel, sand and silt of valleys and floodplains.

N

Approximate Scale: 1" = 1000'

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REGIONAL GEOLOGY MAP

12/20

Figure 3

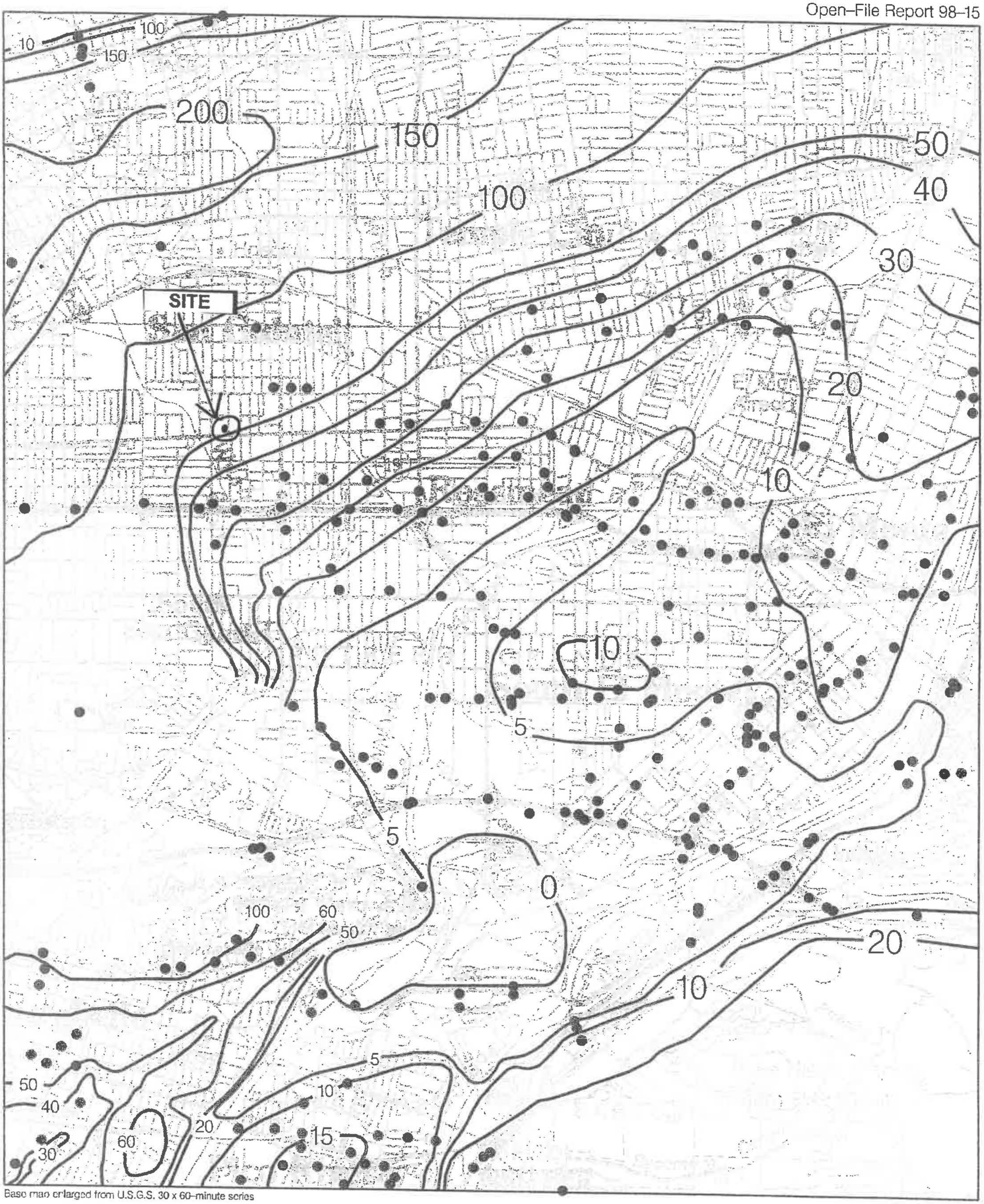


Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations, El Monte Quadrangle.

● Borehole Site

30 Depth to ground water in feet

ONE MILE

SCALE

4.2 Seismic Induced Hazards

Based on our review of the "Seismic Hazard Zones, El Monte Quadrangle" by California Department of Conservation, Division of Mines and Geology, it is concluded that the site is located outside the mapped potential liquefaction areas. It is our understanding that a liquefaction study is not required by the city for the subject site.

4.3 Excavatability

Excavation of the subsurface materials should be able to be accomplished with conventional earthwork equipment.

4.4 Surficial Soil Removal and Recompaction

Based on our investigation, it is concluded that the existing surficial soils may not be suitable for structure support as they presently exist and will require remedial grading as discussed herein.

4.5 Groundwater

Static ground water levels were not encountered during our subsurface investigation to the maximum explored depth of 42 feet below the existing ground surface. Based on the historically high groundwater depth map prepared by CDMG Seismic Hazard Zone Report 024 the historic groundwater is approximately 50 feet below ground surface at the subject site (High Ground Water Map El Monte Quadrangle). Based on the surrounding historic well measurement data obtained from Los Angeles County Department of Public Works, the shallowest groundwater depth is 36.6 feet (Well ID: 2902F; Measure Date: 12/15/1944). Groundwater is therefore not expected to be a significant constraint during the construction. However, groundwater may be a significant constraint if grading is completed during the rainy season when perched water is more likely to occur.

5.0 RECOMMENDATIONS

Based on the subsurface conditions exposed during field investigation and laboratory testing program, it is recommended that the following recommendations be incorporated in the design and construction phases of the project.

5.1 Grading

5.1.1 Site Preparation

Prior to initiating grading operations, any existing vegetation, trash, debris, over-sized materials (greater than 6 inches), and other deleterious materials within construction areas should be removed from the site.

5.1.2 Surficial Soil Removals

No detailed grading plan was available at the time of preparing this report however, it is anticipated that the required excavation for the proposed two (2)-level subterranean garage will extend to a maximum depth of approximately 26 feet below the existing ground surface. It is anticipated that most unsuitable and/or loose soils near the surface will be removed by excavation for the subterranean parking structures. It is EGL's opinion that no additional removal will be necessary within the proposed construction areas. However, it is recommended that the construction areas be cut to grade then observed by a representative of this office to verify the sub-grade soil conditions for any potential needs of removal of loose soils and replacement with compacted fill. This may also be necessary due to difference in expansion characteristics of foundation materials beneath a structure. It is also recommended that 1 foot of soil should be removed and recompacted within slab areas for the proposed subterranean garage level.

During the grading of the proposed slab area if expansive material is encountered it should be removed and replaced with sandy import material (EI < 20). If import is mixed with onsite material EGL should provide inspections to verify the soils are mixed uniformly and testing of the mixed fill material to determine the expansion potential. The expansion index of the mixed soil should be less than 20. Some preliminary testing of the import and onsite should be performed to determine the soil mixture ratio prior to backfilling the building pad.

Locally deeper removals may be necessary to expose competent natural ground. The actual removal depths should be determined in the field as conditions are exposed. Visual inspection and/or testing may be used to define removal requirements.

5.1.3 Treatment of Removal Bottoms

Soils exposed within areas approved for fill placement should be scarified to a depth of 6 inches, conditioned to near optimum moisture content, and then compacted to minimum project standards.

5.1.4 Structural Backfill

The onsite soils may be used as compacted fill provided they are free of organic materials and debris. During the grading of the proposed slab area if expansive material is encountered it should be removed and replaced with sandy import material (EI < 20). If import is mixed with onsite material EGL should provide inspections to verify the soils are mixed uniformly and testing of the mixed fill material to determine the expansion potential. The expansion index of the mixed soil should be less than 20. Some preliminary testing of the import and onsite should be performed to determine the soil mixture ratio prior to backfilling the building pad. Fills should be placed in relatively thin lifts, brought to near optimum moisture content, then compacted to obtain at least 90 percent relative compaction based on laboratory standard ASTM D-1557-12.

5.1.5 Shoring

The proposed basement will require excavation near the property line to a maximum depth of approximately 26.0 feet below the existing ground surface. The excavation procedures or methods to be used could depend on many factors, which include depth of excavation, soil conditions, distance to the existing structures, consequences of potential ground movement, and construction procedures.

Based on the materials encountered at the subject site and the depth of the proposed excavation, it is our opinion that soldier piles with lagging must be used to support the vertical cuts during construction of the proposed subterranean garage. The contractor should be solely responsible for safety during construction. A survey monitoring program, or other type of instrumentation, may be necessary to monitor potential movement along the banks.

Shoring, consisting of conventional soldier piles and braced with lagging, may be used for support of the planned excavations. Design parameters for the shoring system are presented in the following diagrams. Calculations for the equivalent fluid pressure for temporary shoring condition of braced loading and triangle loading with a minimum factor of safety of 1.25 is presented below and on Figure 4.

Lateral Pressure for Temporary Excavation

For triangle 1-story design

Assume no wall friction

Equations:

$\Phi m = \text{Arctan}(\text{Tan}\Phi/\text{F.S.})$

$Cm = C/\text{F.S.}$

$a/(\text{Sin}(90+\Phi m) = CmL/(\text{Sin}(\alpha - \Phi m)$

$a = (CmL\text{Sin}(90+\Phi m))/\text{Sin}(\alpha - \Phi m)$

$b = w - a$

$P_A = b\text{Tan}(\alpha - \Phi m)$

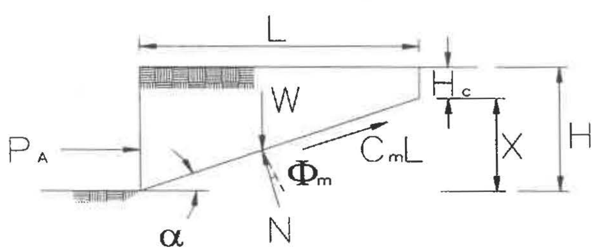
$(\text{E.F.P.})_{wall} = 2Pa/H^2$

Data:

C =	90	psf
H =	26	ft
Φ =	30	degree
α =	50	degree
Hc =	1.25	ft
γ =	125	pcf
F.S. =	1.25	

Calculations:

X =	24.75
L =	20.76772
A =	282.9601
Φm =	24.79128
Cm =	72
CmL =	2326.236
W =	35370.02
a =	4958.368
b =	30411.65
PA =	14316.29
E.F.P. =	42.35588



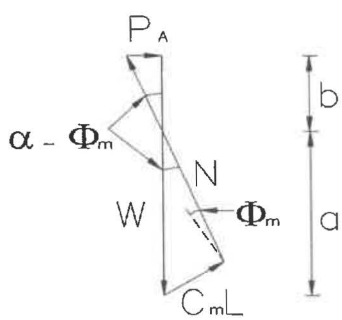
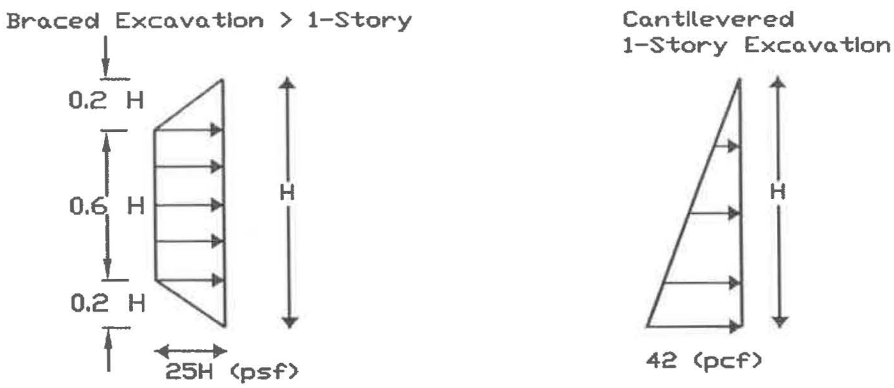


Figure 4



For Trapezoidal > 1-story design: $\sigma_{h\,(shoring)} = 0.2 \times \gamma \times H$ (DM-7.1 page 7.2-100, Reference #10)
125 pcf x 0.2 x H = 25H psf

The spacing of the soldier piles should be determined by the project structural engineer. Lagging may be required to span between soldier piles to support to lateral earth pressures or prevent soils sloughing. Due to the closeness of the adjacent buildings and public right-of-ways the piles should be designed with a maximum allowable lateral deflection of 0.5" at the top of the piles. The structural engineer should design the temporary shoring for surcharge of the adjacent buildings. The surcharge load from the adjacent building may be projected downward from the bottom of the footings at a 1:1 projection. The wood lagging between the soldier piles should be pressure treated and left in place.

Careful examination of the soil during the excavation and observation of on-site installation of the shoring system by a representative of this office is mandatory to verify the soil condition. All shoring and bracing should be in accordance with current requirements of Cal/OSHA and all other agencies having jurisdiction.

5.2 Shallow Foundation Design

5.2.1 Bearing Value

An allowable bearing value of 2000 pounds per square foot (psf) may be used for design of continuous or pad footings with a minimum of 12 or 24 inches in width, respectively. All footings should be a minimum of 18 inches deep and founded on competent natural soils. This bearing value may be increased by 250 psf for each additional foot of depth or width to a maximum value of 4000 psf. This value may be increased by one third (1/3) when considering short duration seismic or wind loads.

5.2.2 Settlement

Settlement of the footings placed as recommended and subject to no more than allowable loads is not expected to exceed 1/2 inch. Differential settlement between adjacent columns is not anticipated to exceed 1/4 inch for a span of 30 feet or less.

5.2.3 Lateral Pressures

Passive earth pressure may be computed as an equivalent fluid pressure of 300 pcf, with a maximum earth pressure of 3500 psf. An allowable coefficient of friction between soil and concrete of 0.35 may be used with the dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one third (1/3).

Active earth pressure from horizontal backfill may be computed as an equivalent fluid weighting of 52 pounds per cubic foot for the design of cantilevered walls (See calculation on Figure 5). The proposed basement retaining walls that are restrained against lateral movement or rotation at the top may be designed for the at-rest equivalent fluid pressure. An at-rest fluid weighting of 63 pounds per cubic foot may be used for free-draining, level backfill (See calculation below). For catilever (unrestrained) walls greater than 6' with level backfill, an additional seismic lateral force of $25H^2$ plf should be applied at 0.37H from the base of the wall (H = retained height). For basement (restrained) walls greater than 6' with level backfill, an additional seismic lateral force of $40H^2$ plf should be applied at 0.37H from the base of the wall (H = retained height). The above values assume free-draining conditions.

Using a friction angle of $\theta = 30°$ (Direct Shear, B-5 @ 15'):

For Level Backfill: $k_0 = 1 - \sin\theta = 1 - \sin 30° = 0.5$ (DM-7.2 page 7.2-76)

125 pcf x 0.5 = 62.5 pcf, Use an EFP of 63 pcf

Seismic Lateral Earth Pressure:

$$\Delta P_{ae\ (cantilever\ wall)} = ½\ \gamma\ H^2\ (0.42\ PGA_m/g) = 0.5 * 125 * 0.42 * 0.952 = 25H^2 \text{ plf}$$

$$\Delta P_{ae\ (basement\ wall)} = ½\ \gamma\ H^2\ (0.68\ PGA_m/g) = 0.5 * 125 * 0.68 * 0.952 = 40H^2 \text{ plf}$$

Based on our site visit and the current site plan the adjacent structures are anticipated to surcharge the proposed basement walls. The basement retaining walls should be designed for surcharge load from the adjacent structures where the structures are at a horizontal distance equal or less than the height of the retaining wall. The surcharge load should be determined by

Lateral Pressure for Permanent Wall

For triangle

Assume no wall friction

Equations:

$\Phi_m = \text{Arctan}(\text{Tan}\Phi/F.S.)$

$C_m = C/F.S.$

$a/(\text{Sin}(90+\Phi_m) = C_m L/(\text{Sin}(\alpha - \Phi_m)$

$a = (C_m L \text{Sin}(90+\Phi_m))/\text{Sin}(\alpha - \Phi_m)$

$b = w - a$

$P_A = b\text{Tan}(\alpha-\Phi_m)$

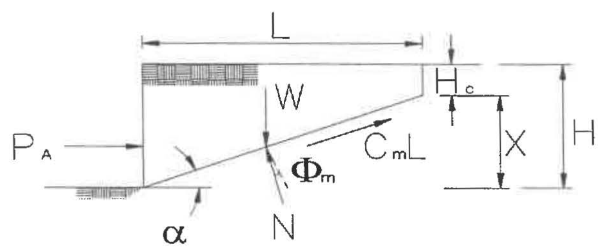
$(E.F.P.)_{wall} = 2Pa/H^2$

Data:

C =	90	psf
H =	26	ft
Φ =	30	degree
α =	60	degree
Hc =	1.25	ft
γ =	125	pcf
F.S. =	1.5	

Calculations:

X =	24.75
L =	14.28942
A =	194.6933
Φm =	21.05172
Cm =	60
CmL =	1714.73
W =	24336.67
a =	2545.714
b =	21790.95
PA =	17613.42
E.F.P. =	52.1107



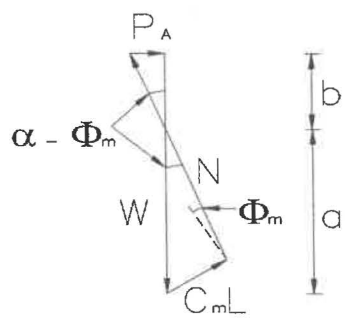


Figure 5

the structural engineer. The surcharge load on the proposed basement wall should be determined by projecting a 1:1 plane downward from the adjacent structures foundation.

5.3 Foundation Construction

It is anticipated that the entire structure will be underlain by onsite soils of very low expansion potential. The following presents our recommendations for the foundation construction.

All footings should be founded at a minimum depth of 18 inches below the lowest adjacent ground surface and founded entirely into competent natural soils. All continuous footings should have at least one No. 4 reinforcing bar placed at the top and one No. 4 reinforcing bar placed at the bottom of the footings. A grade beam of at least 12 inches square, reinforced as recommended above for footings, should be utilized across the garage entrances. The base of the reinforced beam should be at the same elevation as the bottom of the adjoining footings.

5.4 Concrete Slab

Concrete slabs should be a minimum of 4 inches thick and reinforced with a minimum of #3 rebar spaced at 24" on center each way, or its equivalent. All slab reinforcement should be supported to ensure proper positioning during placement of concrete. Garage slabs should be poured separately from footings. A positive separation should be maintained with expansive joint material to permit relative movement. Concrete slabs in moisture sensitive areas should be underlain with a vapor barrier consisting of a minimum of six-mil polyethylene membrane with all laps sealed. A minimum of two inches of sand should be placed over the membrane to aid in uniform curing of concrete.

5.5 Retaining Wall

Wall should be provided with subdrains to reduce the potential for the buildup of hydrostatic pressure. Backdrains could consist of free drainage materials (SE of 30 or greater) or CalTrans Class 2 permeable materials immediately behind the wall and extending to within 18 inches of the ground surface. A 4-inch diameter perforated pipe should be installed at the base of the wall and sloped to discharge to a suitable collection facility or through weep holes. Alternatively, commercially available drainage fabric could be used. The fabric manufacturer's recommendations should be followed in the installation of the drainage fabric backdrain.

5.6 Temporary Excavation and Backfill of Utility Trench

All trench excavations should conform to CAL-OSHA and local safety codes. All utilities trench backfill should be brought to near optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of ASTM D-1557-12. All temporary excavations should be observed by a field engineer of this office so as to evaluate the suitability of the excavation to the exposed soil conditions.

6.0 SEISMIC DESIGN

Based on our studies on seismicity, there are no known active faults crossing the property. However, the subject site is located in Southern California, which is a tectonically active area. The following CBC 2019 (Chapter 16) & ASCE 7-16 seismic related values may be used:

Site Classification: (ASCE, Table 20.3-1)	D
Spectral Response Accelerations (g):	
(CBC, Figure 1613.2.1 (1) 0.2-Second, S_s	1.996
(CBC, Figure 1613.2.1 (2)) 1-Second, S_1	0.720
Site Coefficient:	
(CBC, Table 1613.2.3 (1)) F_a	1.0
(CBC, Table 1613.2.3 (2)) F_v	1.7

Based on the U.S. Seismic Design Maps (USGS, updated January 2019), the proposed structures may be designed to accommodate up to a maximum site horizontal acceleration of 0.952g with 2% probability of being exceeded in 50 years. However, the Project Structural Engineer should be aware of the information provided to determine if any additional structural strengthening is warranted.

7.0 TEMPORARY TRENCH EXCAVATION AND BACKFILL

All trench excavations should conform to CAL-OSHA and local safety codes. Based on EGL's field investigation EGL believes some caving may occur in trenches. All utilities trench backfill should be brought to near optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of ASTM D-1557-12. Field representative of this office should observed all temporary excavations and to evaluate excavation suitability to the exposed soil conditions.

8.0 CORROSION POTENTIAL

Chemical laboratory tests were conducted on the existing onsite near surface materials sampled during EGL's field investigation to aid in evaluation of soil corrosion potential and the attack on concrete by sulfate in the soils. The test results are presented in the Appendix B.

According to ACI 318-14 Table 19.3.1.1, a sulfate content of 0.003 percent by weight in soils is assigned to Class "S0" and the severity of exposure to sulfate for concrete placed in contact with the onsite soil is considered "Not Applicable". Based on the testing results and ACI 318-14 Table 19.3.2.1, it is concluded that there is no restriction on the type of cement ("No Type Restriction") to be used at the site; however EGL recommends that Type II cement be used.

Based on the minimum resistivity test results, the subsurface soils are moderately corrosive to buried metal pipe. Any underground steel utilities should be blasted and given protective coating. Should additional protective measures be warranted, a corrosion specialist should be consulted.

9.0 INSPECTION

As a necessary requisite to the use of this report, the following inspection is recommended:

- Temporary excavations.
- Removal of surficial and unsuitable soils.
- Backfill placement and compaction.
- Utility trench backfill.
- Foundation excavation.

The geotechnical engineer should be notified at least 1 day in advance of the start of construction. A joint meeting between the client, the contractor, and the geotechnical engineer is recommended prior to the start of construction to discuss specific procedures and scheduling.

10.0 111 STATEMENT

Based on our field investigation and the laboratory testing results, it is our opinion that the grading and proposed structures will be safe against hazard from landslide, settlement, or slippage and the proposed construction will have no adverse effect on the geologic stability of the adjacent properties provided our recommendations are followed.

11.0 DRAINAGE

Building pads should be properly drained toward the street away from the slope and structure via swales or area drains. Positive pad drainage shall be incorporated into the final plans. In no cases should water be allowed to pond within the site, impound against structures or flow in a concentrated and/or uncontrolled manner down the descending slope areas.

In order to evaluate the feasibility of the proposed infiltration system, EGL has performed a percolation test at the subject site based on the County of Los Angeles Department of Public Works of "*Guidelines for Geotechnical Investigation and Reporting; Low Impact Development Stormwater Infiltration*" (GS200.2, 2017). The boring (B-1) was presoaked and tested on November 16 & 17, 2020. The test procedures are described as following:

- 3"-diameter perforated pipe surrounded with gravel was placed in the test boring B-1 so that caving would not occur during the percolation testing. The bottom of test boring was also covered with 2 inches of gravel.
- The test boring was filled with a minimum depth of 12 inches water two consecutive times for the presoak prior to filling for the percolation test.
- For the percolation test, a minimum of 12 inches of water was placed within the boring B-1. The drops in the water level were recorded. For the first two tests water still remained within boring after 30 minutes so the test time interval between readings used was 30 minutes.
- Once the time interval for the test was determined, the boring was filled with a minimum depth of 12 inches of water multiple times. The drops in the water level at 30 minutes were recorded and then the boring was filled to a depth of a minimum of 12 inches of water again. This was repeated additional six (6) times until a stabilized rate was obtained. The last three measured drops were used to calculate the design infiltration rate of the soil. Design Infiltration rate calculations are presented in Appendix C.

Based on the results of our preliminary percolation test of the material, the minimum design infiltration rate is 0.27 in/hr. Reduction factors have been applied to our infiltration rate. Due to the high percentage of clay material encountered within test boring B-1 and percolation test results, it is EGL's opinion that an infiltration/detention basin within the natural soil is not feasible due to the very stiff/hard clayey material. An infiltration system using planter boxes or approved equivalent may be used. If planter boxes are used, they should be waterproofed and designed with an overflow to the street.

12.0 REMARKS

The conclusions and recommendations contained herein are based on the findings and observations at the exploratory locations. However, soil materials may vary in characteristics between locations of the exploratory locations. If conditions are encountered during construction which appear to be different from those disclosed by the exploratory work, this office shall be notified so as to recommend the need for modifications.

This report has been prepared in accordance with generally accepted professional engineering principles and practice. No warranty is expressed or implied. This report is subject to review by controlling public agencies having jurisdiction.

REFERENCES:

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7. CDMG, (1999), "Seismic Hazard Zones of Baldwin Park 7.5-minute Quadrangle, Los Angeles County, California"; prepared by California Division of Mines and Geology; Official Map; scale 1" = 2000'
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11. USGS, (2014), "US Seismic Design Maps"; updated January 2019; prepared by United States Geological Survey; https://earthquake.usgs.gov/ws/designmaps/asce7-10.html
12. Yeats, Robert S., (2004) "Tectonics of the San Gabriel Basin and Surroundings, Southern California"; GSA Bulletin; September/October 2004; v.116; no. 9/10; p. 1158-1182

APPENDIX A

FIELD INVESTIGATION

Our field exploration was performed at the subject property on November 16 & 17, 2020 with the aid of a hollow-stem drill rig of ACE Drilling Service. A total of six (6) 8-inch diameter hollow-stem auger borings were drilled to a maximum depth of 42.0 feet below the existing ground surface. Upon completion of drilling and percolation testing, all borings were backfilled with onsite soil removed from excavations and tamped. The purpose of the excavation was to investigate the engineering characteristics of the onsite soils with respect to the proposed development.

The borings were supervised and logged by EGL's engineer. Relatively undisturbed ring samples and bulk samples were collected during drilling for laboratory testing. The approximate locations of these borings are shown on the Site Plan (Figure 2). Ring samples were taken at frequent intervals. The samples taken by hollow-stem auger were obtained by driving a sampler with successive blows of a 140-pound hammer dropping from a height of 30 inches.

Representative undisturbed samples of the subsurface soils were retained in a series of brass rings, each having an inside diameter of 2.42 inches and a height of 1.00 inch. All ring samples were transported to our laboratory. Bulk surface soil samples were also collected for additional classification and testing.

EGL

BORING LOG: B-1

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/16/2020
DATE LOGGED:	11/16/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
2		R	16	SC	109.1	10.1	@ 2.0' Clayey sand, fine to coarse grained, dark brown, slightly moist, loose to meidum dense
5		R	30	SC	114.8	11.3	@ 5.0' Clayey sand, fine to coarse grained, dark yellowish brown, slightly moist, meidum dense, few fine gravel
10		R	15	SC	108.6	12.1	@ 10.0' Clayey sand, fine to coarse grained, dark yellowish brown, slightly moist, loose to meidum dense, few fine gravel
15		R	30	SC	99.5	13.0	@ 15.0' Silty clayey sand, fine grained, olive brown, slightly moist, medium dense
20		R	40	SM	100.2	14.6	@ 20.0' Silty sand, fine to meidum grained, olive brown, very moist, medium dense, trace of clay
25		R	35	SM	95.5	5.9	@ 25.0' Silty sand, fine to meidum grained, olive brown, slightly moist, medium dense
30		R	25	ML/CL	91.2	25.8	@ 30.0' Clayey silt with silty clay, olive brown, very moist, very stiff
32							Total Depth = 32.0 feet No Caving; No Groundwater Boring Backfilled and Tamped After Percolation Test Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches

Depth scale (ft): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44

EGL

BORING LOG: B-2

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/16/2020
DATE LOGGED:	11/16/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
0							
2		R	36	SC	111.4	9.7	@ 2.0' Clayey sand, fine to coarse grained, dark brown, slightly moist, meidum dense, few fine gravel
4							
		R	15	CL	111.0	11.6	@ 5.0' Sandy clay, dark brown, slightly moist, stiff
6							
8							
10		R	32	SC-CL	108.9	13.8	@ 10.0' Clayey sand to sandy clay, fine to coarse grained, olive brown, slightly moist, medium dense and very stiff
12							
14							
		R	36	SM	108.2	4.4	@ 15.0' Silty sand, fine to medium grained, olive brown, slightly moist, medium dense, little gravel up to 2.0" in size
16							
18							
20		R	28	SM	97.6	14.6	@ 20.0' Silty sand, fine grained, olive brown, very moist, medium dense, trace of clay, few gravel up to 2.0" in size
22							
24							
		R	40	SM	97.4	10.3	@ 25.0' Silty sand, fine to coarse grained, olive brown, moist to very moist, medium dense, trace of clay, few gravel up to 2.0" in size
26							
28							
30		R	40	SM/ML	97.9	12.7	@ 30.0' Silty sand with sandy silt, fine grained, olive brown, moist to very moist, medium dense and very stiff
32							
34							
		R	30	SM	110.1	8.6	@ 35.0' Silty sand, fine to coarse grained, olive brown, moist, medium dense, few gravel up to 1.0" in size
36							
38							
40		R	27	SM	99.1	12.1	@ 40.0' Silty sand, fine grained, olive brown, very moist, medium dense, trace of clay

EGL

BORING LOG: B-2 (Con't)

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/16/2020
DATE LOGGED:	11/16/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
42		R	50	SM	103.5	5.3	@ 42.0' Silty sand, fine to medium grained, olive brown, slightly moist, dense, little gravel up to 2.0" in size
44							
46							Total Depth = 42.0 feet Caved to 27.0 feet; No Groundwater Boring Backfilled and Tamped
48							
50							Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
52							
54							
56							
58							
60							
62							
64							
66							
68							
70							
72							
74							
76							
78							
80							
82							
84							

EGL

BORING LOG: B-3

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/17/2020
DATE LOGGED:	11/17/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
0							
2		R	11	CL	105.3	11.4	@ 2.0' Sandy clay, dark yellowish brown, slightly moist, firm
4							
		R	27	CL	115.1	12.4	@ 5.0' Sandy clay, dark yellowish brown, slightly moist, very stiff
6							
8							
10		R	29	CL-SM	110.0	15.5	@ 10.0' Sandy clay to silty sand, fine to coarse grained, olive brown, slightly moist to very moist, very stiff and medium dense
12							
14							
		R	21	SC/ML	96.4	13.2	@ 15.0' Clayey sand with clayey silt, fine grained, olive brown, slightly moist, medium dense and stiff
16							
18							
20		R	30	SC	101.5	11.6	@ 20.0' Clayey sand, fine grained, olive brown, slightly moist, medium dense
22							
24							
		R	27	SC	109.5	12.9	@ 25.0' Clayey sand, fine grained, olive brown, slightly moist, medium dense
26							
28							
30		R	36	SM	100.2	11.2	@ 30.0' Silty sand, fine grained, olive brown, very moist, medium dense
32							
34							
		R	30	SM	84.4	17.8	@ 35.0' Silty sand, fine grained, olive brown, very moist, medium dense
36							
38							Total Depth = 35.0 feet No Caving; No Groundwater Boring Backfilled and Tamped
40							
42							Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
44							

EGL

BORING LOG: B-4

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/17/2020
DATE LOGGED:	11/17/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
0							
2		R	13	SC	104.7	11.4	@ 2.0' Clayey sand, fine to medium grained, dark yellowish brown, slightly moist, loose
4							
5		R	30	SC	113.1	9.8	@ 5.0' Clayey sand, fine to coarse grained, strong brown, slightly moist, medium dense
6							
8							
10		R	36	SC	109.3	9.8	@ 10.0' Clayey sand, fine grained, dark olive brown, slightly moist, medium dense
12							
14							
15		R	30	SM	96.2	6.8	@ 15.0' Silty sand, fine grained, dark olive brown, slightly moist, medium dense
16							
18							
20		R	35	SM	97.3	14.9	@ 20.0' Silty sand, fine grained, olive brown, very moist, medium dense, trace of clay, few fine gravel
22							
24							
25		R	48	SM	93.2	9.3	@ 25.0' Silty sand, fine grained, olive brown, moist to very moist, dense, trace of clay, few fine gravel
26							
28							
30		R	35	CL	73.8	36.4	@ 30.0' Silty clay, olive brown, very moist, very stiff
32							
34							
35		R	30	SC/ML	75.8	16.1	@ 35.0' Clayey sand with clayey silt, olive brown, fine grained, very moist, meidum dense and very stiff
36							
38							Total Depth = 35.0 feet No Caving; No Groundwater Boring Backfilled and Tamped
40							
42							Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
44							

EGL

BORING LOG: B-5

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE: ACE Drilling
DATE EXCAVATED: 11/17/2020
DATE LOGGED: 11/17/2020
EXCAVATION METHOD: Hollow Stem
SAMPLE METHOD: Split-Tube
ELEVATION: -----
LOGGED BY: KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
0–4	B						
2		R	22	SC	116.3	13.1	@ 2.0' Clayey sand, fine to coarse grained, dark yellowish brown, slightly moist, medium dense
5		R	27	SC	118.3	11.9	@ 5.0' Clayey sand, fine to coarse grained, strong brown, slightly moist, medium dense
10		R	35	SC	114.8	15.1	@ 10.0' Clayey sand, fine to medium grained, dark olive brown, moist, medium dense
15		R	32	SM	100.2	11.6	@ 15.0' Silty sand, fine grained, olive brown, very moist, medium dense, trace of clay
20		R	30	SC	107.5	11.3	@ 20.0' Clayey sand, fine to medium grained, olive brown, slightly moist, medium dense
20–25	B						
25		R	40	SM	93.6	17.6	@ 25.0' Silty sand, fine grained, olive brown, very moist, medium dense, trace of clay
30		R	40	SM	95.6	3.3	@ 30.0' Silty sand, fine to medium grained, olive brown, dry to slightly moist, medium dense
35		R	35	SM	101.8	6.0	@ 35.0' Silty sand, fine to medium grained, olive brown, slightly moist, medium dense

Total Depth = 35.0 feet
No Caving; No Groundwater
Boring Backfilled and Tamped

Hammer Driving Weight = 140 lbs.
Hammer Driving Height = 30 inches

EGL

BORING LOG: B-6

PROJECT LOCATION: 205 E. Valley Boulevard, San Gabriel, California

PROJECT NO: 20-AA-093GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	11/17/2020
DATE LOGGED:	11/17/2020
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	KY

S: Standard Penetration Test B: Bulk Sample R: Ring Sample

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Sample: Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
2		R	35	SC	108.0	8.9	@ 2.0' Clayey sand, fine to coarse grained, strong brown, slightly moist, medium dense
5		R	50	SC	113.3	8.7	@ 5.0' Clayey sand, fine to coarse grained, strong brown, slightly moist, dense
10		R	30	SC	107.6	11.2	@ 10.0' Clayey sand, fine to coarse grained, strong brown, slightly moist, medium dense
15		R	27	CL	104.1	17.0	@ 15.0' Sandy clay, olive brown, moist, very stiff
20		R	30	SM/SC	99.5	14.1	@ 20.0' Silty clayey sand, fine grained, olive brown, slightly moist to moist, medium dense
25		R	40	SM	95.0	3.6	@ 25.0' Silty sand, fine to medium grained, olive yellow, dry to slightly moist, medium dense
30		R	40	SM-ML	82.6	12.7	@ 25.0' Silty sand to sandy silt, fine grained, olive yellow, moist to very moist, medium dense and very stiff

Total Depth = 30.0 feet
No Caving; No Groundwater
Boring Backfilled and Tamped

Hammer Driving Weight = 140 lbs.
Hammer Driving Height = 30 inches

APPENDIX B

LABORATORY TESTING

During the subsurface exploration, EGL personnel collected relatively undisturbed ring samples and bulk samples. The following tests were performed on selected soil samples:

Moisture-Density

The moisture content and dry unit weight were determined for each relatively undisturbed soil sample obtained in the test borings in accordance with ASTM D2937 standard. The results of these tests are shown on the boring logs in Appendix A.

Shear Tests

Shear tests were performed in a direct shear machine of strain-control type in accordance with ASTM D3080 standard. The rate of deformation was 0.025 inch per minute. Selected samples were sheared under varying confining loads in order to determine the Coulomb shear strength parameters: internal friction angle and cohesion. The shear test results are presented in the attached plates.

Consolidation Tests

Consolidation tests were performed on selected undisturbed soil samples in accordance with ASTM D2435 standard. The consolidation apparatus is designed for a one-inch high soil filled brass ring. Loads are applied in several increments in a geometric progression and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid. The samples were inundated with water at a load of one kilo-pounds (kips) per square foot, and the test results are shown on the attached Figures.

Corrosion Potential

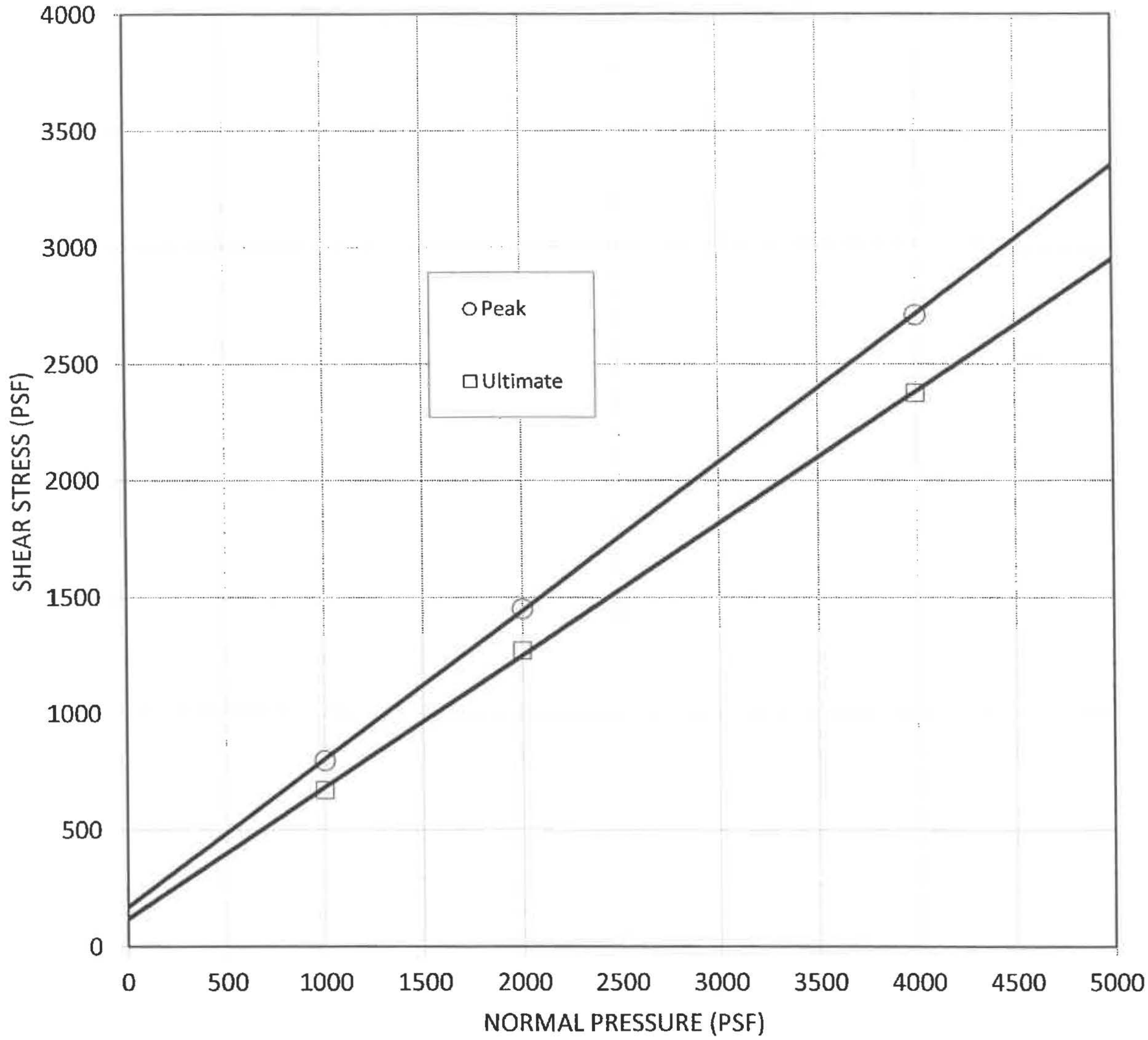
Corrosion series of bulk sample was tested in accordance with CalTrans test methods. The series consist of Chloride Content, Sulfate Content, pH, and Minimum Resistivity tests. The methods used and test results are as follows:

Sample Location	pH	Chloride (ppm)	Sulfate (% by weight)	Min. Resistivity (ohm-cm)
B-5 @ 20' - 25'	7.74	165	0.003	4,400

Expansion Index

The Expansion Index was determined for the typical site material encountered in the borings. The laboratory standard used was ASTM D4829-95 and the test results are as follows:

Sample Location	Expansion Index	UBC Classification
B-5 @ 20' - 25'	15	Very Low



Boring No.:	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B-1	6	25.0	Ring	SM	○	170	32
					□	120	29

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)	γ_d (pcf)	S (%)
1000	5.9	27.5	94.3	94.3
2000	5.9	26.7	95.7	94.8
4000	5.9	25.4	98.2	95.9

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

EGL Project No.: 20-AA-093GE
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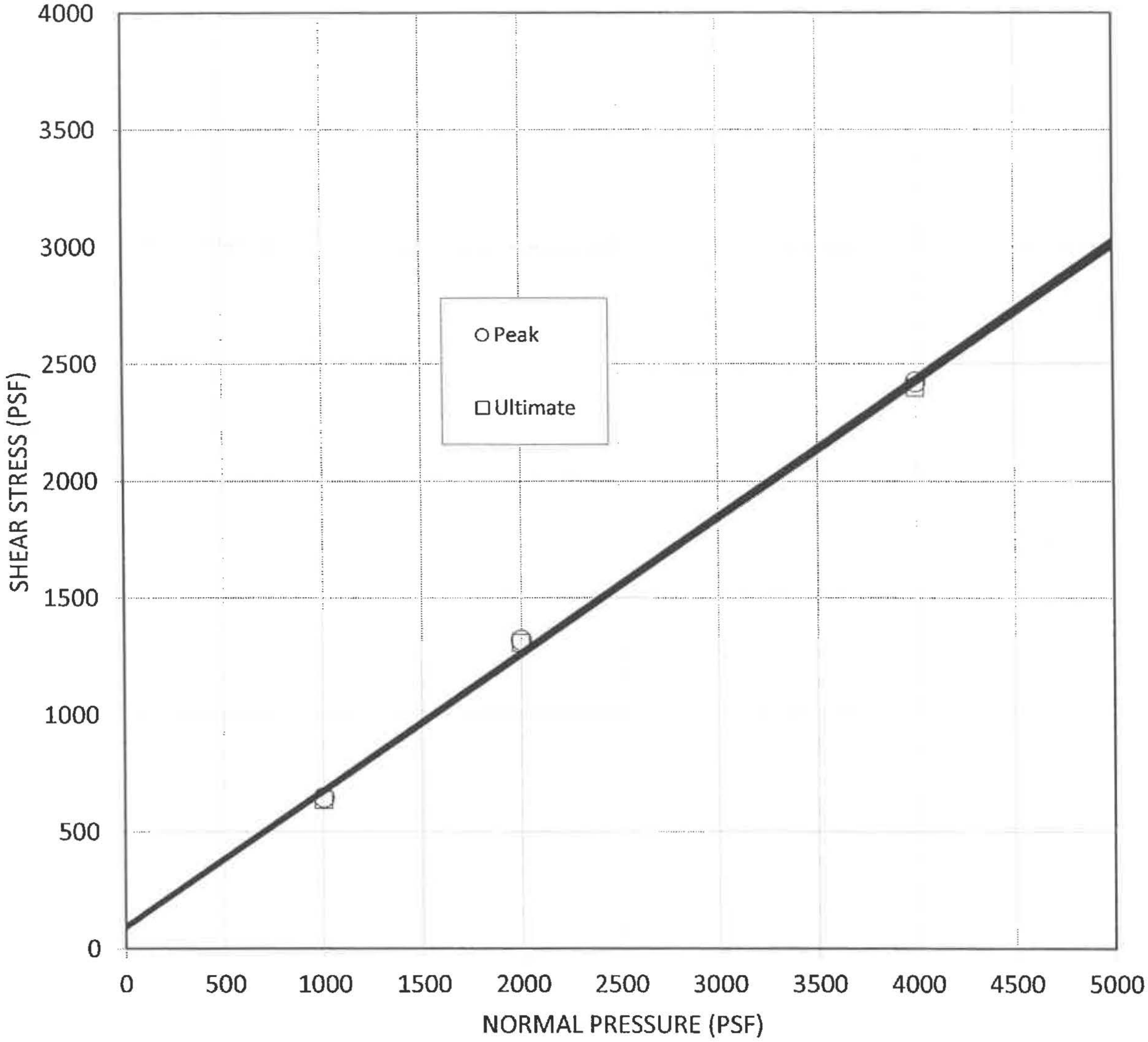
DIRECT SHEAR

12/20 (ASTM D3080) Figure

11819 Goldring Road, Unit A, Arcadia, California 91006; Phone (626) 263-3588; Fax (626) 263-3599



Boring No.:	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B-5	4	15.0	Ring	SM	○	96	30
					□	90	30

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)	γ_d (pcf)	S (%)
1000	11.6	25.0	97.8	93.2
2000	11.6	24.6	99.7	96.3
4000	11.6	24.4	100.1	96.7

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

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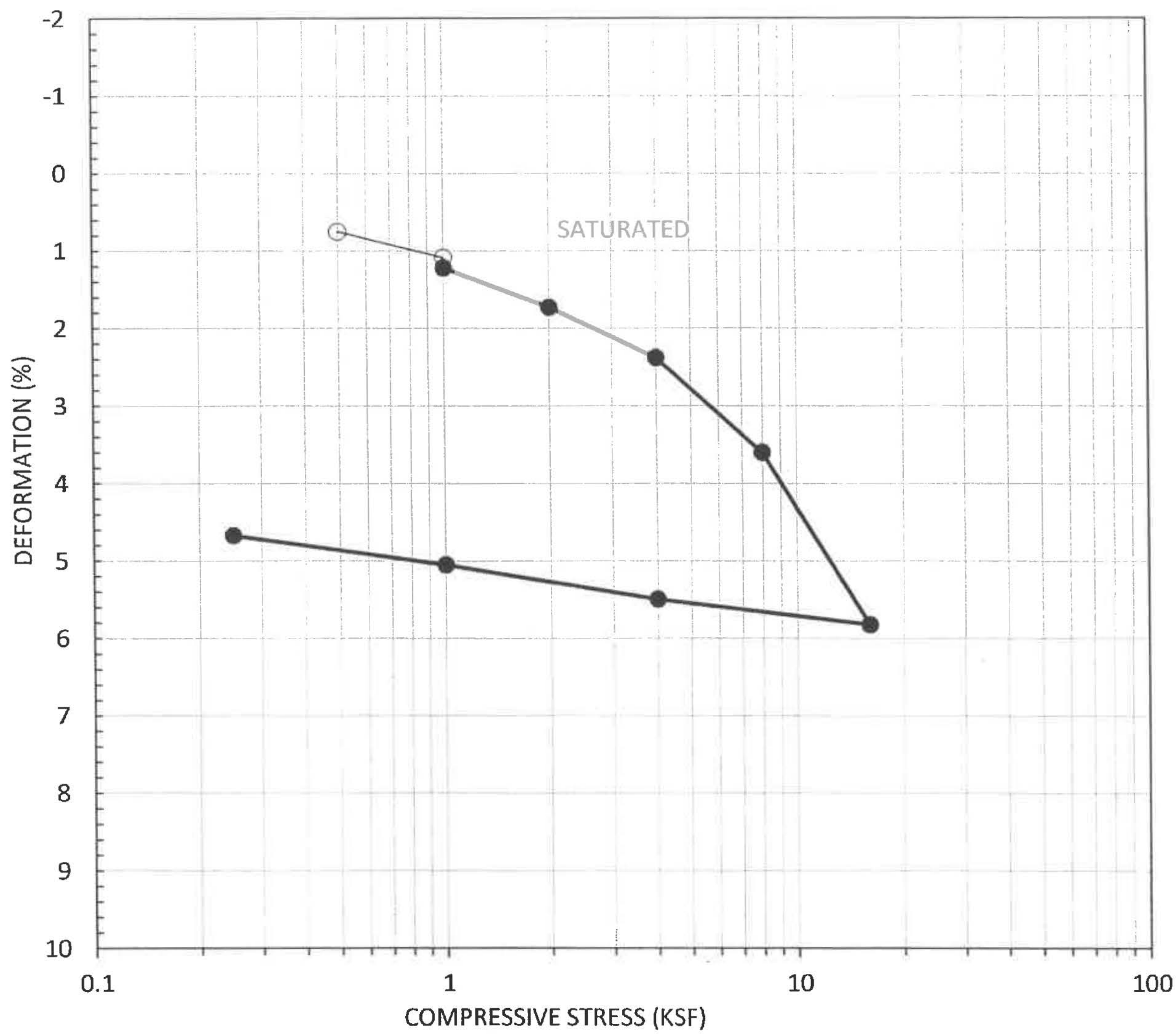
DIRECT SHEAR

12/20 (ASTM D3080) Figure

11819 Goldring Road, Unit A, Arcadia, California 91006; Phone (626) 263-3588; Fax (626) 263-3599



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-2	8	35.0	SM	8.6	110.0	0.532

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

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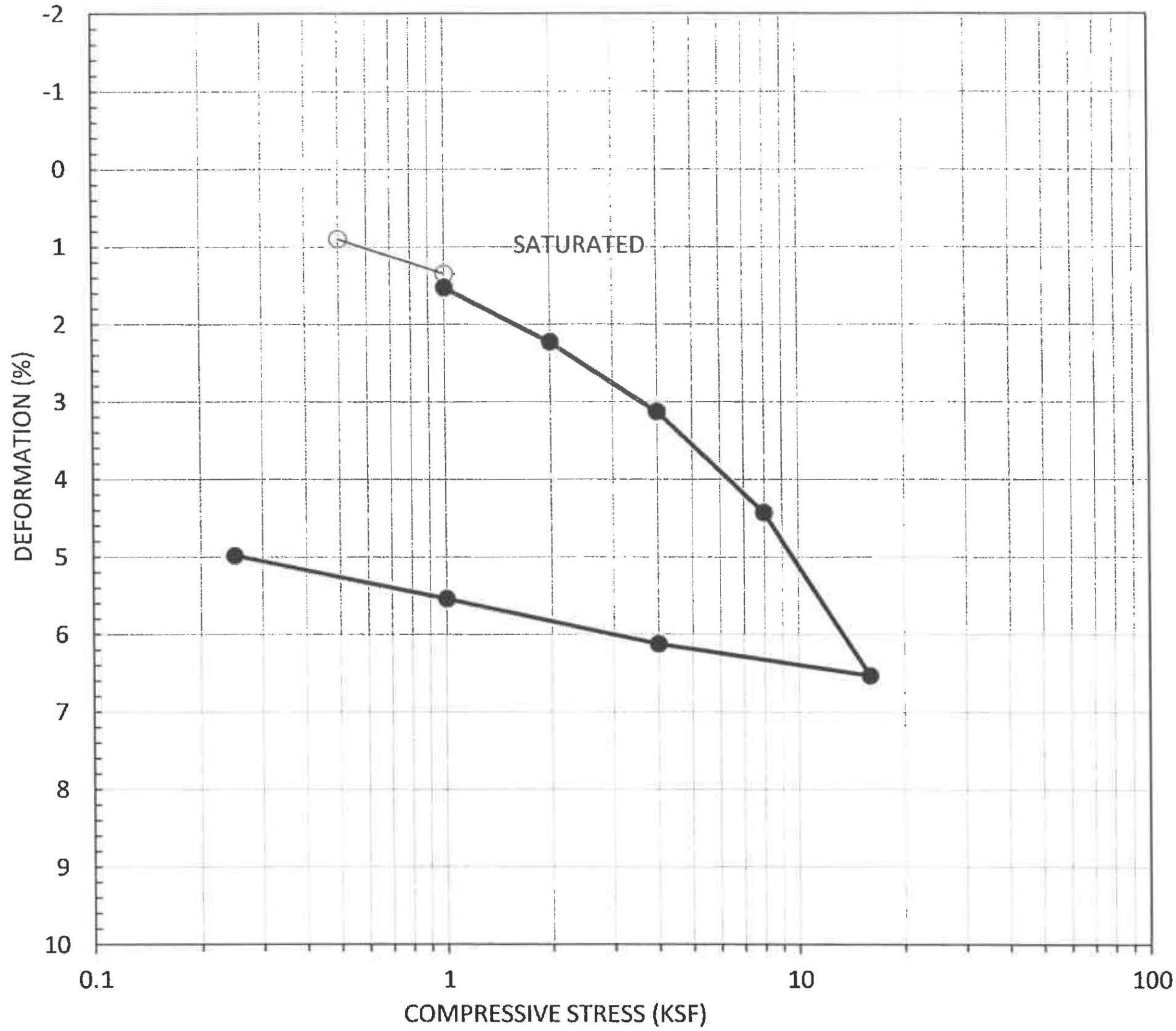
CONSOLIDATION

12/20 (ASTM D2435) Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-4	6	25.0	SM	9.3	93.4	0.804

ENVIRONMENTAL
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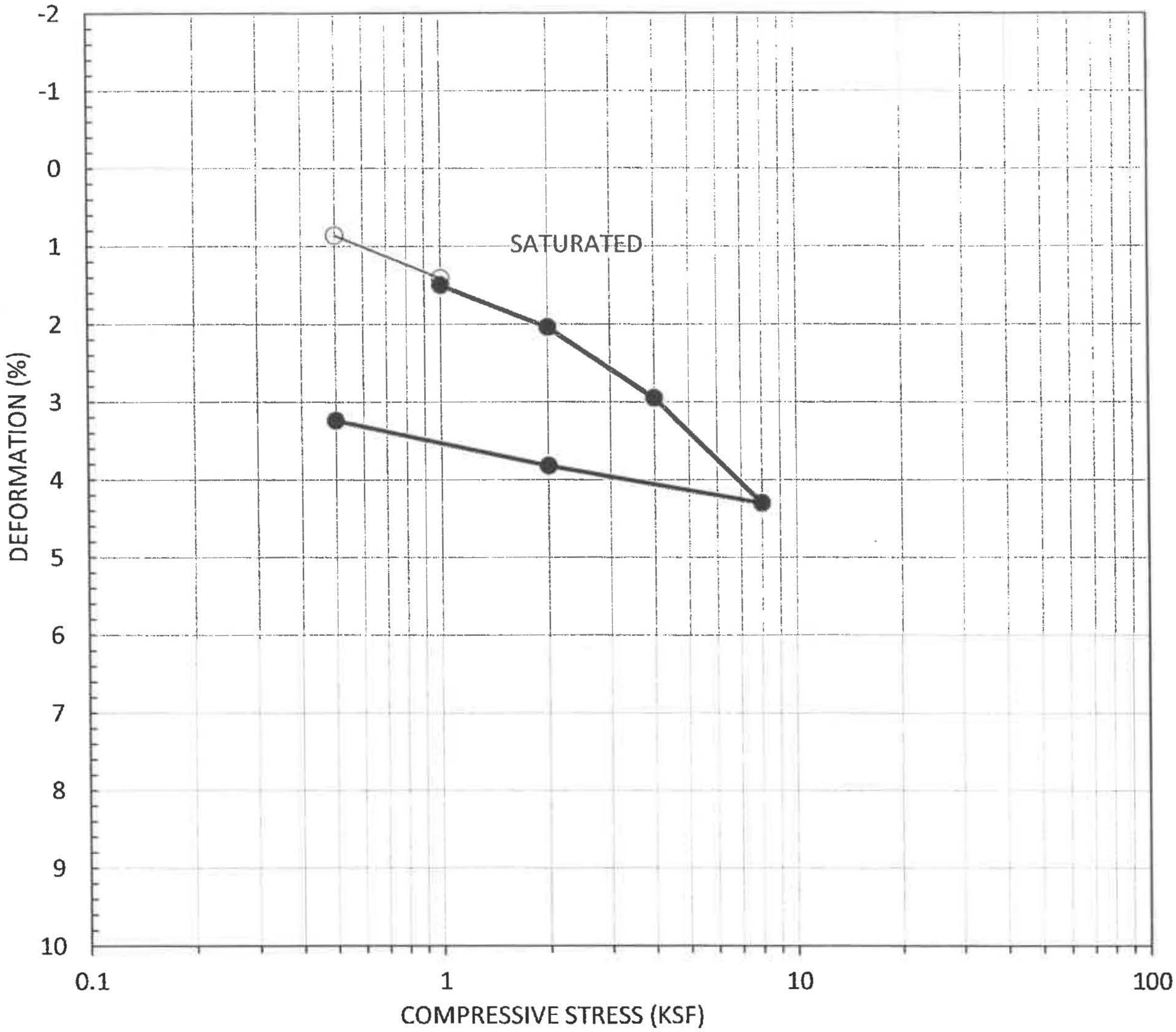
CONSOLIDATION

12/20 (ASTM D2435) Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-6	4	15.0	CL	17.0	104.8	0.608

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

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CONSOLIDATION

12/20 (ASTM D2435) Figure

APPENDIX C
INFILTRATION TEST RESULTS

PRESOAK AND PERCOLATION TEST: Boring B-1: November 16 & 17, 2020
Test Boring Diameter and Depth: Boring B-1: 8"x 32' deep

PRESOAK: B-1. November 16, 2020

Test Location	Boring Diameter (in)	Total Boring Depth (ft)	Initial Water Depth, d_i (in)	Drop, Δd (ft)	Time (hr:min) Start / End	Δ Time (min)	Notes:
B-1	8.0	32.0	15.3	4.3	13:28 / 13:58	30	
B-1	8.0	32.0	15.5	1.5	14:05 / 14:35	30	

PERCOLATION TEST: B-1. November 17, 2020

Test Location	Boring Diameter (in)	Total Boring Depth (ft)	Initial Water Depth, d_i (in)	Drop, Δd (in)	Time (hr:min) Start / End	Δ Time, Δt^+ (min)	Measured Percolation Rate (in/hr)	Total Reduction Factor*	Design Infiltration Rate (in/hr)
B-1	8.0	32.0	14.3	3.5	8:33 / 9:03	30	0.86	2.00	0.43
B-1	8.0	32.0	13.0	3.3	9:16 / 9:46	30	0.87	2.00	0.43
B-1	8.0	32.0	14.5	2.9	9:57 / 10:27	30	0.70	2.00	0.35
B-1	8.0	32.0	14.3	2.8	10:35 / 11:05	30	0.68	2.00	0.34
B-1	8.0	32.0	14.8	2.3	11:15 / 11:45	30	0.54	2.00	0.27
B-1	8.0	32.0	15.3	2.3	11:53 / 12:23	30	0.53	2.00	0.27
B-1	8.0	32.0	14.4	2.3	12:33 / 13:03	30	0.55	2.00	0.27
B-1	8.0	32.0	14.5	2.3	13:09 / 13:39	30	0.55	2.00	0.27

$^+$First 2 tests drained in more than 30 min; therefore, a 30 min interval was used for the tests.

Average Design Infiltration Rate (in/hr): 0.27

Measured Percolation Rate = (60/Δt * Vol. of Hole Tested) / (Area of Boring Tested)

Reduction Factor, $RF_t = 2$

$RF_v = 1$

$RF_s = 1$

*Total Reduction Factor, $RF = RF_t \times RF_v \times RF_s$

Design Infiltration Rate = Measured Percolation Rate/RF

Site: 205 E. Valley Boulevard, San Gabriel
Project No: 20-AA-093