501 West Route 66 and 532 Parker Drive Project

Initial Study/Proposed Mitigated Negative Declaration

Volume II: Appendices

Prepared for:

City of Glendora
116 East Foothill Boulevard
Glendora, CA 91741

Prepared by:

Sapphos Environmental, Inc.
430 North Halstead Street
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November 23, 2020

Appendix E

Report of Geotechnical Investigation

Environmental Geotechnology Laboratory, Inc.

August 19, 2019

501 W. Route 66 Partners, LLC
Mr. Robert Artura
130 N. Glendora Avenue,
Glendora, California 91741

Subject: **Report of Geotechnical Engineering Investigation, Proposed Eight (8) -Unit Residential Condominiums, One (1) Commercial Building and Associated Structures, APN: 8539-027-900, 901 & 902; 501 West Route 66, Glendora, Los Angeles County California, EGL Project No.: 19-128-004GE**

Ladies and Gentlemen:

In accordance with your request, Environmental Geotechnology Laboratory, Inc. (EGL) has prepared this geotechnical engineering report for the proposed development at the subject site. The purpose of this report was to evaluate the subsurface conditions and to provide recommendations for foundation designs and other relevant parameters for the proposed construction.

Based on the findings and observations during our investigation, it is concluded that the subject site is suitable for its intended use from the geotechnical engineering viewpoint, provided that 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.

Ryan Jones, GE 2852
Project Engineer

Dist: (4) Addressee
HJ/RJ/ky

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REPORT OF GEOTECHNICAL ENGINEERING INVESTIGATION

Proposed Eight (8) -Unit Residential Condominiums,
One (1) Commercial Building and Associated Structures

APN: 8539-027-900, 901 & 902

AT

501 West Route 66
Glendora, California

Prepared by
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY, INC.
Project No.: 19-128-004GE
August 19, 2019

TABLE OF CONTENT

1.0 INTRODUCTION

1.1 Purpose

This report presents a summary of our preliminary geotechnical engineering investigation for the proposed residential and commercial development at the subject site. The purposes of this investigation were 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 the followings:

- Review of available soil data of the subject site and its vicinity.
- Logging and sampling (subsurface exploration) of a total of five (5) 8-inch-diameter hollow stem borings. The borings were extended to a maximum depth of 25.0 feet below the existing ground surface. Boring logs are presented in Appendix A.
- Perform laboratory testing on representative onsite samples to establish soil-engineering characteristics. Field moisture and density are presented on boring logs in Appendix A. Laboratory test results are presented in Appendix B.
- Engineering analyses of the geotechnical data obtained from our background studies, field investigation, and laboratory testing.
- Perform one (1) percolation test to determine the design infiltration rate of the soil at the site. Percolation test results are presented in Appendix C.
- Preparation of this report to present our findings, conclusions, and recommendations for the proposed construction.

1.3 Proposed Construction

It is our understanding that the proposed development at the site consists of eight (8) –unit residential condominiums, one (1) commercial building and associated structures. The proposed buildings are anticipated to be one and/or two-story wood frame structures with concrete slab-on-grade. Column loads are unknown at this time, but are expected to be light to medium. Minor cut/fill grading operation is anticipated to achieve the desired grades.

1.4 Site Conditions

The subject site is located on the north side of West Route 66 and northeast of the intersection of the West Route 66 and Parker Drive in the City of Glendora, County of Los Angeles,

California. The approximate regional location is shown on the Site Location Map (Figure 1). The project site is currently vacant. Topographically, the subject site is relatively flat. Detailed configuration of the site is shown on the Site Plan, Figure 2.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration was performed at the subject property on August 5, 2019 with the aid of a hollow-stem drill rig of ACE Drilling Services. A total of five (5) 8-inch diameter hollow-stem auger borings were drilled to a maximum depth of 25.0 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 a 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 and corrosion potential. In-situ moisture and density test results are presented on the boring logs in Appendix A. The results of our laboratory testing along with a summary of the testing procedures are presented in Appendix B.

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 25.0 feet. The onsite soils consist predominantly of dark olive brown and olive brown clayey sand (SC), silty sand (SM) and well-graded sand (SW). In general, our boring B-1 encountered dark olive brown, fine to coarse grained, slightly moist, and loose to medium dense clayey sand (SC) to a depth of approximately 3.0 feet. Below this, layers of dark olive brown to olive brown, fine to coarse grained, dry to very moist, and medium dense to very dense silty sand (SM) and well-graded sand (SW) were encountered to the

Note: Map modified from "Seismic Hazard Zones, Azusa Quadrangle" and "Seismic Hazard Zones, Glendora Quadrangle" by California Department of Conservation, Division of Mines and Geology.

Approximate Scale: 1" = 1000'

Potential Liquefaction Area

Potential Earthquake-Induced Landslide Areas

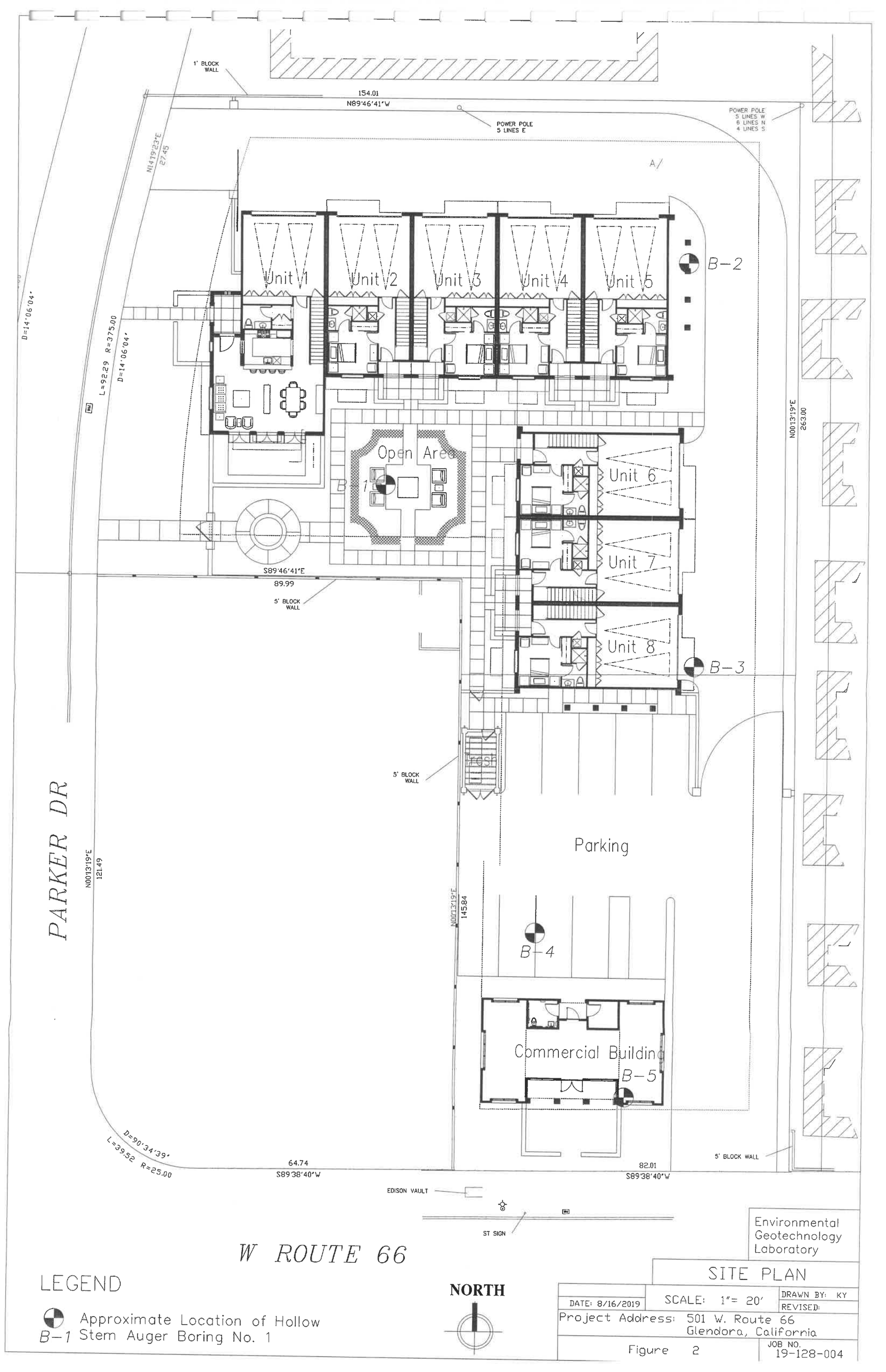
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

Project Address:
501 W. Route 66
Glendora, California

SITE LOCATION MAP

08/19

Figure 1



LEGEND

B-1 Approximate Location of Hollow Stem Auger Boring No. 1

NORTH

Environmental Geotechnology Laboratory

SITE PLAN

DATE: 8/16/2019	SCALE: 1"= 20'	DRAWN BY: KY
		REVISED:
Project Address: 501 W. Route 66 Glendora, California		
Figure 2		JOB NO. 19-128-004

maximum explored depth of 25.0 feet below the existing ground surface. Based on Dibblee (1989), the site is underlain by alluvial gravel and sand of valley areas (Qa; see Figure 3).

3.2 Groundwater

Static ground water levels were not encountered during our subsurface investigation to the maximum explored depth of 25.0 feet below the existing ground surface. Based on the historically high groundwater depth map prepared by CDMG Seismic Hazard Zone Report 025 the historic groundwater is approximately greater than 150 feet below ground surface at the subject site (High Ground Water Map Glendora Quadrangle) 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, 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.

4.2 Seismic Induced Hazards

Based on our review of the "Seismic Hazard Zones, Azusa and Glendora Quadrangles" 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 opinion 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.

Note: Map modified from Geologic Map of the "Azusa and Glendora Quadrangles" by Thomas W. Dibblee, Jr.

Qa: Surficial Sediments: Alluvial gravel and sand of valley areas.

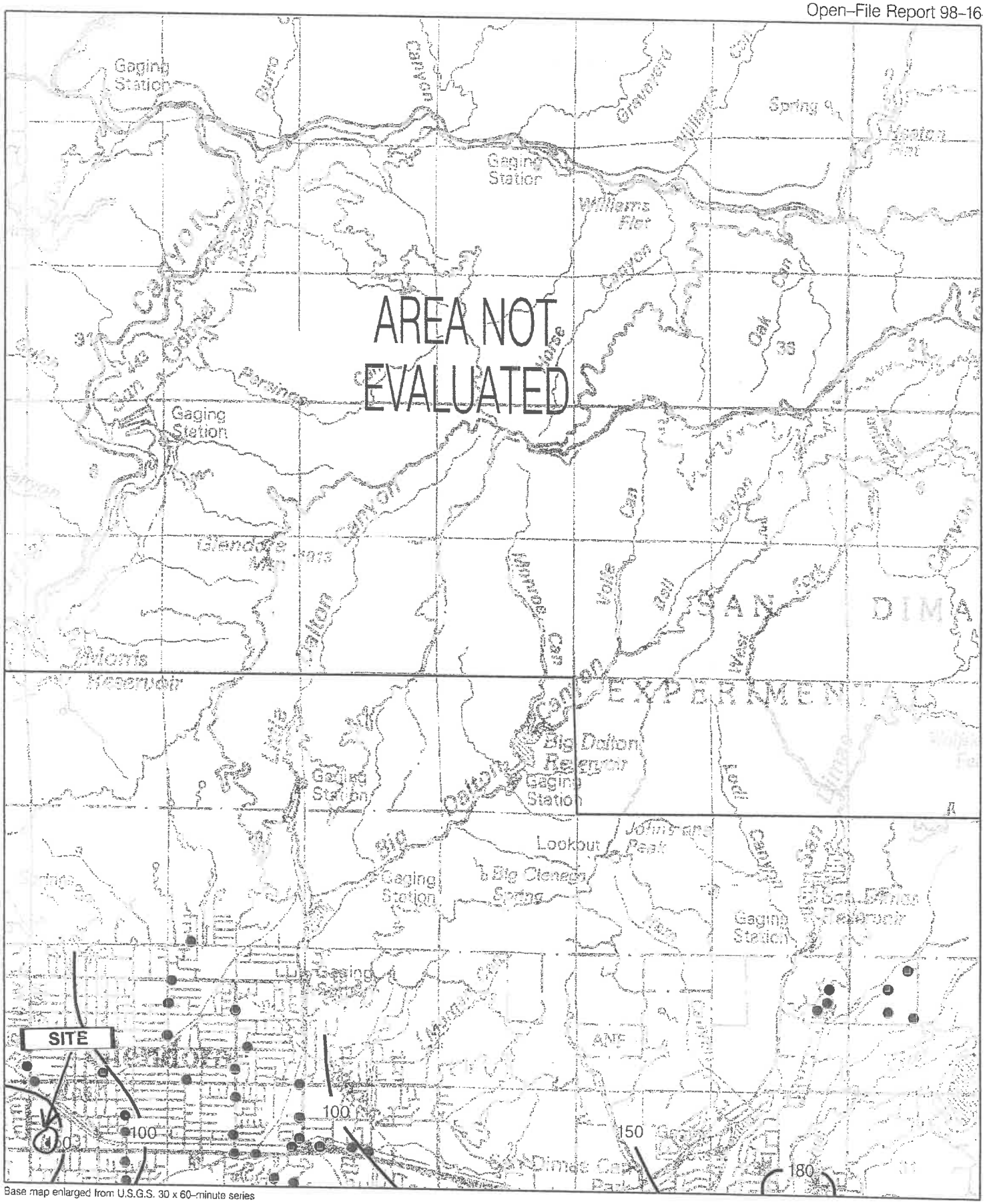
Approximate Scale: 1" = 1000'

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY	Project Address: 501 W. Route 66 Glendora, California

REGIONAL GEOLOGY MAP

08/19

Figure 3



Base map enlarged from U.S.G.S. 30 x 60–minute series

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

● Borehole Site

30 Depth to ground water in feet

ONE MILE

SCALE

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 25.0 feet below the existing ground surface. Based on the historically high groundwater depth map prepared by CDMG Seismic Hazard Zone Report 025 the historic groundwater is approximately greater than 150 feet below ground surface at the subject site (High Ground Water Map Glendora Quadrangle) 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 subject site.

5.1.2 Surficial Soil Removals

No detailed grading plan was available at the time of preparing this report however, based on our field exploration and laboratory data obtained to date, it is recommended that the building pads for the new residential and commercial structures be removed and recompacted. The removal depth should be 3 feet below existing grade or 1 foot beneath proposed footing bottom whichever is deeper. The recommended removal should be extended at least 5 feet beyond proposed building lines. Existing near surface soils should also be removed at least one foot within proposed concrete slab and driveway areas. The construction areas should be excavated and then observed by a representative of this office to verify the 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.

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 12 inches, conditioned to near optimum moisture content, then compacted in-place 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. Soils imported from off-site sources should be similar to the onsite soils and should be approved by the Soil Engineer prior to transporting to the site. 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.

5.2 Shallow Foundation Design

5.2.1 Bearing Value

For the proposed buildings, an allowable bearing value of 1800 pounds per square foot (psf) may be used for design of the footings placed at a depth of at least 18 inches below the lowest adjacent ground and founded on the new certified compacted fill. For the proposed site walls, that are not part of the building, an allowable bearing value of 2200 pounds per square foot (psf) may be used for the footings placed at a depth of 18 inches below the lowest adjacent ground surface and founded on the new certified compacted fill. Single spread footings should be at least 24 inches square and continuous footings should be at least 12 inches wide. These bearing values may be increased by 200 psf for each additional foot of depth or width to a maximum value of 2500 psf. The above recommended 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 anticipated to exceed 3/4 inch. Differential settlement between adjacent columns is not anticipated to exceed 1/4 inch.

5.2.3 Lateral Pressures

Passive earth pressure may be computed as an equivalent fluid pressure of 300 pounds per cubic foot, with a maximum earth pressure of 2500 pounds per square foot. An allowable coefficient of friction between soil and concrete of 0.40 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 30 pounds per cubic foot. The above value assumes free-draining conditions.

5.3 Foundation Construction

It is anticipated that the entire structure will be underlain by onsite soils of very low expansion potential. Following presented 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 into new certified compacted fill. Proposed footings should include surcharge from adjacent neighboring structures, including structural footings and/or walls. All continuous footings should have at least one No. 4 reinforcing bar placed both 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 entrance. 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 wrapped in gravel and geofabric 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

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 2016 (Chapter 16) & ASCE 7-10 (Chapter 20) seismic related values may be used:

Site Classification: (ASCE, Table 20.3-1)	D
Spectral Response Accelerations (g):	
(CBC, Figure 1613.3.1 (1) 0.2-Second, S_S	2.308
(CBC, Figure 1613.3.1 (2)) 1-Second, S_1	0.871
Site Coefficient:	
(CBC, Table 1613.3.3 (1)) F_a	1.0
(CBC, Table 1613.3.3 (2)) F_v	1.5

Based on the U.S. Seismic Design Maps (USGS, updated June 2014), the proposed structures may be designed to accommodate up to a maximum site horizontal acceleration of 0.839g 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 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 0.002 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 mildly 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.

8.0 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.

9.0 PERCOLATION TEST

In order to evaluate the feasibility of the infiltration system, EGL has performed percolation tests 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-5) was presoaked and tested on August 5 & 6, 2019. The test procedures are described as following:

- 3"-diameter perforated pipe surrounded with gravel was placed in the test boring B-5 so that caving would not occur during the percolation testing.
- The test boring was filled with a depth of 8' water for the presoak on August 5, 2019. The water was completely drained by August 6, 2019.
- Actual percolation tests were performed on August 6, 2019. 24 -36 inches of water was placed within the test boring, and the drops in the water level were recorded. For the first two tests water drained faster than 10 minutes within test boring so the actual test time to completely drain the hole should be used.
- The test boring was filled with depth of 12 – 24 inches of water multiple times, and the times for the water to drain out were recorded. This was repeated ten (10) times. 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 14.91 in/hr. Reduction factors have been applied to our infiltration rate. Based on the uniformity of the soil the infiltration rate should be adequate throughout the site. The soil at the site appears uniform so a reduction factor of 1 is used for RF_V. Due to the proposed filter within each catch basin and maintenance program a reduction factor of 1 was used for RF_s. It is our opinion that dispersal of on-site storm water runoff by an infiltration system is considered feasible from a geotechnical engineering standpoint. The infiltration system and the final plumbing plans should be designed and prepared by the project Civil Engineer.

Due to the high percentage of fine to coarse grained silty sand and well-graded sand at the site it is EGL's opinion that an infiltration system may be placed at the site. The infiltration system should be a minimum of 10 feet away from the building foundations and should not be surcharged by the building foundations. It is also recommended that the infiltration chamber be placed within natural soil and not compacted fill material. The infiltration system should also have an overflow or bypass to protect the site from flooding.

Based on the consolidation test results presented in Appendix B all the samples collected below 5 feet showed a deformation of less than 1.0% at the time of saturation. It is EGL's opinion that hydro-consolidation of the soil due to the proposed infiltration system is negligible and should not impact the proposed structure.

Based on the Seismic Hazard Zones Map, (Figure 1, Ref. #7), the subject site is not located within a seismically induced liquefaction zone. It is EGL's opinion that the proposed infiltration system will not increase the potential for liquefaction to occur at the site. Plate 1.2 Historically Highest Ground Water Contours and Borehole Log Data Locations prepared by CDMG SHZR 025 (Ref #5) shows the historical groundwater depth is approximately greater than 150 feet below the ground surface at the subject site. It is EGL's opinion that the proposed infiltration system will not have any impact on groundwater and that no mounding effects are expected below the subject site.

10.0 DRAINAGE

The pad 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 case 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.

11.0 ASPHALT PAVEMENT

Preliminary structural pavement sections are designed according to the CalTrans Highway Design Manual and an assumed "R"-value of 40.

Location	Traffic Index	AC Thickness (inches)	Class 2 Aggregate Base Thickness (inches)	Compacted Subgrade (inches)
Parking Areas	4.5	3	5	12
Driveways	5.0	4	6	12

A traffic index of 4.5 is typically used for parking area for passenger vehicles with an average daily traffic of less than 200 trips. A traffic index of 5.0 is used for drive areas with an average daily traffic of less than 1,200 passenger vehicles with minor truck traffic. These pavement sections are considered preliminary and may be revised after the grading is completed provided additional testing is performed on the subgrade soil.

12.0 111 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 adversely affect on the geotechnical stability of the adjacent properties provided our recommendations are followed

13.0 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

1. American Concrete Institute, (2014), "*Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary*", Chapter 19: Durability Requirements, Sections 19.3.1: Exposure Categories and Classes & 19.3.2: Requirements for Concrete Mixtures; pages 317 to 323, Tables 19.3.1.1 and 19.3.2.1".
2. ASCE, (2010), "ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures: Third Printing, Errata incorporated, Includes Supplement No. 1; prepared and published by American Society of Civil Engineers.
3. CBC, (2016), "California Building Code: California Code of Regulations, Title 24, Part 2, Volume 2 of 2, California Building Standards Commission"; Section 1613 Earthquake Loads.
4. CDMG, (1998), "Seismic Hazard Evaluation of the Azusa 7.5-minute Quadrangle, Los Angeles County, California"; updated 2006; prepared by California Division of Mines and Geology; Seismic Hazard Zone Report 021; 59 pgs, 6 figs, 4 tables and 3 plates.
5. CDMG, (1998), "Seismic Hazard Evaluation of the Glendora 7.5-minute Quadrangle, Los Angeles County, California"; updated 2006; prepared by California Division of Mines and Geology; Seismic Hazard Zone Report 025; 59 pgs, 6 figs, 5 tables and 3 plates.
6. CDMG, (1999), "Seismic Hazard Zones of Azusa 7.5-minute Quadrangle, Los Angeles County, California"; prepared by California Division of Mines and Geology; Official Map; scale 1" = 2000'
7. CDMG, (1999), "Seismic Hazard Zones of Glendora 7.5-minute Quadrangle, Los Angeles County, California"; prepared by California Division of Mines and Geology; Official Map; scale 1" = 2000'
8. EBTA Architects, (2019), "Site Plan, 501 W. Route 66, Glendora, California", Job No. 19019, scale 1/16" = 1'-0", dated August 15, 2019.
9. Los Angeles County, (2017), "Guidelines For Design, Investigation, And Reporting Low Impact Development Stormwater Infiltration"; dated 06-30-2017; Administrative Manual GS200.2, prepared by County of Los Angeles Department of Public Works, Geotechnical and Materials Engineering Division, 40 pages; http://ladpw.org/gmed/permits/docs/policies/GS200.2.pdf
10. USGS, (2014), "US Seismic Design Maps"; updated 06-23-2014; prepared by United States Geological Survey; https://earthquake.usgs.gov/ws/designmaps/asce7-10.html
11. 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 August 5, 2019 with the aid of a hollow-stem drill rig of ACE Drilling Services. A total of five (5) 8-inch diameter hollow-stem auger borings were drilled to a maximum depth of 25.0 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 a 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: 501 W. Route 66, Glendora

PROJECT NO: 19-128-004GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	08/05/2019
DATE LOGGED:	08/05/2019
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	CS

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

Depth (ft)	Sample: Bulk	Sample: Undisturbed	Blows Counts; 12"	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	*Earth Material Descriptions*
0 - 2	B	R	13	SC	95.1	7.4	@ 2.0' Clayey sand, fine- to coarse-grained, dark olive brown, slightly moist, loose to medium dense, few fine gravel
4 - 6		R	38	SW/SM	113.0	2.4	@ 5.0' Well-graded sand with silty sand, fine- to coarse-grained, dark olive brown, dry, medium dense, few gravel up to 1.0" in size
8 - 10		R	30	SW/SM	106.4	2.5	@ 10.0' Well-graded sand with silty sand, fine- to coarse-grained, dark olive brown, dry, medium dense, few gravel up to 2.0" in size
12 - 14							
16		R	35	SM	109.3	11.4	@ 15.0' Silty sand, fine- to medium-grained, dark brown, moist to very moist, medium dense, few fine gravel, trace of clay
18 - 20		R	50/8"	SM/SW	97.7	3.3	@ 20.0' Silty sand to well-graded sand, fine- to coarse-grained, olive brown to dark olive brown, dry, very dense, few fine gravel
22 - 24							
26		R	50/7"	SM/SW	109.3	2.7	@ 25.0' Silty sand to well-graded sand, fine- to coarse-grained, olive brown to dark olive brown, dry, very dense, few fine gravel
28 - 30							Total Depth = 25.0 feet No Caving; No Groundwater Boring Backfilled and Tamped
32 - 34							Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
36 - 38							
40 - 42							
44							

EGL

BORING LOG: B-2

PROJECT LOCATION: 501 W. Route 66, Glendora

PROJECT NO: 19-128-004GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	08/05/2019
DATE LOGGED:	08/05/2019
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	CS

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	29	SM	110.2	2.8	@ 2.0' Silty sand, fine- to coarse-grained, olive brown, dry, medium dense, few fine gravel & hair roots
4							
6		R	20	SM	99.3	5.0	@ 5.0' Silty sand, fine- to coarse-grained, dark olive brown, slightly moist, medium dense, few fine gravel, trace of clay
8							
10		R	40	SW/SM	110.1	2.4	@ 10.0' Well-graded sand with silty sand, fine- to coarse-grained, olive brown, dry, medium dense, few fine gravel
12							
14							
16		R	50/11"	SW/SC	103.8	5.3	@ 15.0' Well-graded sand to clayey sand, fine- to coarse-grained, olive brown, slightly moist, dense to very dense, few fine gravel
18							
20		R	50/5"	SW/SM	117.2	1.7	@ 20.0' Well-graded sand with silty sand, fine- to coarse-grained, olive brown, dry, very dense, few fine gravel
22							
24							
26		R	50/6"	SM	111.8	2.0	@ 25.0' Silty sand, fine- to coarse-grained, olive brown, dry, very dense, few fine gravel
28							Total Depth = 25.0 feet No Caving; No Groundwater Boring Backfilled and Tamped Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
30							
32							
34							
36							
38							
40							
42							
44							

EGL

BORING LOG: B-3

PROJECT LOCATION: 501 W. Route 66, Glendora

PROJECT NO: 19-128-004GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	08/05/2019
DATE LOGGED:	08/05/2019
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	CS

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	15	SM	80.2	6.8	@ 2.0' Silty sand, fine grained, olive brown, slightly moist, medium dense, trace of clay
4							
6		R	20	SM/SW	107.7	4.0	@ 5.0' Silty sand to well-graded sand, fine- to coarse-grained, olive brown, slightly moist, medium dense, few fine gravel
8							
10		R	40	SW/SM	111.5	2.0	@ 10.0' Well-graded sand with silty sand, fine- to coarse-grained, dark olive brown, dry, medium dense, few gravel up to 3.0" in size
12							
14							
16		R	50/11"	SM	105.5	6.6	@ 15.0' Silty sand, fine- to coarse-grained, dark olive brown, slightly moist, dense to very dense, few fine gravel
18							
20							Refusal @ 18.0 feet Total Depth = 18.0 feet No Caving; No Groundwater Boring Backfilled and Tamped Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							

EGL

BORING LOG: B-4

PROJECT LOCATION: 501 W. Route 66, Glendora

PROJECT NO: 19-128-004GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	08/05/2019
DATE LOGGED:	08/05/2019
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	CS

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	10	SC	88.1	15.5	@ 2.0' Clayey sand, fine- to medium-grained, dark olive brown, moist, loose
4 - 6		R	10	SM	89.0	9.7	@ 5.0' Silty sand, fine- to coarse-grained, dark olive brown, moist, loose, few gravel up to 2.5" in size
8 - 10		R	35	SW/SC	110.8	9.8	@ 10.0' Well-graded sand to clayey sand, fine- to coarse-grained, olive brown, moist, medium dense, few fine gravel
12 - 14 - 16		R	30	SM	101.6	11.4	@ 15.0' Silty sand, fine- to coarse-grained, olive brown, very moist, medium dense, trace of clay
18 - 20		R	50/7"	SM/SW	-	-	@ 18.0' Silty sand and well-graded sand, fine- to coarse-grained, olive brown, slightly moist, very dense, few fine gravel; unable to sample due to rocky condition
22 - 24 - 26 - 28 - 30 - 32 - 34 - 36 - 38 - 40 - 42 - 44							Refusal @ 18.0 feet Total Depth = 18.0 feet No Caving; No Groundwater Boring Backfilled and Tamped Hammer Driving Weight = 140 lbs. Hammer Driving Height = 30 inches

EGL

BORING LOG: B-5

PROJECT LOCATION: 501 W. Route 66, Glendora

PROJECT NO: 19-128-004GE

EXCAVATION SERVICE:	ACE Drilling
DATE EXCAVATED:	08/05/2019
DATE LOGGED:	08/05/2019
EXCAVATION METHOD:	Hollow Stem
SAMPLE METHOD:	Split-Tube
ELEVATION:	-----
LOGGED BY:	CS

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	14	SM	88.1	6.6	@ 2.0' Silty sand, fine- to medium-grained, dark olive brown, slightly moist, medium dense, few gravel up to 1.0" in size, trace of clay
4 - 6		R	27	SM/SW	102.3	2.3	@ 5.0' Silty sand to well-graded sand, fine- to coarse-grained, olive brown, dry, medium dense, few fine gravel
8		R	50/10"	SW	113.6	4.2	@ 7.0' Well-graded sand, fine- to coarse-grained, dark olive brown, slightly moist, very dense, few gravel up to 1.0" in size
10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28 - 30 - 32 - 34 - 36 - 38 - 40 - 42 - 44							Total Depth = 8.0 feet No Caving; No Groundwater Boring Backfilled and Tamped After Percolation Test 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.

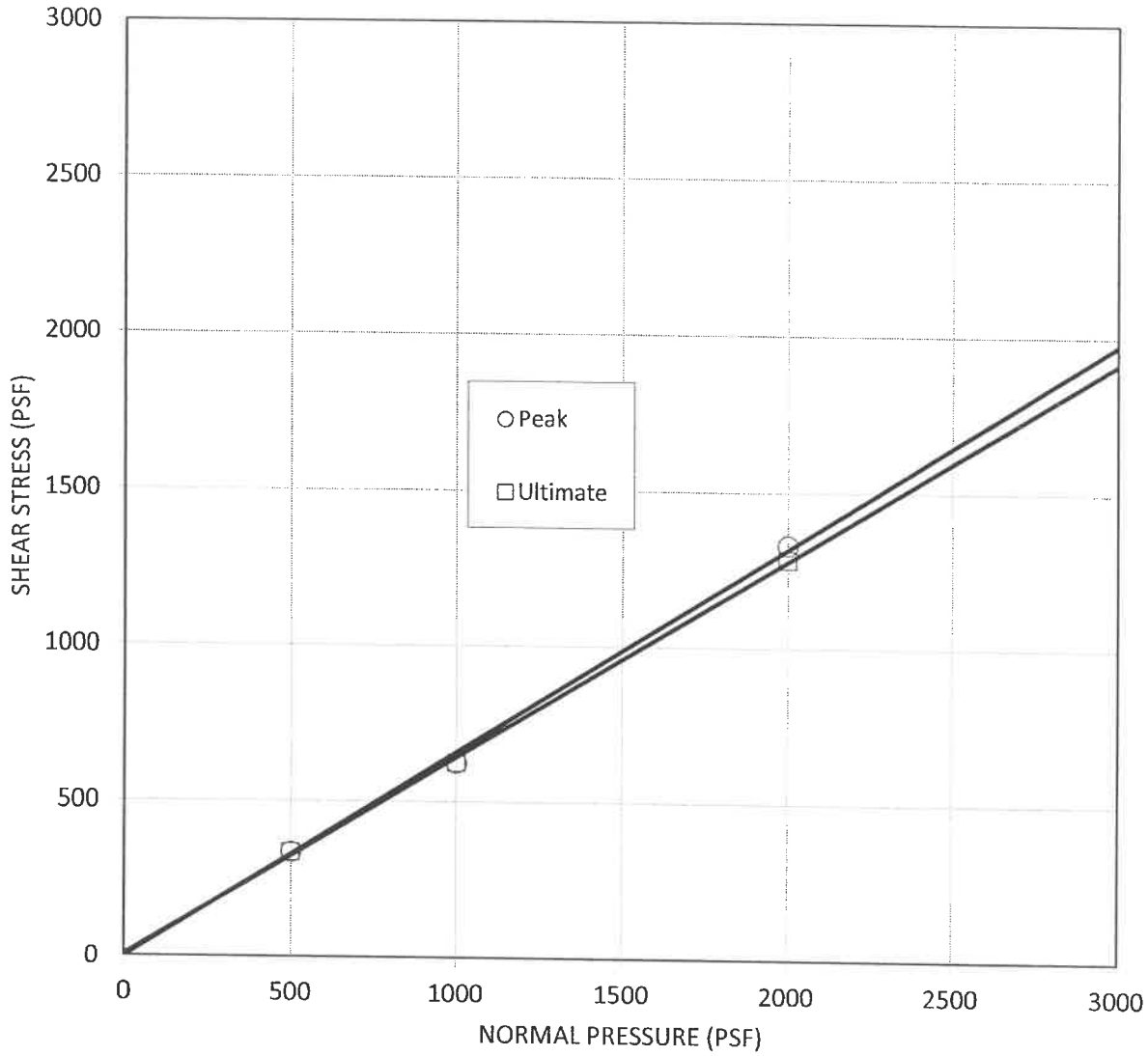
Consolidation Tests

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 Test

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	CT-412 Chloride (ppm)	CT-417 Sulfate (% by weight)	CT-643 Min. Resistivity (ohm-cm)
B-1 @ 0-5'	7.63	137	0.002	10,200



Boring No.:	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B-2	2	5.0	Ring	SM	○	0	33
					□	6	32

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)	γ_d (pcf)	S (%)
500	5.0	22.0	102.4	92.3
1000	5.0	23.7	99.7	92.6
2000	5.0	24.4	99.0	93.8

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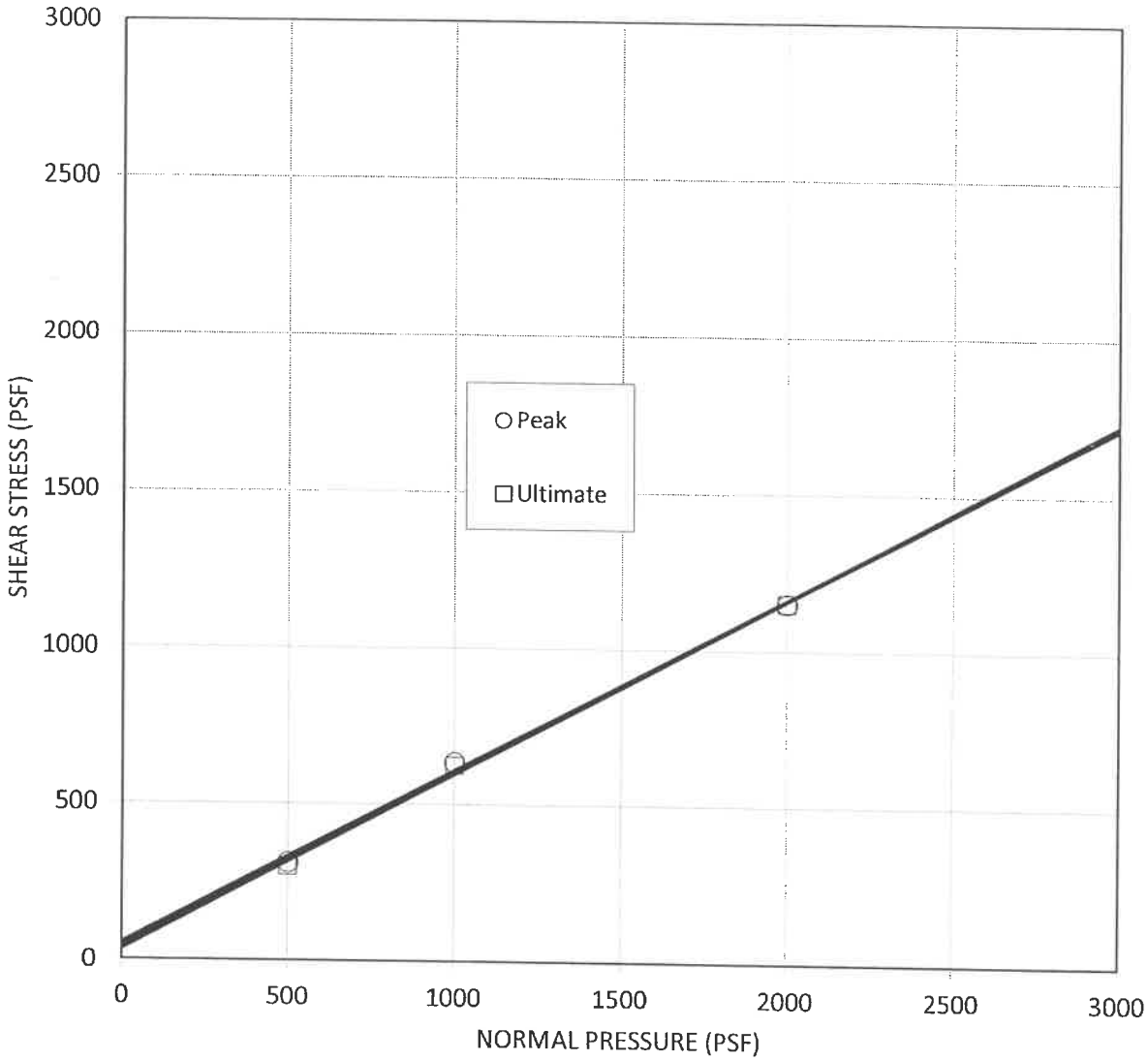
DIRECT SHEAR

08/19 (ASTM D3080) Figure



Boring No.:	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B-4	1	2.0	Ring	SC	○	54	29
					□	36	29

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)	γ_d (pcf)	S (%)
500	15.5	32.3	88.5	96.4
1000	15.5	31.6	88.5	94.4
2000	15.5	31.6	88.0	93.3

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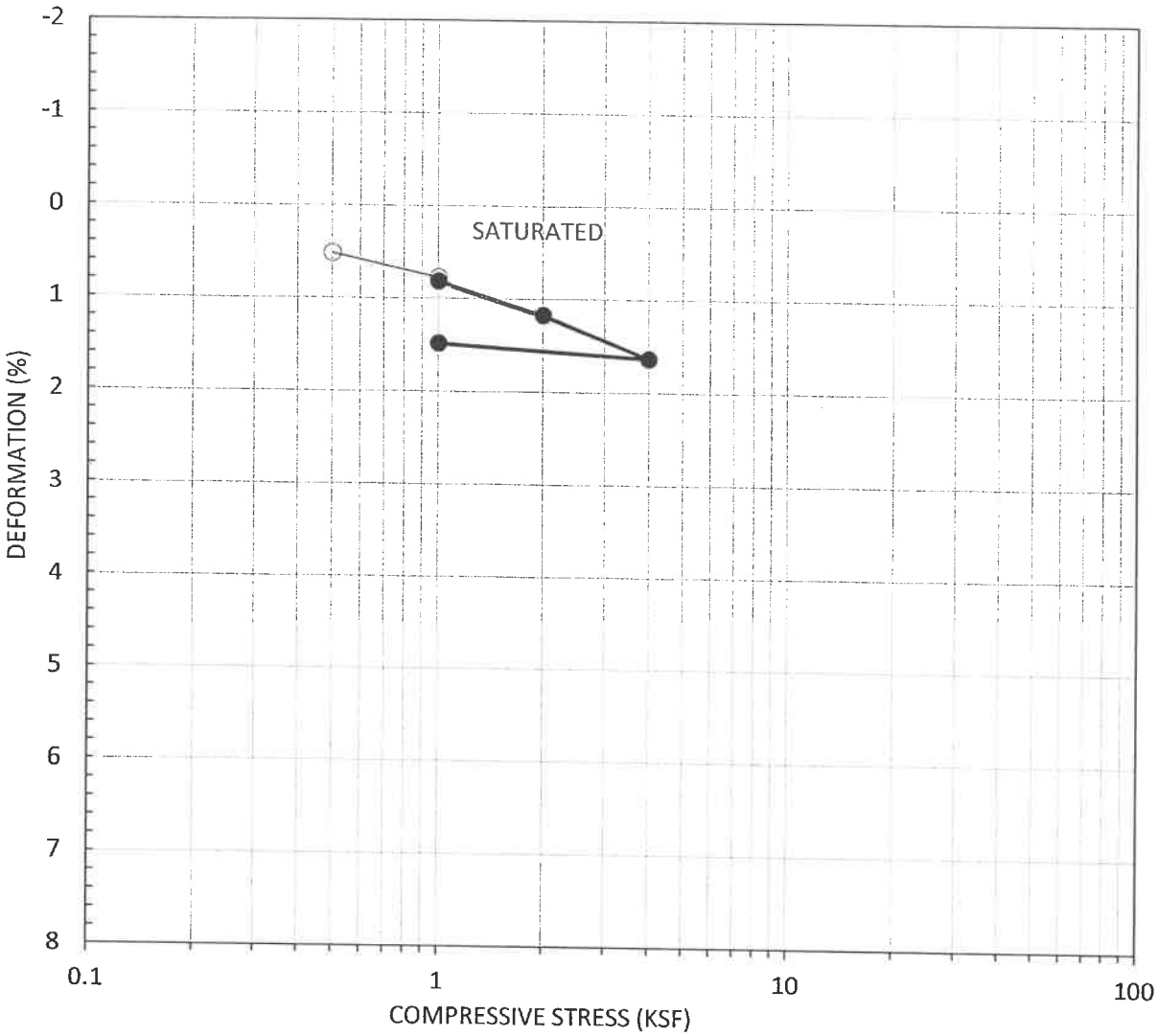
Glendora, California

DIRECT SHEAR

08/19 (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-1	2	5.0	SW/SM	2.4	115.6	0.458

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

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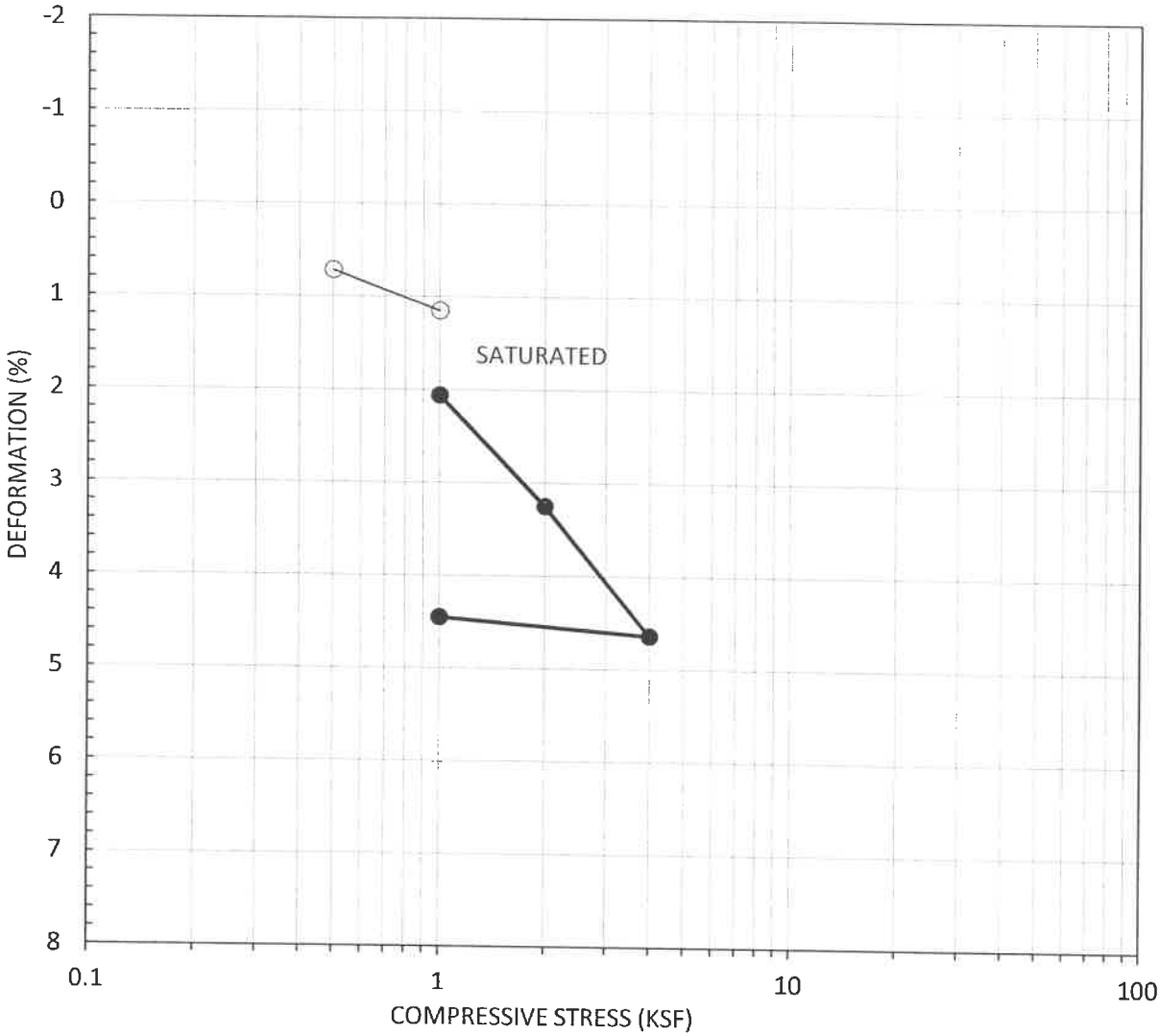
CONSOLIDATION

08/19

(ASTM D2435)

Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-2	1	2.0	SM	2.8	110.8	0.521

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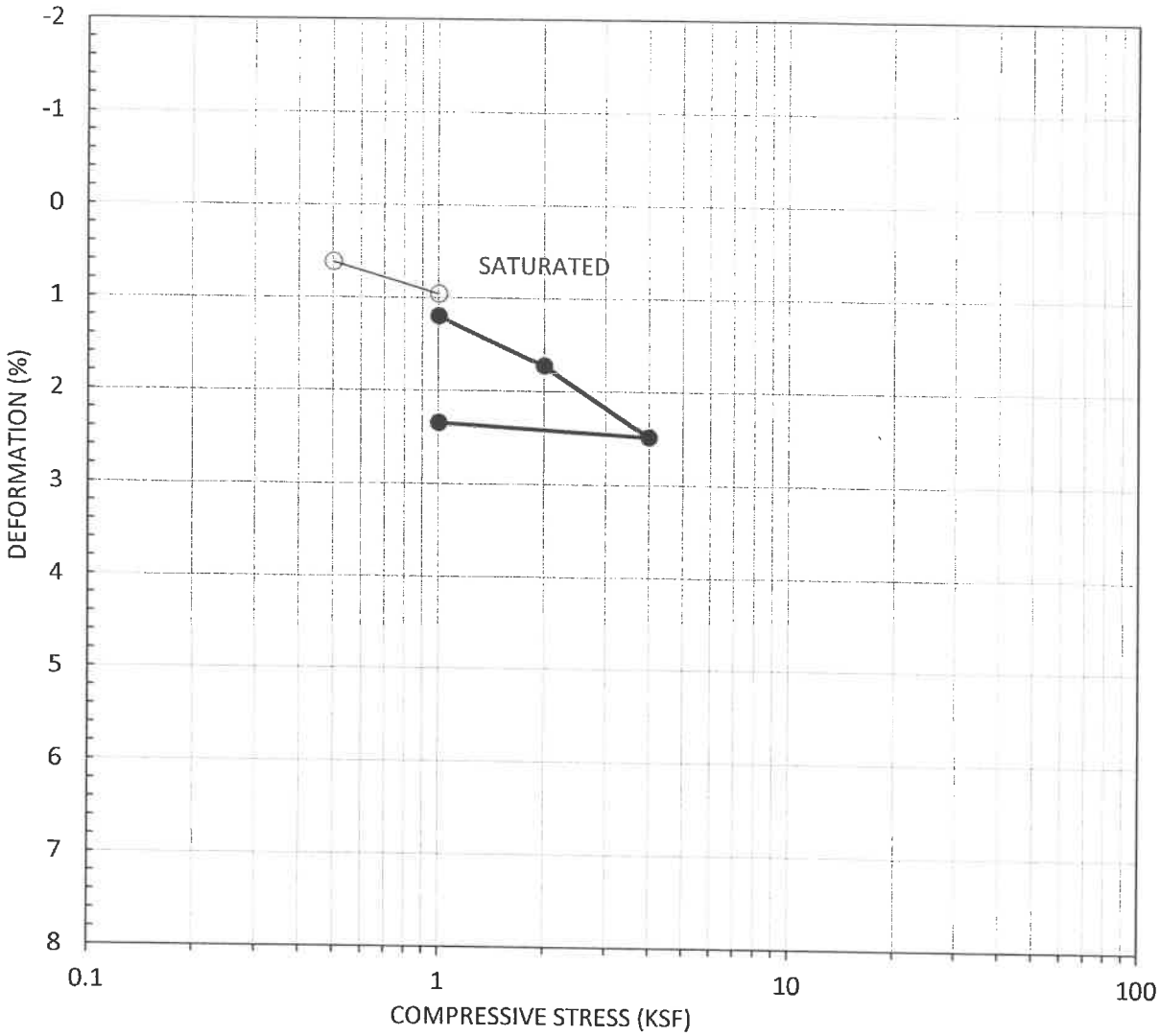
Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-3	3	10.0	SW/SM	2.0	112.7	0.495

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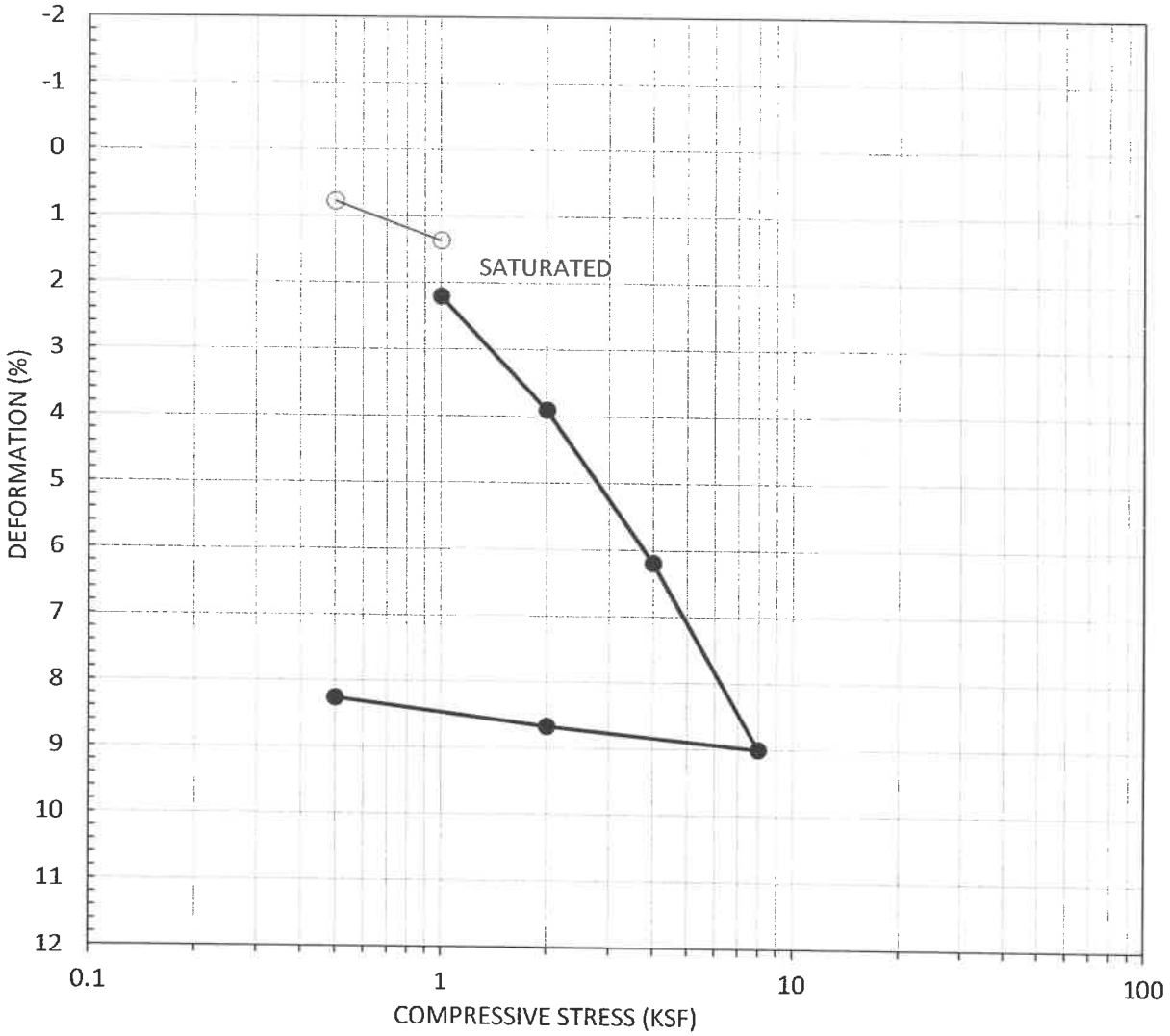
Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-4	4	15.0	SM	11.4	104.1	0.619

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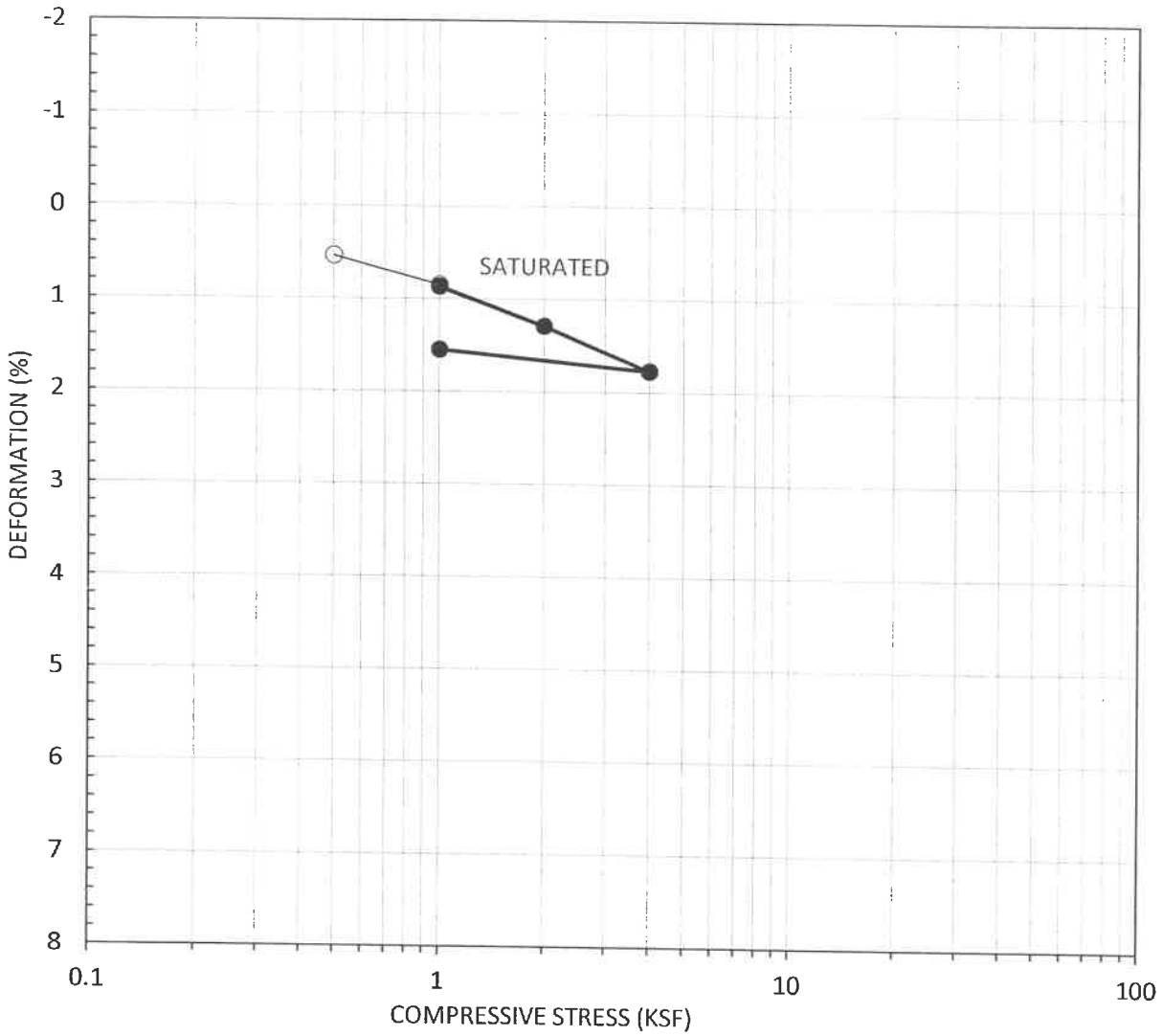
Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density	Init. Void Ratio
○	B-5	3	8.0	SW	4.2	115.2	0.463

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Figure

APPENDIX C
INFILTRATION TEST RESULTS

PRESOAK AND PERCOLATION TEST: Test Boring B-5: August 5 & 6, 2019
Test Boring Diameter and Depth: Test Boring B-5: 8" diameter and 8.0' deep

PRESOAK: B-5. August 5 & 6, 2019

Test Location	Boring Diameter (in)	Total Boring Depth (ft)	Initial Water Depth, d_i (in)	Drop, Δd (in)	Time (hr:min) Start	Time (hr:min) End	Δ Time (min)	Notes:
B-5	8.0	8.0	24.0	24.0	8:23	8:27	4.0	As part of the presoak the test hole was filled with 8.0' of water on August 5, 2019. The water was drained by August 6, 2019.
B-5	8.0	8.0	36.0	36.0	8:29	8:37	8.0	

PERCOLATION TEST: B-5. August 6, 2019

Test Location	Boring Diameter (in)	Total Boring Depth (ft)	Initial Water Depth, d_i (in)	Drop, Δd (in)	Time (hr:min) Start	Time (hr:min) End	Δ Time, Δt^+ (min)	Measured Percolation Rate (in/hr)	Total Reduction Factor*	Design Infiltration Rate (in/hr)
B-5	8.0	8.0	24.0	24.0	8:41	8:49	8.0	13.85	2.00	6.92
B-5	8.0	8.0	12.0	12.0	8:51	8:55	4.6	22.46	2.00	11.23
B-5	8.0	8.0	12.0	12.0	9:00	9:04	4.3	24.03	2.00	12.02
B-5	8.0	8.0	12.1	12.0	9:08	9:12	4.7	21.92	2.00	10.96
B-5	8.0	8.0	12.0	12.0	9:16	9:19	3.6	28.57	2.00	14.29
B-5	8.0	8.0	12.0	12.0	9:25	9:28	3.2	32.04	2.00	16.02
B-5	8.0	8.0	12.0	12.0	9:32	9:35	3.3	31.17	2.00	15.58
B-5	8.0	8.0	12.0	12.0	9:38	9:41	3.3	31.65	2.00	15.82
B-5	8.0	8.0	12.0	12.0	9:45	9:48	3.5	29.81	2.00	14.91
B-5	8.0	8.0	12.0	12.0	9:51	9:54	3.7	28.03	2.00	14.01

⁺First 2 tests drained in less than 10 min; therefore, the actual time to compeletely drain the hole was used for the tests.

Average Design Infiltration Rate (in/hr): 14.91

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 x RF_v x RF_s

Design Infiltration Rate = Measured Percolation Rate/RF

Site: 501 W. Route 66, Glendora
Project No: 19-128-004