LK Geotechnical Engineering, Inc.
10120 National Boulevard, Los Angeles, CA 90034
Engineer: 626.328.4346; Geologist: 310.866.8977

GEOTECHNICAL INVESTIGATION REPORT
PROPOSED 1- TO 2- STORY CLASSROOM BUILDINGS, PLAY PLACE, DRIVEWAY AND PARKING LOT
APN 6137-032-033 & APN 6137-017-001
15526 – 15544 PLUMMER STREET
LOS ANGELES, CALIFORNIA

February 11, 2022
LKGE Project No. 21-1212

FOR

Bright Star Schools - Valor Elementary School
600 S. La Fayette Park Place
Los Angeles, CA 90057

February 11, 2022
LKGE Project No. 21-1212

Bright Star Schools - Valor Elementary School
600 S. La Fayette Park Place
Los Angeles, CA 90057

Attn: Mr. Hrag Hamalian, CEO

Subject: **GEOTECHNICAL INVESTIGATION REPORT**
Proposed 1- to 2-Story Classroom Buildings, Play Place, Driveway and Parking Lot
APN 6137-032-033 & APN 6137-017-001
15526-15544 Plummer Street
Los Angeles, California

Dear Mr. Hrag Hamalian,

Pursuant to your request, LK Geotechnical Engineering, Inc. has completed a geotechnical investigation and prepared this report for the proposed improvements at the subject site. The primary objective of this investigation was to provide our best estimate of the geotechnical factors that pertain to the gross stability of the proposed improvements and to evaluate alternatives for a foundation system for the proposed structures.

The report includes a description and an evaluation of the soil materials and provides soils engineering recommendations for construction of the proposed improvements. This report is intended for submittal to the appropriate governmental authorities that control the issuance of necessary permits.

Based on our findings, the proposed project is geotechnically feasible, provided that the recommendations in this report are incorporated into the design and are implemented during construction of the project.

If you have any questions regarding the information contained in this report, please feel free to call this office.

Sincerely,

LK GEOTECHNICAL ENGINEERING, INC.

Sean Lin, G.E. 2921
Principal Engineer

TABLE OF CONTENTS

List of Plates

List of Appendices

1. SCOPE OF WORK

To prepare this report, we have performed the tasks described in the following subsections:

1.1. Literature Review

We reviewed geological literature including geologic maps, topographic maps and aerial photographs relevant to the subject site in preparation of this report. A list of literature reviewed is presented in the "References" section of this report.

1.2. Field Exploration

We performed field exploration consisting of logging of five (5) exploratory soil borings on January 11, 2022. The exploration was performed using an 8-inch diameter hollow-stem auger drill rig and a hand auger. The borings were advanced to a maximum depth of approximately 31.5-feet below existing grade. The approximate boring locations are shown on Plate 1. Detailed descriptions of the soils encountered during drilling are presented in Appendix A – Field Exploration.

1.3. Field Percolation Testing

We performed a percolation testing by using one of the exploratory borings to determine the infiltration rate of on-site soil. Detailed testing data is presented in Appendix A – Field Exploration.

1.4. Geotechnical Laboratory Testing

Representative soil samples collected from our field exploration were delivered to the EGLab, Inc. (EGL) of Arcadia, California for testing, and to evaluate relevant engineering properties. The detailed laboratory test results are presented in Appendix B – Laboratory Testing. Based on our review of the laboratory data, LKGE concurs with and accept the laboratory testing results performed by EGLab, Inc.

1.5. Engineering Analysis and Report Preparation

We compiled all geological and geotechnical data obtained from literature review, field exploration and laboratory test results, and then prepared this report to present our findings and the geotechnical recommendations, including seismic considerations, grading, foundations, foundation setback, retaining walls, floor slabs, temporary excavations, and drainage.

2. PROPOSED DEVELOPMENT AND SITE DESCRIPTION

2.1. Proposed Development

It is our understanding that the proposed project consists of constructing a new charter school (non-DSA project) including two (2), 1-story buildings and one (1), 2-story building, a

play place, driveway and parking lot at the subject site. The existing single-family house will remain. The proposed structures are shown on Plate 1 – Site Plan and Geotechnical Exploration Map.

2.2. Site Description

The project site is located at 15526-15544 Plummer Street in the Los Angeles, California. The site is bounded by Plummer Street on the north, a single-story family residence on the east, a single-story family residence on the west, and four (4) single-story family residences on the south.

The site is currently occupied by a single-family house (to remain) with a few trees and an empty lot with foliage and a few trees.

The site is essentially level. The regional topographic gradient is approximately 0.5 percent toward the south. Drainage across the site is by uncontrolled sheet flow to the adjacent sidewalks, street, as well as by infiltration within unpaved areas.

3. SITE GEOLOGY AND SUBSURFACE CONDITIONS

3.1. Regional Geology

According to the regional geologic map (Dibblee, 1992), the project the site is underlain by alluvium (geologic map symbol Qa). This material composes silty sand and sandy silt. A portion of the geologic map is reproduced as Plate 2 – Regional Geologic Map.

3.2. Subsurface Earth Materials

Based on our review of the available regional geologic data and our field exploration, the earth materials observed at the site consist of artificial fill and alluvium.

3.2.1. Artificial Fill (Af)

Artificial fill consisting of silty sand with man-made debris was encountered within our exploratory Borings B-3, B-4 and B-5 at the site. The maximum observed thickness of the artificial fill at the site was on the order of 1- to 2-feet. Artificial fill depths may vary across the site. This material is considered unsuitable for foundation or slab support for the proposed structures and/or for support of new compacted fill.

3.2.2. Alluvium (Qa)

Alluvium consisting of dark brown to light brown silty sand and sandy silt were encountered in our exploratory borings at the site. The alluvium at the site was observed to be medium dense, and dry to slightly moist. Undisturbed alluvium is considered suitable for foundation or slab support for the proposed structures and/or for support of new compacted fill, provided that our recommendations are followed and integrated into the improvement plans.

3.2.3. Excavation Characteristics

The earth materials underlying the site should be generally excavatable with heavy-duty earthwork equipment in good working condition. Some gravels, cobbles and man-made debris should be anticipated within the fill soils derived from demolition. Local caved-in conditions should be anticipated in the sandy soils during excavation.

3.3. Groundwater

No groundwater was observed on the site or in our exploratory borings to a maximum depth of 31.5-feet below existing grade. According to the State of California Seismic Hazard Zone Report of the Van Nuys Quadrangle, the site is located within an area with the historically highest groundwater level reportedly greater than 150-feet below ground surface. The groundwater level appears to be well below the level of the proposed structures. It should be noted that local fluctuations in groundwater levels may occur due to seasonal variations in rainfall, irrigation and water line leaks.

4. GEOLOGIC AND SEISMIC HAZARDS EVALUATION

4.1. Seismic Hazard Zones Evaluation

The southern California region is seismically active and commonly experiences strong ground shaking resulting from earthquakes along active faults. Ground shaking resulting from a moderate to major earthquake (Magnitude 6.0 or greater) can be expected during the lifespan of the existing and/or proposed structures. Property owners and the general public should be aware that any structure or slope in the southern California region could be subject to significant damage as a result of a moderate or major earthquake. The hazards associated with seismic activity in the vicinity of the site are discussed and evaluated in the following sections.

4.1.1. Earthquake Fault Zone

The State of California established the Alquist-Priolo Earthquake Fault Zoning Act in 1972 which went into effect in 1973. The purpose of this Act is to prohibit the construction of most structures for human occupancy across the traces of active faults and to mitigate the hazard of fault rupture. An "active fault" is defined by the State Mining and Geology Board as one which had surface displacement within the Holocene era (+/- 11,000 years) and is well defined at the surface. The term “sufficiently active” has been used if there is evidence of Holocene surface displacement along one or more of its segments or branches.

The Act was renamed the Alquist-Priolo Special Studies Zones Act in 1975 and then Alquist-Priolo Earthquake Fault Zoning Act in 1994. The original designation “Special Studies Zones” has been renamed “Earthquake Fault Zones”. Under the Act, the State Geologist is required to delineate Earthquake Fault Zones (EFZ) along active faults in California. Development within these zones must include geologic investigations demonstrating that the sites are not threatened by surface displacement from future faulting. The California Geologic Survey (CGS) is required to delineate active faults,

compile maps of EFZs and submit such Official Maps to the public and continually review and revise EFZs based on new geologic and seismic data. EFZ boundaries on early maps were positioned about 660 feet (200 meters) away from the fault traces to accommodate imprecise locations of the faults and possible existence of active branches. The policy since 1997 is to position the EFZ boundaries about 500 feet (150 meters) away from major active faults and about 200 to 300 feet (60 to 90 meters) away from well defined, minor faults.

Based on our review of the State of California Seismic Hazard Zones map, the site is not located within an Earthquake Fault Hazard zone (see Plate 3). The closest known fault is the Northridge Hills Fault Zone which is mapped about 0.13-miles southwest of the site.

4.1.2. Soil Liquefaction Potential

Soil liquefaction occurs when the pore pressures generated within a soil mass approach the effective overburden pressure. Liquefaction of soils may be caused by cyclic loading such as that imposed by ground shaking during earthquakes. The increase in pore pressure results in a loss of strength, and the soil then can undergo both horizontal and vertical movements, depending on the site conditions. Other phenomena associated with soil liquefaction include sand boils, ground oscillation, and loss of foundation bearing capacity. Liquefaction is generally known to occur in loose, saturated, relatively clean, fine-grained cohesionless soils at depths shallower than approximately 50 feet. Factors to consider in the evaluation of soil liquefaction potential include groundwater conditions, soil type, grain size distribution, relative density, degree of saturation, and both the intensity and duration of ground motion.

Based on our review of the State of California Seismic Hazard Zones map, the site is not located within a Liquefaction Hazard zone (see Plate 3). Based on lack of shallow ground water, it is our professional opinion that the site is not susceptible to liquefaction. Seismically-induced settlement is considered negligible.

4.2. CBC Seismic Design Parameters

The future structures should be designed by the structural engineer in accordance with the applicable seismic building code. Based on our geotechnical investigation, the subject site is classified as Site Class D in accordance with the 2019 California Building Code that refers to the ASCE 7-16.

Per Section 11.4.8 of ASCE 7-16, structures shall be designed for the seismic response coefficient C_s determined by Eq. (12.8-2) for values of $T \leq 1.5\ T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) for $T_L \geq T > 1.5\ T_s$ or Eq. 37.5 (12.8-4) for $T > T_L$, where

T = the fundamental period of the building
$T_s = S_{D1}/S_{DS}$
T_L = long-period transition period

The design spectral response acceleration parameters presented on the following table generated by the Applied Technology Council (ATC) website, may be utilized for seismic design:

Site location (latitude, longitude): (34.2422, -118.4711)				
Spectral Period, T (second)	MCE_R ground motion (g)	Site-modified Spectral acceleration (g)		**Seismic design acceleration (g)**
0.2	S_s = 2.211	F_a = 1.0	S_{MS} = 2.211	**S_{DS} = 1.474**
1.0	S_1 = 0.776	F_v = 1.7	S_{M1} = 1.319	**S_{D1} = 0.879**
Site modified peak ground acceleration PGA_M = 1.001 g				
Long-period transition period T_L = 8 second				
Seismic Design Category = E				

If seismic response coefficient C_s recommended above is not applicable for structural design, our office can perform a site-specific ground motion hazard analysis upon the project structural engineer's request.

5. GEOTECHNICAL ENGINEERING RECOMMENDATIONS

5.1. Geotechnical Overview

Based on the findings of our investigation, the site is considered to be suitable from a soils engineering standpoint for construction of the proposed structures, provided the recommendations included herein are followed and integrated into the building and/or grading plans.

The following is a list of geotechnical considerations for this project:

- Based on our site observations, the near surface soils are disturbed and not suitable for structural support and will require mitigation during site development. We recommend that the proposed buildings be supported on conventional footings bearing on new certified compacted fill blanket benched into the underlying, firm native alluvium.
- Based on our review of laboratory testing results, the on-site near surface soil has "Medium" expansive potential. Mitigation for expansive soil has been incorporated into our recommendations.

Geotechnical engineering analyses performed for this report were based on the preliminary information provided to us. If the design substantially changes, then our geotechnical engineering recommendations would be subject to revision based on our evaluation of the changes.

5.2. Expansive Soil Evaluation

Expansive soils are characterized by their ability to undergo significant volume changes (shrink or swell) due to variations in moisture content. Changes in soil moisture content can result from rainfall, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors, and may cause unacceptable settlement or heave of structures, concrete slabs supported on-grade, or pavements supported over these materials. Depending on the extent and location below finished subgrade, these soils could have a detrimental effect on the proposed construction.

Based on our laboratory testing results, the artificial fill is considered as expansive soil with "Medium" expansive potential. Mitigation for expansive soil has been incorporated into our recommendations.

5.3. Collapsible Soil Evaluation

Based on our review of the laboratory testing results, the on-site near surface soil has a "slight" collapsible potential. Mitigation for collapsible soil has been incorporated into our recommendations.

5.4. Stormwater Infiltration Evaluation

Percolation testing was performed using the falling head boring test method in accordance with the Los Angeles County Guidelines. The water level was measured to the nearest tenth of a foot and converted to inches in the calculation. The infiltration rate is shown in the table below and the raw data is attached in Appendix A.

Soil Infiltration Rate

Boring No.	Total Depth of Boring (ft)	Depth of Testing Zone (ft)	Soil Description of Testing Zone	Infiltration Rate (inch/hour)
B-1	20	10 – 20	Sandy SILT	0.15

Based on our test results, the infiltration rate **does not** meet the minimum infiltration rate (0.3 inch/hour) required for "infiltration-type" stormwater treatment system in accordance with the Los Angeles County Guidelines. On this basis, it is not suitable to use the "infiltration-type" stormwater treatment system for LID design at the site. Alternate designs not infiltrating into the site shall be considered.

5.5. Site Preparation and Earthwork

Prior to construction/grading, the area of the proposed development should be clear of any loose surficial soils, vegetation and/or man-made debris. Demolition debris and other unsuitable materials should be stripped and removed from the site. Water lines or other old utility lines or installations to be abandoned should be removed or crushed in place. Holes resulting from removal of buried obstructions which extend below finished site grades should be backfilled with compacted soils.

5.5.1. Over-Excavation and Subgrade Preparation

For the proposed building, we recommend over-excavate at least 3-feet below the existing grade, or 1-foot below the proposed foundation bottom, whichever is deeper, and then place with compacted fill. The lateral extent of the over-excavation should be at least 3-feet beyond the edge of footing (where space permits) or equidistant to the thickness of fill below footing, whichever is greater.

For any ancillary structures (i.e. property line fence walls, canopies, trash enclosure, etc.), footing may be supported on new compacted fill. We recommend over-excavate at least 1 foot below the footing bottom, or to the depth of disturbed soil/undocumented fill, whichever is deeper. The lateral extent of the over-excavation should be equidistant to the thickness of fill below footing (where space permits).

For pavement and hardscape (patios, steps, walkways, etc.), we recommend scarify 6 inches below the subgrade, or to the depth of undocumented fill, whichever is deeper, and then recompact to 90% relative compaction.

Any excavated bottoms for footings or to receive new compacted fill should be inspected and approved by a representative from LKGE. prior to compaction work. Deeper excavations may be required in areas where soft, saturated, or unsuitable materials, for example, tree root balls or undocumented fill are encountered.

5.5.2. Compaction

On-site materials are considered to be suitable for compaction, provided that all deleterious materials are removed from the site prior to compaction.

All new compacted fill should be compacted to at least 90 percent of the maximum dry density, as determined by the current ASTM D1557 and at about 2 percent above optimum moisture content. Fill should be placed in horizontal lifts of approximately 8 inches in loose thickness, and then compacted by mechanical methods, using sheepsfoot rollers, multiple wheel pneumatic tired rollers, or other appropriate compacting rollers.

It may be necessary to import soils to the site to be used as compacted fill. Imported materials should be a sandy type of material and approved by the geotechnical engineer prior to transporting to the job site. The sandy material should not have an Expansion Index which exceeds 20 and should not contain rocks larger than 8-inches maximum size.

5.5.3. Utility Trench Backfill

Trench excavations to receive backfill shall be free of trash, debris or other unsatisfactory materials at the time of backfill placement. The utility should be bedded with clean sand to at least one foot over the crown. The bedding sand should have a sand equivalent (SE) of 30 or greater. The remainder of trench backfill may be onsite soils compacted to 90 percent of the laboratory maximum dry density as per ASTM D1557.

5.5.4. Shrinkage/Bulking Due to Compaction

Based on our review of the in-situ soil density data, preliminary volumetric shrinkage on the order of 10 to 15 percent as a result of compaction of onsite soil may be assumed.

5.5.5. Weather Related Grading Considerations

When rain is forecasted, we recommend all critical excavated bottoms, footings or trenches be covered with plastic sheeting to minimize subgrade soil saturation, and for the ease of removal of water.

Fill soil that has been spread and awaits compaction shall be properly compacted prior to rains. These fills, once compacted, shall have the surface sloped to drain to an area (temporary detention basin) where water can be removed easily.

Temporary drainage devices should be installed to collect and transfer excess water to the street in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope.

Once the earthwork is ready to resume after rainfall, the excavations and/or compaction conditions should be observed by this firm. Any soils saturated by the rain shall be removed and air-dried/mixed with dry materials for proper compaction. We will recommend additional mitigation measures based on the actual site conditions, if needed.

5.6. Temporary Excavation

The maximum recommended height of unsurcharged, temporary vertical excavations in the earth materials at the site is 5 feet. Excavations above this height should be trimmed to a 1:1 (H:V) ratio where the space is available. Surcharge loads, including construction vehicles and materials, should not be placed within five (5) feet of the unsupported excavation edge.

Excavations shall not remove the lateral support from a public way, from an adjacent property or from an existing structure. Where proper temporary vertical excavations are not feasible due to space constraints, slot-cut or temporary shoring may be utilized. Temporary excavation may be proceeded with the “A-B-C” slot cut method with a maximum 8-foot slot width to a maximum height of 7-feet (see Plate SC-1). The excavated slots should not be left open overnight and should be backfilled on the same day it was excavated before the next set of slots are excavated.

Surfaces exposed in slope excavations should be kept moist but not saturated to minimize raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Water should not be allowed to pond on the top of the excavation or to flow towards it. All excavations should be stabilized within 30 days of initial excavation.

All excavations shall be made in accordance with the regulations of the State of California, Division of Occupational Safety and Health, (Cal/OSHA). These recommended temporary excavation slopes do not preclude local raveling and sloughing. Provided our recommendations are followed, the resulting temporary excavations are anticipated to be safe from a geotechnical standpoint for the proposed construction operations, and should not expose workers to hazards due to cave-ins, provided that geologic conditions exposed by the excavations are as anticipated.

Confined or trench excavations (i.e. retaining walls or utility trench excavations) should be made in accordance with the regulations of the State of California, Division of Occupational Safety and Health (Cal/OSHA). We recommend that confined excavations should be shored using hydraulic shoring, screw jacks or timber shoring, as determined by the project engineer.

All temporary excavations at the site should be observed and monitored by our representative to verify soil conditions so that any necessary modifications can be made based on variations of soil encountered at the site. Surcharged temporary excavations and shoring should be continuously observed by our representative. If adverse conditions are encountered during excavations, additional recommendations will be provided.

It is recommended that a pre-excavation site meeting be attended by the grading contractor, the soils engineer and an agency representative to discuss methods and sequence of excavation.

5.7. Conventional Footings

Conventional footings can be used for support of the proposed structures, provided footings are founded on firm compacted fill. Footings shall be reinforced with a minimum of four (4), #4 (½-inch diameter) reinforced bars. Two (2) bars shall be placed near the bottom and two (2) bars placed near the top of the footing. The actual reinforcement of footings shall be designed by the project structural engineer.

Continuous footings should be at least 18 inches in width and at least 24 inches deep below the lowest adjacent grade into compacted fill. Footings with the minimum dimensions specified above may be designed using an allowable bearing pressure of 2,000 psf.

Square footings should be at least 24 inches in width and at least 24 inches deep below the lowest adjacent grade into compacted fill. Footings with the minimum dimensions specified above may be designed using an allowable bearing pressure of 2,000 psf.

The allowable bearing capacity can increase 350 psf for each additional foot of width, and 500 psf for each additional foot of depth to a maximum allowable capacity of 4,500 psf.

The bearing pressure given is for the total of dead and frequently applied live loads and may be increased by one-third for short duration loading which includes the effects of wind or seismic forces.

The estimated static settlement is expected to be less than ½ inch with differential settlement estimated to be less than ¼ inch within a span of 30 feet. Settlement of the proposed foundation system is expected to occur on initial load application.

Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive earth pressure within compacted fill. An allowable coefficient of friction of 0.3 may be used with the dead load forces. Passive earth pressure may be computed as an equivalent fluid having a density of 300 pcf with a maximum earth pressure of 4,500 psf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

5.8. Floor Slab-on-Grade

Concrete slab-on-grade should be supported on 2-inches thick sand (or ¾-inch gravel) over firm compacted subgrade. A vertical unit modulus of subgrade reaction (k_1) of 150 pci based on a 1'x1' load plate can be assumed for structural design.

Concrete slabs should be at least 4 inches thick and should be reinforced with a minimum of #4 rebar spaced not exceeding 16 inches on center, each way. The project structural engineer should design the reinforcement of slab based on the design performance criteria.

5.9. Moisture Retarder

Concrete slabs to be covered with flooring should be protected by an acceptable plastic vapor retarder/barrier (minimum 10 mil thickness) placed underneath the slab. If moisture vapor transmission is a concern to the facility owner, an expert should be consulted to provide additional recommendations for the design and construction of slabs in moisture sensitive flooring areas.

5.10. Conventional Footings for Ancillary Structures

For light-weight ancillary structures (e.g. fence walls, trash enclosures, planter walls, etc.), conventional shallow footings can be used, provided that footings are placed on firm native alluvium or compacted fill per our "Site Preparation and Earthwork" recommendations.

For the design of spread footings for other light-weight structures, we recommend the bottom of square or continuous footings be founded at least 12 inches below the proposed ground surface. A minimum footing width of 18 inches is recommended for square footings and 12 inches for continuous footings. The allowable bearing value for footings with above minimum sizes is 1,500 psf for dead plus live load. Based on the allowable net bearing pressures presented above, static settlement is anticipated to be less than ½ inch. Differential settlement is expected to be up to one-half of the total settlement over a 30-foot span. Most of the static settlement at the project site is expected to occur immediately after the application of the load.

Resistance to lateral loading may be provided by friction acting at the base of foundations and by passive earth pressure. An allowable coefficient of friction of 0.3 may be used with the dead load forces. Passive earth pressure may be computed as an equivalent fluid having a density of 300 pcf with a maximum earth pressure of 4,500 psf. When combining

passive and friction for lateral resistance, the passive component should be reduced by one-third.

5.11. Hardscape

Patios, steps, walkways, etc. are not normally subject to building code requirements for structural support. In order to reduce the potential for distress due to potential settlement, the hardscape should be supported by compacted fill, and it may be desirable to provide additional steel and concrete thickness determined by the project structural engineer. At a minimum, hardscape slab should be reinforced with a minimum of #4 rebar spaced at a maximum distance of 16 inches on center, each way. It should be noted that hardscape constructed to the preceding specification may be subject to distress over time. Periodic maintenance or replacement may be necessary.

5.12. Pavement

Prior to placing pavement structural section, the subgrade shall be prepared in accordance with the recommendations in “Site Preparation and Earthwork” section.

A flexible pavement section consisting of 3 inches of asphalt concrete over 4 inches of base material should be used. A flexible pavement section consisting of 4 inches of concrete over 6 inches of base material should be used for service lanes (truck and loading area), if applicable. The base material should be crushed aggregate base.

As an alternative, a rigid pavement section consisting of Portland Cement Concrete (PCC) can be used. The traffic loading is expected to be primarily light vehicles. Recommendations for the rigid concrete pavement design is provided herein on the following table.

Concrete Thickness	5 inches
95 Percent Compacted Subgrade	12 inches
Contraction Joint Spacing	10 ft.
Depth of Joint	1 inch
Compressive Strength of Concrete @ 28 days	3500 psi
Modulus of Rupture of Concrete @ 28 days	550 psi

Concrete slabs should be separated from other structures or fixed objects within or abutting the paved area by isolation joints. This serves to offset the effects of the differential horizontal and vertical movements of the structures which may fracture the concrete slab. When isolation joints are located where wheel and other loads are applied, the pavement edge at the joint should be thickened by 20 percent or two inches, whichever is greater.

A joint filler should be applied to any new isolated joints within the concrete slab. The joint filler should extend through the slab thickness and should be recessed below the pavement surface so that the joint can be sealed with joint sealant material. The types of joint filler

materials recommended include bituminous mastic, bituminous impregnated cellulose or cork, sponge rubber, or resin-bound cork. Joint filler materials should be installed in accordance with the recommendations of the manufacturer.

5.13. Drainage Protection

All pad and roof drainage should be collected and transferred to the street or an approved area in non-erosive drainage devices. Drainage should not be allowed to pond on the pad or against any foundation or retaining wall.

The California Building Code recommends a minimum 5 percent slope away from the perpendicular face of the building wall for a minimum horizontal distance of 10 feet. We recommend a minimum 5 percent slope away from the building foundations for a horizontal distance of 3 feet be established for any landscape areas immediately adjacent to the building foundations. In addition, we recommend a minimum 2 percent slope away from the building foundations be established for any impervious surfaces immediately adjacent to the building foundations for a minimum horizontal distance of 10 feet. Lastly, we recommend the installation of roof gutters and downspouts which deposit water into a buried drain system be installed instead of discharging surface water into planter areas adjacent to structures.

It is the responsibility of the contractor and ultimately the developer and/or property owner to ensure that all drainage devices are installed and maintained in accordance with the approved plans, our recommendations, and the requirements of all applicable municipal agencies. This includes installation and maintenance of all subdrain outlets and surface drainage devices.

It is recommended that watering be limited or stop altogether during the rainy season when little irrigation is required. Over-saturation of the ground can cause major subsurface damage. Maintaining a proper drainage system will minimize the shrink/swell potential of sub-soils.

5.14. Pre-Construction Survey

We recommend that the client's representative prepare a pre-construction survey in case of any disputes from the adjacent property owner(s). The pre-construction survey should document existing on-site and off-site structures conditions (i.e. existing cracks, damages, and etc.) prior to construction (where applicable). If adverse conditions are encountered during excavations, additional recommendations may be necessary.

6. GENERAL INFORMATION

Accuracy of Provided Drawings

LK Geotechnical Engineering, Inc. (LKGE) investigation, analysis, findings and/or recommendations of a site, with respect to the proposed improvements, are often dependent on several factors or information provided to LKGE by the client and/or the client's representative(s). Provided information or Drawings may include topographic surveys, architectural drawings,

engineering plans and/or grading plans. It is LKGE's assumption that the provided Drawings, to be utilized as part of our investigation, accurately depict topographic conditions, existing and/or proposed structures and grades, property lines, easements, etc. It should be understood that LKGE's use of the provided Drawings does not mean or confirm that the provided Drawings are accurate. If revisions are made to the site Drawings, these documents should be submitted to LKGE as soon as possible. Additional exploration, analysis and/or revised recommendations may be necessary depending upon our review of the revised Drawings, etc.

Environmentally Hazardous or Non-Hazardous Materials

It should be clearly understood that environmental geologic services are not within the scope of this study. Environmental geologic services may include the detection of hazardous or non-hazardous materials, wastes or substances existing on the site from research of available records, exploratory methods, sampling, laboratory analysis, etc. or the recommended treatment and/or disposal of these materials, wastes or substances. If hazardous or non-hazardous materials, wastes or substances are revealed by supplementary investigations or studies or are encountered during construction or grading operations, appropriate environmental investigation(s) and analysis may be required. In this case, mitigation and/or treatment of hazardous or non-hazardous materials, wastes or substances may be necessary. It should be understood that the property owner and potential future property owner(s) shall acknowledge and/or indemnify that LKGE has neither created or contributed to the creation or existence of any hazardous or non-hazardous materials, wastes or substances or otherwise dangerous conditions at the site. All site generated hazardous or non-hazardous materials, wastes or substances are the possession and responsibility of the property owner and potential future property owner(s).

Plan Review

This report is based on the development plans provided to our office. We recommend that the client's representative(s) provide a complete set of the construction, building and/or grading plans to our office for review and/or approval, prior to initiation of construction. Any change in the scope of the project, from that addressed herein, may require additional geotechnical services by LKGE. Formal plans should be reviewed and approved by LKGE, prior to initiation of construction. The appropriate government reviewing agency may require that the building and/or grading plans be signed by a licensed geotechnical engineer and/or a licensed engineering geologist, prior to initiation of construction. The plan review fees will be billed in accordance with our current fee schedule.

Government Reviewing Agency and Additional Geotechnical Services

This report is intended for submittal to the appropriate governmental authorities that control the issuance of necessary permits. The client or client's representative should submit the geotechnical reports to the appropriate government reviewing agency, unless specific arrangements are made with this office. It should be noted that the government reviewing agency has various fees for reviewing geotechnical reports, the fees for which are not included within our scope of work. If applicable, the report submittal fees will be billed in accordance with our current fee schedule. All geotechnical and/or engineering geologic aspects of the proposed development are subject to review and approval by the government reviewing agency. It should be understood that the government reviewing agency may approve or deny any portion of the proposed

development, which may require additional geotechnical services by this office. Additional geotechnical services may include review responses, supplemental letters, plan review and signature, construction observations, meetings, etc. The fees for generating additional reports, letters, exploration, analysis, etc. will be billed on a time and material basis, per our previously approved work acknowledgment or a pre-determined, agreed fee.

Site Observations during Construction

The appropriate government reviewing agency or building department requires that the geotechnical consultant of record provide site observations during grading and construction. The purpose of the site inspections is to verify site geotechnical and/or engineering geologic conditions and conformance with the intensions of the recommendations addressed herein. Although certain geotechnical and/or engineering geologic observations may not be required by the building department, the more site inspections typically reduce the risk for future problems. It is the client's or the client's representative(s) responsibility to contact the appropriate building department or building official regarding approval for all required inspections. Following is a general list of inspections required by this firm.

a) Pre-grade meetings
b) Foundation excavations for all structures (residence, retaining walls, pools, etc.)
c) Temporary excavations/shoring
d) Bottom excavations for primary and/or secondary structural fills
e) Keyway excavations
f) Compaction testing for primary and secondary structural fills
g) Compaction testing for retaining wall backfill and utility trenches
h) Subdrains for retaining walls, swimming pools or ponds

It is recommended that all foundation excavations be approved by this firm prior to placing forms, steel reinforcement and/or concrete. Any fill which is placed at the site should be tested for compaction, especially if used for engineering purposes. All cut-slopes and temporary excavations should be observed by a representative of this firm. Should the observation reveal any unforeseen hazard, appropriate action will be recommended.

Representatives of LKGE will observe work in progress, perform tests on soil, and observe excavations and trenches. Excavation bottom observations should be requested before the placement of subdrains or compacted fill. The approved plans and permits should be on the job site and available for review by this office. The site inspections during construction will be billed on a time and material basis in accordance with our current fee schedule.

It is advised that the client contact LKGE at least 1 week in advance of commencing constructing and/or grading to allow for contractual agreements for geotechnical services during the construction phases of your project. Please advise this office at least 48 hours prior to any required verification or approval.

Construction Site Maintenance

It is the responsibility of the contractor to maintain a safe construction site and for the safe operation of all equipment. When excavations exist on the site, the areas should be secured by

placing appropriate coverings, fencing, warning signs, etc. All excavations should be properly covered and secured. Excavation stock piles or spoil piles should either be removed from the site or be property compacted, in accordance with recommendations presented herein. Fill temporarily stock-piled on the site should be placed in stable or approved areas and away from slopes, excavations or improvements. Earth materials generated from grading should not be disposed of along slopes or other unapproved locations. Workers should not be allowed to enter any un-shored excavations over 5-feet in depth, or depth specified herein. Water should not be allowed to saturate open footing trenches. Temporary erosion control measures and proper drainage control should be followed, especially during the rainy season.

It should be understood that the project contractor or others shall supervise and direct the work and they shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during the performance of the work.

Periodic or continuous observation by LKGE is not intended to include verification of dimensions or review of the adequacy of the contractor's safety measures in, on, or near the construction site.

Final As-Built Reports

During or upon completion of the project or grading, the appropriate government reviewing agency or building department often requires interim or final as-built geotechnical reports prepared by this firm to document that foundations and/or fill placement were conducted per the recommendations addressed herein and/or the approved building and/or grading plans. Interim or final geotechnical reports are often required for placement of primary or secondary structural fill, retaining wall backfill, slope repairs, pile observations, etc. The interim or final geotechnical reports will be billed on a time and material basis, in accordance with our current fee schedule.

7. LIMITATIONS

This report has been compiled for the exclusive use of the addressee(s) of the report, and their authorized representatives. It shall not be transferred to, or used by, a third party, to another project or applied to any other project on this site, other than as described herein, without the written consent and/or thorough review by this firm.

This report and the exploration are subject to the following conditions. Please read this section carefully, it limits our liability.

This report is based on the development plans provided to our office. In the event that any significant changes (from those discussed herein) in the design and/or location of the proposed structure(s) are planned, the conclusions and recommendations contained in this report may not be considered valid unless the changes are reviewed by LKGE and the conclusions and recommendations are modified and/or approved by this firm after such review.

The conclusions and recommendations contained herein are based on the findings and observations made at the test pit, trench and/or boring locations. While no great variations in fill, soil and/or bedrock conditions are anticipated, if conditions are encountered during construction which appears to differ from those disclosed herein, this firm should be notified immediately, so

as to consider the need for modifications or revised geotechnical recommendations. Compliance with the design concepts, specifications or recommendations during construction requires our review during construction which pertains to the specific recommendations contained herein.

The subsurface conditions, excavations, characteristics and geologic structure described herein and shown on the enclosed cross-section(s) have been projected from individual test pits, trenches and/or borings placed on the subject property. The subsurface conditions and excavation characteristics, and geologic structure shown should in no way be construed to reflect any variations which may occur between or away from these exploratory excavations. The projection of geologic data is based on available information and experience and should not be considered exact.

It should be noted that fluctuations in the level of the ground-water may occur at the site due to variations in rainfall, temperature, irrigation, water line leaks, sewage disposal and/or other factors not evident at the time of measurements reported herein. LKGE assumes no responsibility for groundwater variations which may occur across the site. High groundwater levels can be extremely hazardous and saturation of earth materials can cause subsidence, settlement and/or slippage at the site.

The intent of this report is to advise our client and/or client's representative(s) on soils and engineering geologic conditions at the site with respect to the proposed improvements. Implementation of the advice presented in the Recommendations Section of this report is intended to reduce the risk associated with the proposed project and should not be construed to imply total performance of the project. It should be understood that geotechnical consulting and the contents of this report are not perfect. Any errors or omissions noted by any party reviewing this report, and/or any other geotechnical aspect of this project, should be reported to this firm as soon as possible.

Geotechnical engineering is characterized by uncertainty or is described as an inexact science or art. The conclusions and recommendations presented herein are partly based on; 1) the evaluation of technical data gathered by this firm, 2) standard of practice, 3) experience, and, 4) professional judgment. The conclusions and recommendations presented herein should be considered advice. Other geotechnical consultants could arrive at different conclusions and recommendations. This report has been prepared in accordance with generally accepted practice. No warranties, either expressed or implied, are made as to the professional advice provided under the terms of the agreement and included in this report.

It should be understood that LKGE's services are limited to the disciplines of soils engineering and/or engineering geology. While LKGE may refer various professionals or outside services, working in associated disciplines, to their client's or client's representatives, LKGE is not responsible for the performance of work by third parties, which may include, but are not limited to, surveyors, civil or structural engineers, architects, contractors, etc. It should be clearly understood that LKGE is not a licensed surveyor, architect, civil or structural engineer or contractor. LKGE's periodic or continuous inspection(s) of geotechnical work on an LKGE project shall not relieve third party professionals of their responsibility to perform their work in accordance with the applicable and/or approved geotechnical reports, plans, specifications, safety requirements, etc. It should be understood that LKGE's periodic or continuous inspection(s) of geotechnical work on an LKGE project does not imply that LKGE is observing, verifying and/or approving all site work. LKGE will only make site inspections, per our approved work authorization

agreement(s) and/or related to the appropriate geotechnical field services provided by LKGE and will not relieve others of their professional responsibilities.

Should the project be delayed beyond the period of one year after the date of this report, the site should be observed and the report reviewed to consider possible changed conditions.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to assure that the information and recommendations contained herein are called to the attention of the designers and builders for the project.

8. REFERENCES

California Division of Mines and Geology, 1998, Seismic Hazard Zone Report for the San Fernando 7.5 Minute Quadrangles, Los Angeles County, California, SHZ Report 023, 53 pp.

California Geological Survey, 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, Interim Revision 2007, 48 p.

California Geological Survey, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117A, 108 pp.

California Geological Survey, 1999, Seismic Hazard Zones, San Fernando Quadrangle, California, Scale 1"=2,000', Released March 25.

California Geological Survey, 1979, Earthquake Fault Zones, San Fernando Quadrangle, California, Scale 1"=2,000', Released January 11.

City of Santa Monica, 2010, Guidelines for Geotechnical Reports, version 1.6, 43pp.

Dibblee, Thomas W. Jr., 1991, Geologic Map of the San Fernando and Van Nuys (N ½) Quadrangle, Dibblee Geological Foundation Map #DF-31, Scale 1”=2,000’.

Southern California Earthquake Center, 1999, Recommended Procedures For Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California, 70 pages.

Southern California Earthquake Center, 2002, Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California, 132 pages.

PLATES

--- PLUMMER STREET ---

EXPLANATION

⊕ B-1 Boring Location

N

Scale: 1” = 30’

0 30 60

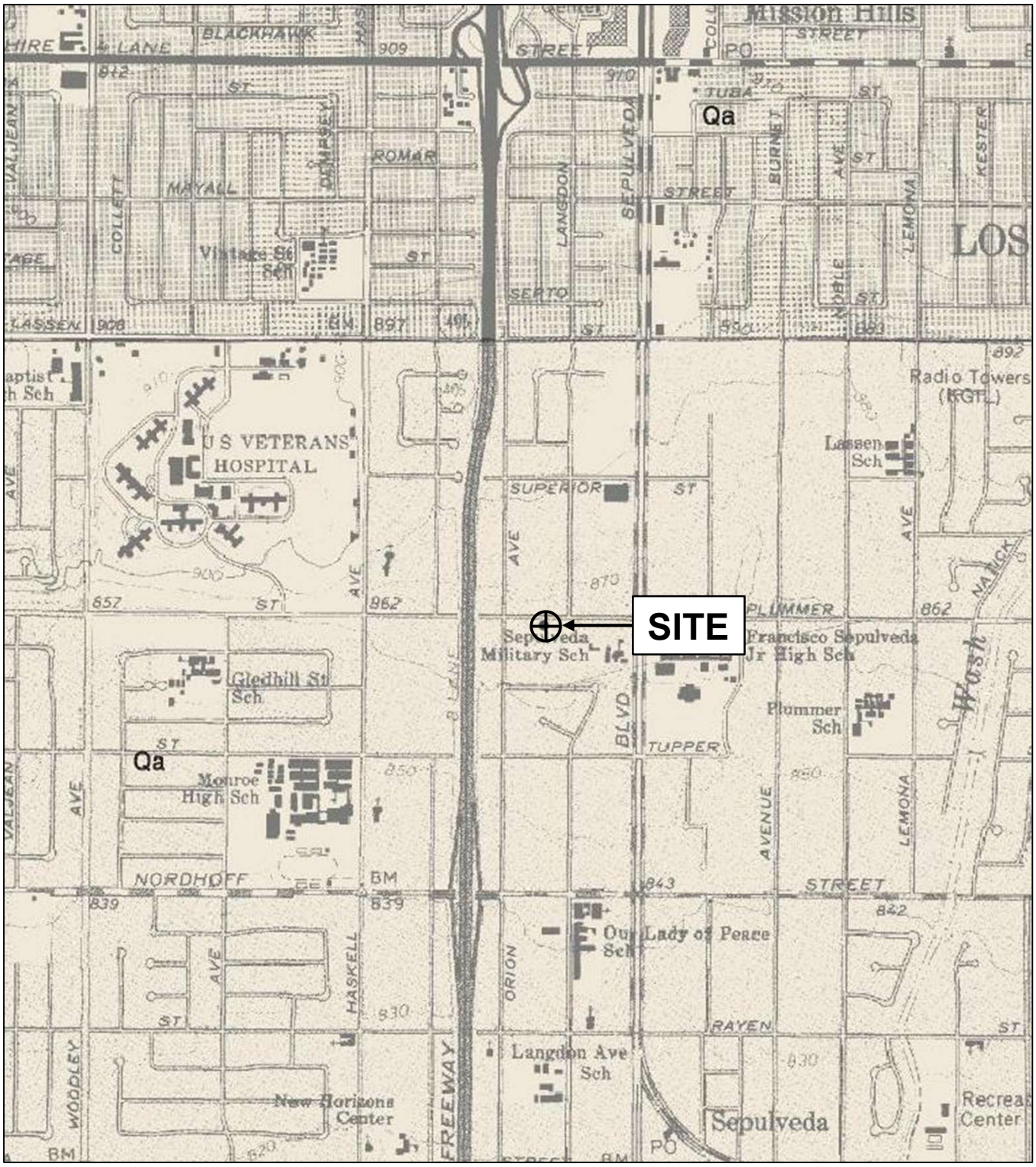
LK Geotechnical

LK Geotechnical Engineering, Inc.
10120 National Blvd., Los Angeles, CA 90034
Tel: 310.866.8977; Fax: 310.204.2459

Site Plan
& Geotechnical Exploration Map

15526-15544 Plummer Street
Los Angeles, California

2/2022	Project 21-1212	Plate 1



Reference: Dibblee and Ehrenspeck, 1991, Geologic Map of the San Fernando and Van Nuys (N ½) Quadrangles.

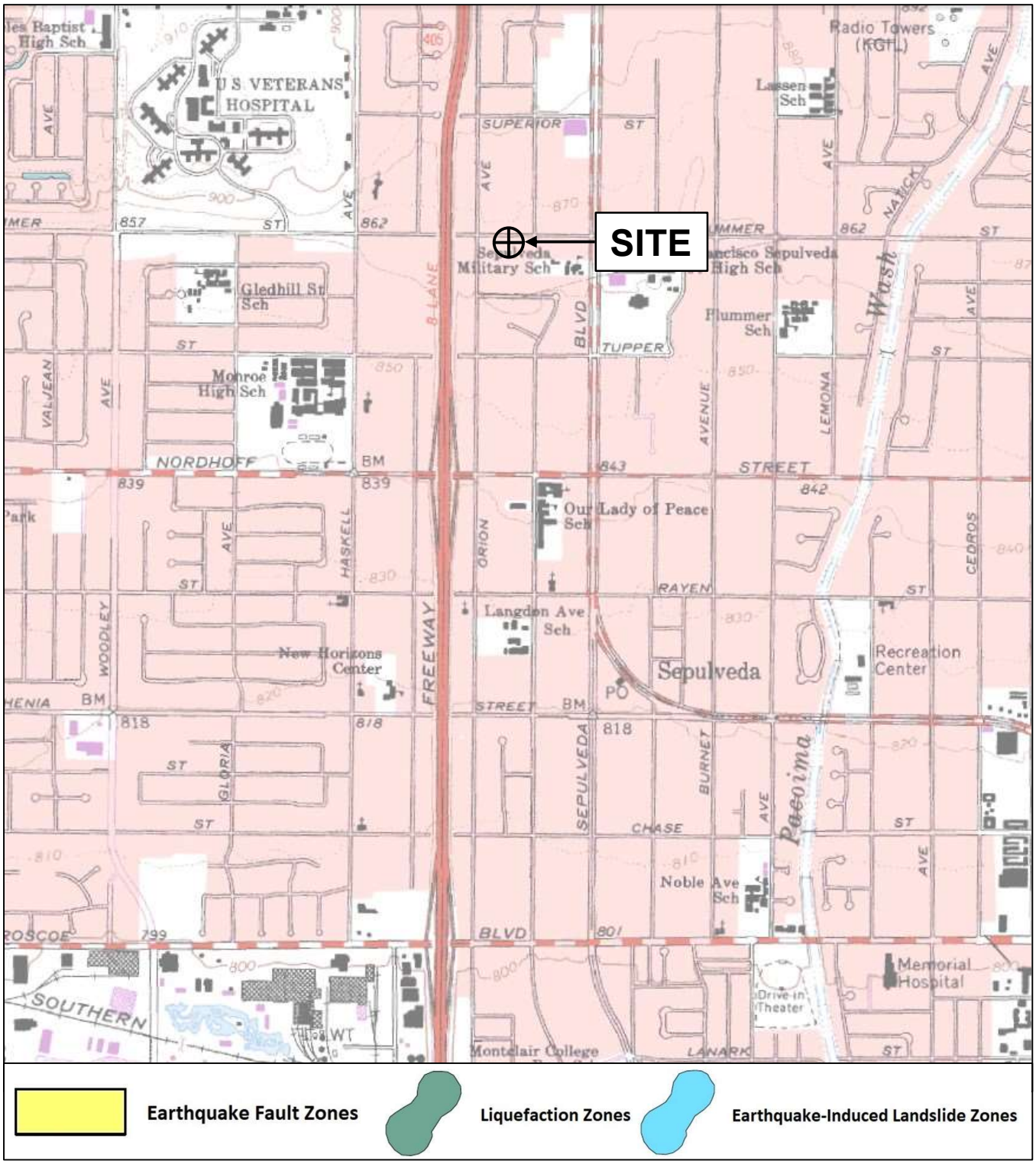
LK Geotechnical

LK Geotechnical Engineering, Inc.
10120 National Blvd., Los Angeles, CA 90034
Tel: 310.866.8977; Fax: 310.204.2459

Regional Geologic Map

15526-15544 Plummer Street
Los Angeles, California

February 2022	Project 21-1212	Plate 2



Reference: CGS ,1998, Seismic Hazard Zones of the Van Nuys Quadrangle.

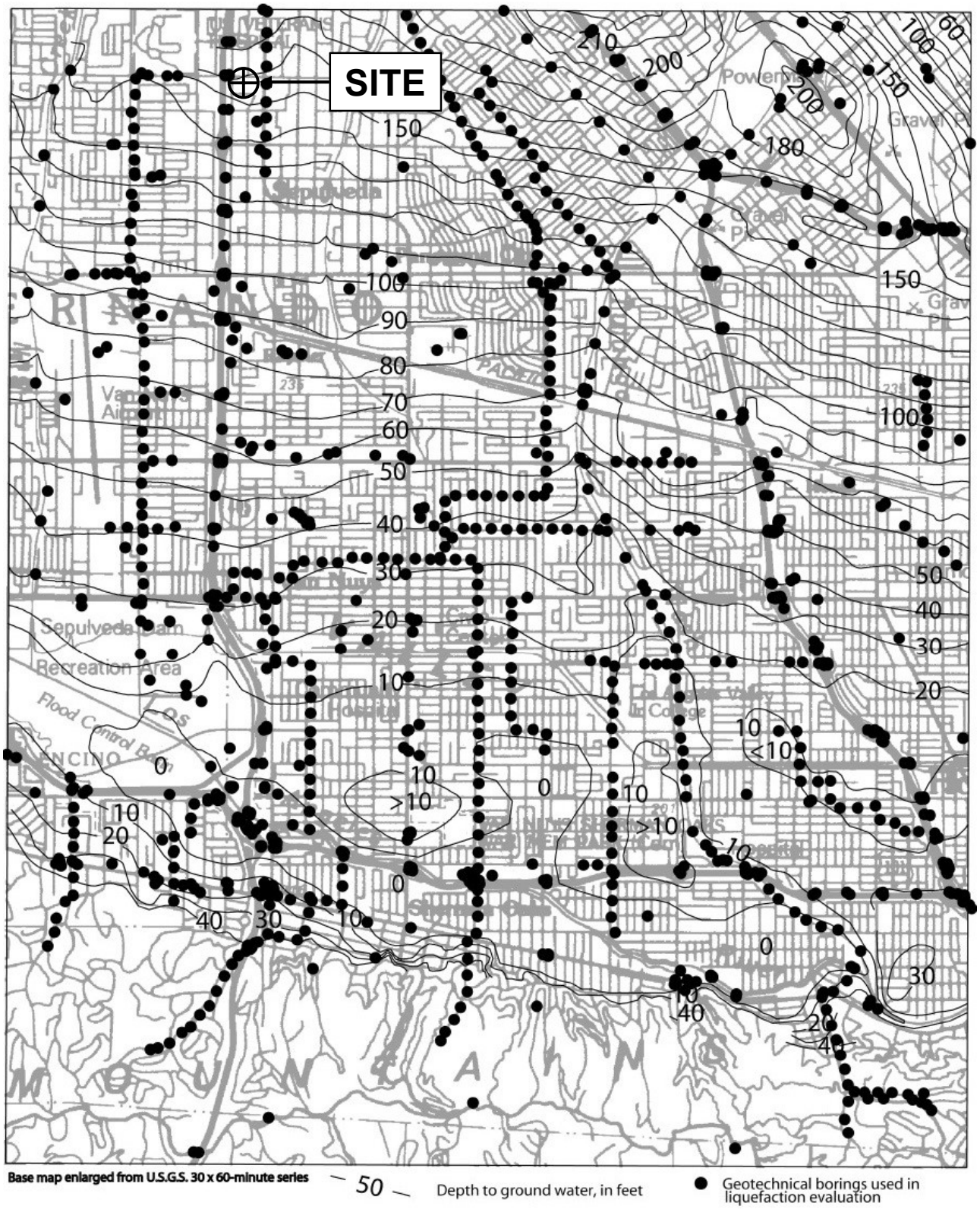
LK Geotechnical

LK Geotechnical Engineering, Inc.
10120 National Blvd., Los Angeles, CA 90034
Tel: 310.866.8977; Fax: 310.204.2459

Seismic Hazard Zones Map

15526-15544 Plummer Street
Los Angeles, California

February 2022	Project 21-1212	Plate 3



Reference: CGS ,1997, Seismic Hazard Zone Report for the Van Nuys 7.5-Minute Quadrangle.

LK Geotechnical

LK Geotechnical Engineering, Inc.
10120 National Blvd., Los Angeles, CA 90034
Tel: 310.866.8977; Fax: 310.204.2459

Historically High Groundwater Map

15526-15544 Plummer Street
Los Angeles, California

February 2022	Project 21-1212	Plate 4

Appendix A
Field Exploration

We performed field exploration consisting of logging of five (5) exploratory soil borings on January 11, 2022. The exploration was performed using an 8-inch diameter hollow-stem auger drill rig and a hand auger. The borings were advanced to a maximum depth of approximately 31.5-feet below existing grade. The approximate boring locations are shown on Plate 1. Detailed descriptions of the soils encountered during drilling are presented in Appendix A – Field Exploration.

The Boring Logs are presented on Plates B-1 through B-5. The Boring Logs describe the earth materials encountered, samples obtained, and show the field and laboratory tests performed. The borings were logged by an engineer or geologist using the Unified Soil Classification System. Drive and bulk samples of representative earth materials were obtained from the borings and delivered to the geotechnical laboratory for testing.

A California modified sampler was used to obtain drive samples of the soil encountered. This sampler consists of a 3-inch outside diameter (O.D.), 2.4-inch inside diameter (I.D.) split barrel shaft that was driven a total of 6-inches into the soil at the bottom of the boring. The soil was retained in brass rings for laboratory testing. Additional soil from each drive remaining in the cutting shoe was usually discarded after visually classifying the soil.

In addition, a Standard Penetration Test (SPT) sampler was used to obtain drive samples of soil encountered. SPT sampler consists of a 2-inch O.D., 1.4-inch I.D. split barrel shaft that is advanced into the soil at the bottom of the drilled hole a total of 18 inches. The number of blows required to drive the sampler the final 12 inches is presented on the boring logs. Soil samples obtained by the SPT were retained in plastic bags.

Upon completion of the geologic and geotechnical logging, the borings were backfilled with soil derived from the cuttings.

Percolation Testing

Percolation testing was performed using the falling head boring test method in accordance with the Los Angeles County Guidelines. The water level was measured to the nearest tenth of a foot and converted to inches in the calculation. The infiltration rate is shown in the table below and the raw data is attached.

Soil Infiltration Rate

Boring No.	Total Depth of Boring (ft)	Depth of Testing Zone (ft)	Soil Description of Testing Zone	Infiltration Rate (inch/hour)
B-1	20	10 – 20	Silty SAND to Sandy SILT	0.15

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-1
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
						Surface: grass	
0						**Alluvium (Qa)** Silty SAND; dark brown to brown; loose to medium dense; trace CLAY upper 2 feet disturbed	
5		2 2	17.1	98.0	SM	Silty SAND; tan brown; loose; damp	DS
10		6 8	5.1	96.4	ML	Sandy SILT; light brown; medium dense; dry	C
15		8 14	9.0	96.8	SM/ML	Silty SAND to Sandy SILT; brown; damp; trace; GRAVEL	
20		12 22	7.6	109.1	SM/ML	Silty SAND to Sandy SILT; brown; damp; trace; GRAVEL	
						Total Depth = 21 ft	
25							

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-2
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
						Surface: grass	
0						**Alluvium (Qa)**	CP, CR
5		9 11	7.8	102.2	SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; dry	C
10		8 12	4.8	95.7	SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; dry	
15		7 7	9.0	87.3	SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; dry	
20		9 12 14			SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; dry	
25		9 12 15			SM	Silty SAND with GRAVEL; light brown; medium dense; damp	PA

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-2
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
						continued…	
25							
30		11 12 10			SM	Silty SAND; light brown; medium dense; dry	
						Total Depth = 31.5 feet	
35							
40							
45							
50							

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-3
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
0						**Artificial Fill (Af)** Silty SAND; dark brown; loose; damp; some brick fragments	
5		7 7	7.5	89.4	SM/ML	**Alluvium (Qa)** Silty SAND to Sandy SILT; light brown; medium dense; damp	
10		5 5 6			SM	Silty SAND; light brown; medium dense; damp	PA
15		7 9	10.1	91.9	SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; damp	
						Total Depth = 16 feet	
20							
25							

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-4
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
						Surface: grass	
0						**Artificial Fill (Af)** Silty SNAD; dark brown; medium dense; damp	
						Alluvium (Qa)	
5		2 2 2			ML	Sandy Silt; light brown; loose; damp	
10		7 11	7.5	86.5	ML	Sandy SILT; light brown; medium dense; dry	C
15		7 10 13			SM/ML	Sandy Silt to Silty SAND; light brown; medium dense; dry; few GRAVEL	
						Total Depth = 16.5 feet	
20							
25							

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-5
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
0						**Artificial Fill (Af)** Silty SAND; dark brown; medium dense; slighty moist	
						Alluvium (Qa)	
5		5 7	8.7	87.7	ML	Sandy SILT; light brown; medium dense; dry	C
10		5 5 6			SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; damp	
15		10 16	4.6	101.3	SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; damp	
20		6 8 8			SM/ML	Silty SAND to Sandy SILT; light brown; medium dense; damp	
25		10 13	7.4	92.4	SM	Silty SAND; light brown; medium dense; damp	

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

* Borehole was backfilled with soil cuttings

LK Geotechnical

BORING LOG

PROJECT ADDRESS	PROJECT NO.	HOLE ID
15526-15544 Plummer Street Los Angeles, CA	21-1212	B-5
	DRILLING METHOD Hollow stem Auger	**DATE DRILLED** 1/11/2022
SURFACE ELEVATIOIN (ft) N/A	**BOREHOLE DIAMETER** 8 inches	**DRILLER** Charlies Soil Sampling
GROUNDWATER DEPTH (ft) Not Encountered	**HAMMER TYPE & EFFICIENCY** Automatic Trip/Eri = 81%	**LOGGED BY** SL

DEPTH (ft)	SAMPLE	BLOWS PER 6"	MOISTURE (%)	DRY UNIT WT (pcf)	USCS	DESCRIPTION	LAB TEST
						continued…	
25							
30		8 15 15			SM	Silty SAND; light brown; medium dense; dry	
						Total Depth = 31.5 feet	
35							
40							
45							
50							

LEGEND

- Bulk Sample
- Cal. Mod. Sample
- SPT Sample
- Groundwater Level

ACRONYM : FC: fine content; PA: particle size analysis; DS: direct shear; C: consolidation; PI: Atterberg limits; EI: expansive index; CR: corrosivity; CP: compaction curve; R: R-value

NOTES :

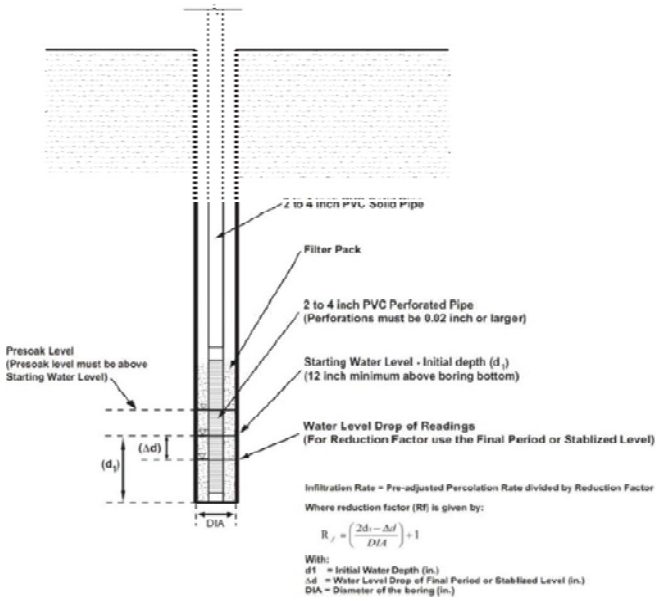
* Borehole was backfilled with soil cuttings

FALLING HEAD BORING PERCOLATION TEST DATA & INFILTRATION RATE CALCULATIONS

Reference: Los Angeles County (2021). Guidelines For Design, Investigation, and Reporting LID Stormwater Infiltration, GS200.1.

Project No.: 21-1212
Project Name: 15526-15544 Plummer Street

Boring No.: B-1
Diameter of Boring (D): 8.0 inches
Depth of Boring (d_b): 20.0 feet = 240 inches
Diameter of Perc. Pipe : 3.0 inches
Length of Pipe (d_p) : 20.0 feet = 240 inches
Perforated Section Depth: 15- 20 feet



PRE-SOAK

Date: 1/11/2022
Start Time: 7:50 AM
Elapsed Time: 30.00 minutes
Water Remaining: yes

DETERMINE READING TIME INTERVAL

Date: 1/11/2022
Start Time: 8:21 AM
Elapsed Time: 30.00 minutes
Water Remaining: yes

REDUCTION FACTORS

Boring method:	RF_t =	2.0	(1 ~ 3)
Site variability, number of tests:	RF_v =	1.0	(1 ~ 3)
Long-term siltation, maintenance:	RF_s =	1.0	(1 ~ 3)
Total Reduction Factor:	$RF = RF_t + RF_v + RF_s$		

PERCOLATION TEST **Test Performer:** SL **Calculated by:** SL

Reading Number	Initial Time T_i	Final Time T_f	Elapsed Time ΔT (min)	Initial depth to water surface dw_i (inches)	Final depth to water surface dw_f (inches)	Initial height of water column d_i (inches)	Drop of water column Δd (inches)	Water column area factor $(2*d_i - \Delta d)/D$	**Raw Percolation Rate** $k_i = \Delta d/CF/\Delta T$ *(inch/hr)*	Total Reduction Factor RF	**Design Infiltration Rate** $k = k_i / RF$ (inch/hr)
1	8:55 AM	9:25 AM	30	138.5	147.7	101.5	9.2	25.2	**0.73**	4.0	**0.18**
2	9:25 AM	9:55 AM	30	147.7	156.2	92.3	8.5	23.0	**0.74**	4.0	**0.19**
3	9:55 AM	10:25 AM	30	156.2	163.0	83.8	6.7	21.1	**0.64**	4.0	**0.16**
4	10:25 AM	10:55 AM	30	163.0	169.0	77.0	6.0	19.5	**0.62**	4.0	**0.15**
5	10:55 AM	11:25 AM	30	169.0	174.2	71.0	5.3	18.1	**0.58**	4.0	**0.15**
6	11:25 AM	11:55 AM	30	174.2	179.2	65.8	4.9	16.8	**0.58**	4.0	**0.15**

Recommended Design Infiltration Rate (inch/hr) = 0.15

Appendix B
Laboratory Testing

Representative soil samples collected from our field exploration were delivered to the EGLab, Inc. (EGL) of Arcadia, California for testing, and to evaluate relevant engineering properties. Based on our review of the laboratory data, LKGE concurs with and accept the laboratory testing results performed by EGLab, Inc.

Laboratory Moisture Content and Density Tests

The moisture content and dry densities of selected driven samples obtained from the exploratory borings were evaluated in general accordance with the latest version of ASTM D 2937. The results are shown on the attached EGL report.

Sieve Analysis

Soil grain-size analysis utilizing series of sieves was performed on representative soil sample(s) per the ASTM C136/C117 Method. The test results are presented in the attached EGL report.

Direct Shear Test

Direct shear testing was conducted on representative soil samples to determine their shear strength in accordance with the ASTM D3080. The sample was saturated under normal load before testing. For each test, three samples were placed, one at a time, into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant shear rate of 0.01-inches per minute. Shear deformation was recorded until a maximum of about 0.3 inches of horizontal displacement was achieved. Ultimate shear strengths for each sample were selected from the shear stress-displacement data. Based on the test data, the stress generally becomes constant beyond 0.2 inch of displacement and it is our opinion that the samples were sheared to its ultimate strength status. The shear strength parameters are presented in the following table and on the attached EGL report.

Sample Location	Depth (ft.)	Soil Type	Soil Description	Ultimate Strength Parameters	
				Cohesion (psf)	Friction Angle (degrees)
B-1	5	Qa	Sandy SILT	132	27

Consolidation Test

Consolidation testing was performed on representative soil samples under consolidated drained conditions per the ASTM D2435 Method. Axial loads were carried to a maximum of 8,000 psf. To hasten consolidation, investigate the collapsibility potential and similar possible adverse field conditions, water was added to an axial load of 2,000 psf. Compressibility of the soils within the zone of significant stress was investigated and the results are provided on the attached EGL report. The collapse/swell potential is tabulated below:

Sample Location	Depth (ft.)	Soil Type	Soil Description	Percent of Collapse (-)/ Swell (+)	Collapse Index
B-1	10	Qa	Sandy SILT	-1.2	Slight
B-4	10	Qa	Sandy SILT	-1.0	Slight
B-2	5	Qa	Sandy SILT	+0.4	None
B-5	5	Qa	Sandy SILT	-0.8	Slight

Expansion Index Test

Expansion Index testing was performed on representative soil sample(s) per the ASTM D4829 Method. The soil was molded to a 4-inch diameter, 1-inch thick specimen under a specified compactive energy at approximately 50 percent saturation, and then loaded with 144 psf equivalent surcharge under inundated condition. Readings of volumetric swell were taken for a period of 24 hours. The test results are presented in the attached EGL report.

Sample Location	Depth (ft.)	Soil Type	Soil Description	Expansion Index	Expansion Potential
B-2	0 – 5	Qa	Sandy SILT	59	Medium

Maximum Laboratory Compaction Test

The maximum laboratory compaction and optimum moisture content of the on-site artificial fill and alluvium materials were determined in accordance with ASTM Method D1557. The soils are placed in a 4 inch diameter mold having a 1/30 cubic foot volume and compacted with 25 blows of a 10 pound hammer falling 18 inches on each of five layers. The results are provided on the attached EGL report and are tabulated below:

Sample Location	Depth (ft.)	Soil Type	Soil Description	Optimum Moisture Content (%)	Maximum Dry Unit Weight (pcf)
B-2	0-5	Qa	Sandy SILT	10.5	126.5

Corrosivity Tests

Soil pH and resistivity tests were performed on a representative soil sample in general accordance with the latest version of California Test Method 643. The chloride content of the selected sample was evaluated in general accordance with the latest version of California Test Method 422. The sulfate content of the selected samples was evaluated in general accordance with the latest version of California Test Method 417. The test results are presented in the attached EGL report.

EGLAB, INC.,
11819 Goldring Road, Unit D, Arcadia, CA 91006
Ph: 626-263-3588; Fax: 626-263-3599; Email: ryan@eglab.com

February 7, 2022

LK Geotechnical Engineering, Inc.
10120 National Boulevard
Los Angeles, California 90034

Attn: Mr. Sean Lin

Project Name: 15526-15544 Plummer Street, Los Angeles
Project No: 21-1212
EGL Job No. 22-122-003

Dear Mr. Lin:

We have completed the testing program conducted on samples from the above project. The tests were performed in accordance with testing procedures as follows:

TEST	METHOD
Moisture & Dry Density	ASTM D2937
Consolidation	ASTM D2435
Direct Shear	ASTM D3080
Corrosion	CT-417,422,643
Expansion Index	ASTM D4829
Grain Size Analysis	ASTM D422
Modified Proctor Compaction	ASTM D1557
Collapse Potential	ASTM D5333

Enclosed is the Summary of Test Results.

We appreciate the opportunity to provide testing services to LK Geotechnical Engineering, Inc. Should you have any questions, please call the undersigned.

Sincerely yours,
EGLAB, Inc.

Ryan Jones, GE
Principal Engineer

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NAME: 15526-15544 Plummer Street, Los Angeles

EGLAB JOB NO.: 22-122-003

PROJECT NO.: 21-1212

CLIENT: LK Geotechnical, Inc.

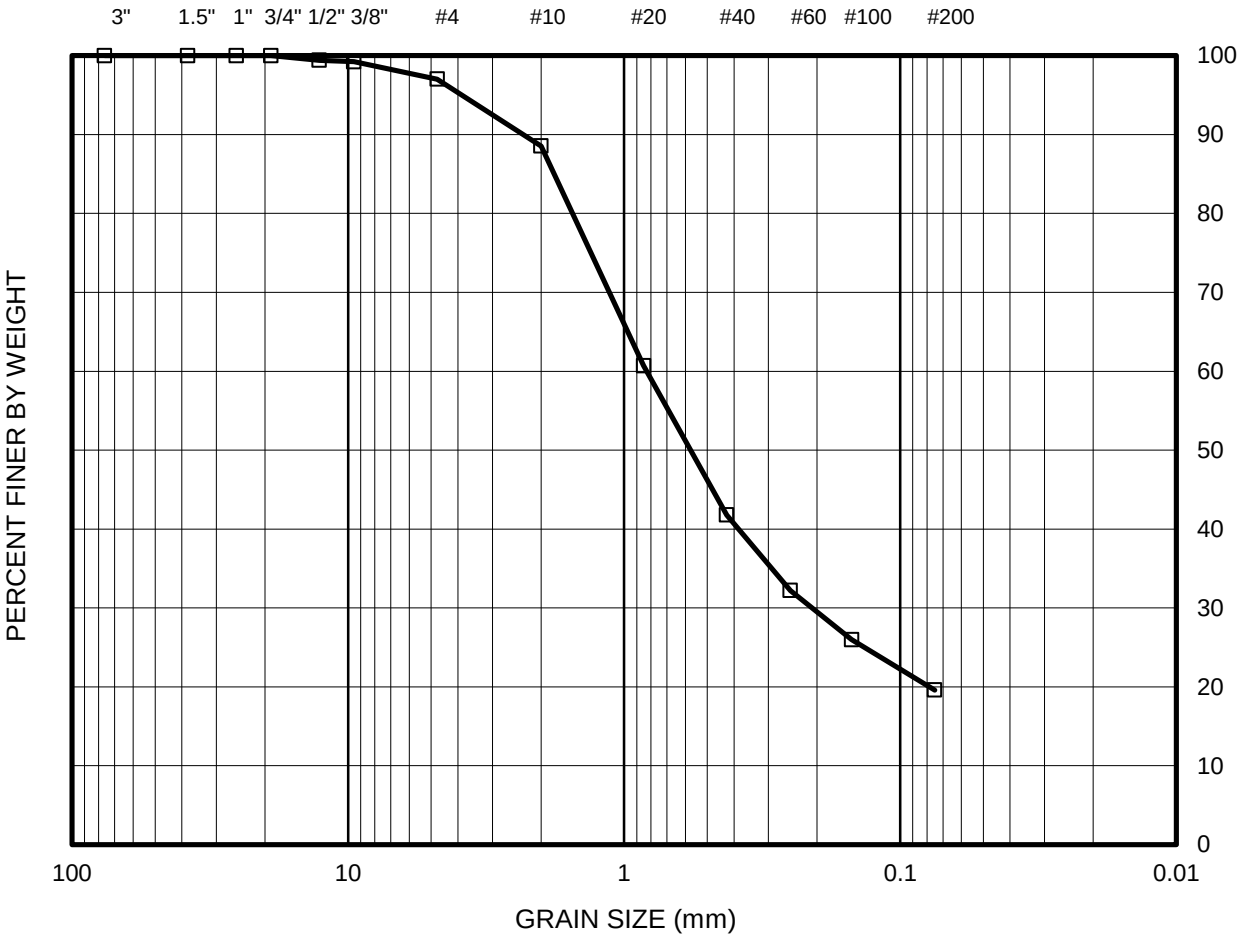
DATE: 1/19/2022

SUMMARIZED BY: JT

BORING NO.	SAMPLE NO.	DEPTH (ft)	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (PCF)	EXPANSION INDEX ASTM D 4829
B-1	N/A	5.0	17.1	98.0	
B-1	N/A	10.0	5.1	96.4	
B-1	N/A	15.0	9.0	96.8	
B-1	N/A	20.0	7.6	109.1	
B-2	N/A	0-5.0			59
B-2	N/A	5.0	7.8	102.2	
B-2	N/A	10.0	4.8	95.7	
B-2	N/A	15.0	9.0	87.3	
B-3	N/A	5.0	7.5	89.4	
B-3	N/A	15.0	10.1	91.9	
B-4	N/A	10.0	7.5	86.5	
B-5	N/A	5.0	8.7	87.7	
B-5	N/A	15.0	4.6	101.3	
B-5	N/A	25.0	7.4	92.8	

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B-2	N/A	25.0	SPT	SM	N/A	N/A

Gravel:	3.0%
Sand:	77.4%
Fine:	19.6%

EGLAB, INC.

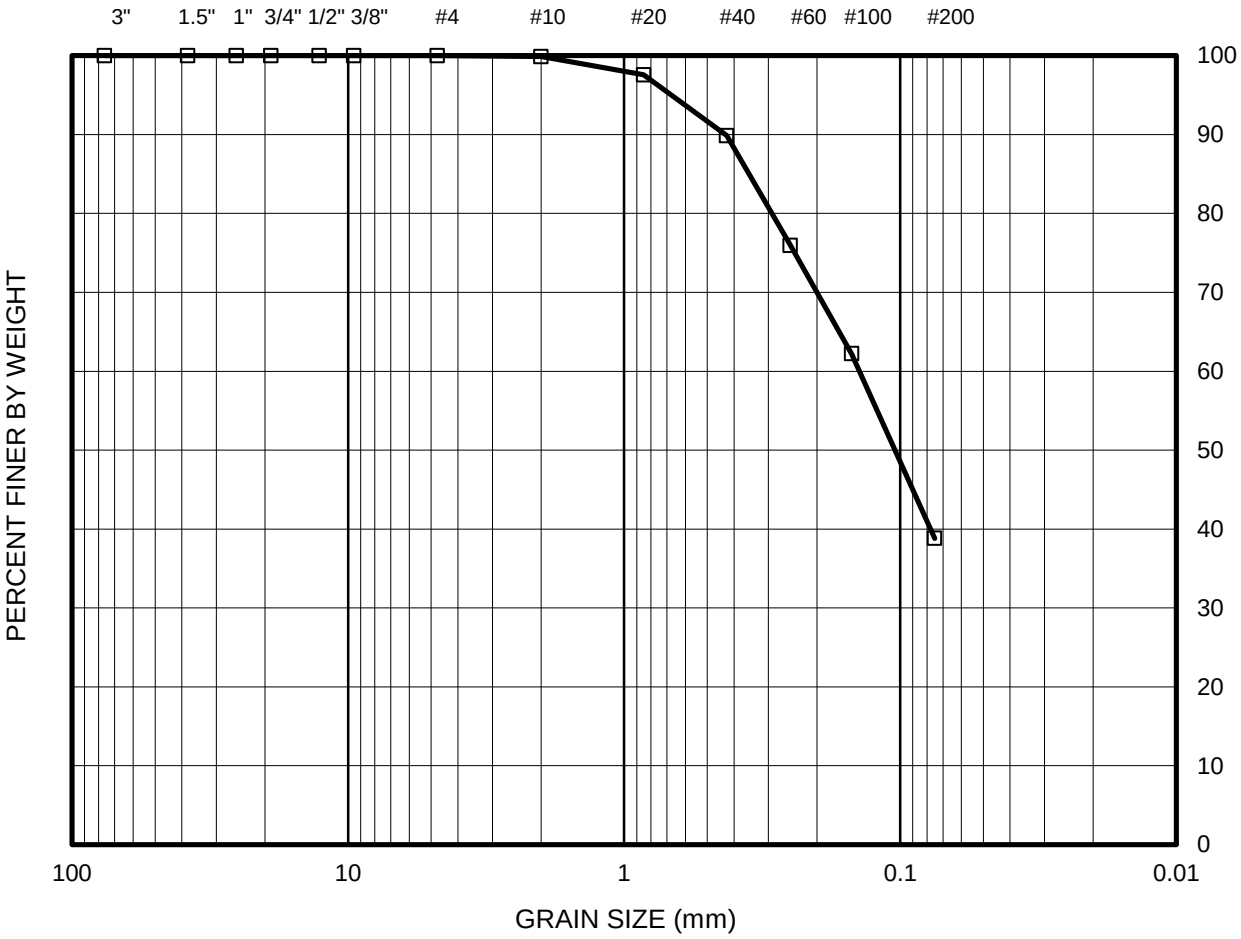
Project Name:
15526-15544 Plummer Street, Los Angeles
Client Job No.: 21-1212
Client Name: LK Geotechnical, Inc.
EGLAB Project No.: 22-122-003

GRAIN SIZE DISTRIBUTION CURVE

01/20/22 (ASTM D422) FIGURE

GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

U.S STANDARD SIEVE OPENING | U.S. STANDARD SIEVE NUMBER | HYDROMETER



SYMBOL	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
☐	B-3	N/A	10.0	SPT	SM	N/A	N/A

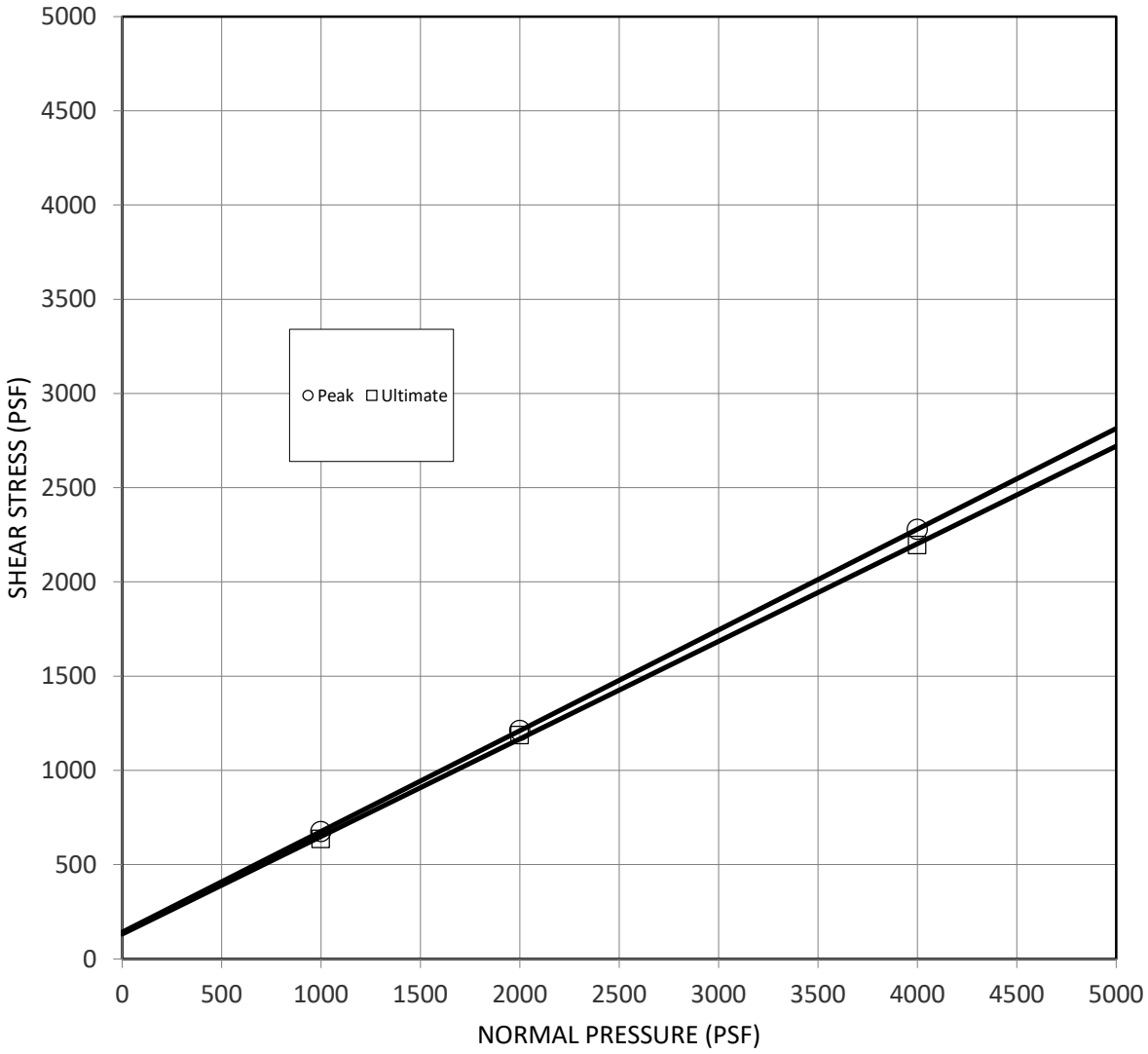
Gravel:	0.0%
Sand:	61.2%
Fine:	38.8%

EGLAB, INC.

Project Name:
15526-15544 Plummer Street, Los Angeles
Client Job No.: 21-1212
Client Name: LK Geotechnical, Inc.
EGLAB Project No.: 22-122-003

GRAIN SIZE DISTRIBUTION CURVE

01/20/22 (ASTM D422) FIGURE



Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Type	Symbol	Cohesion (PSF)	Friction Angle
B-1	N/A	5.0	Ring	CL	○	142	28
					□	132	27

Normal Stress (psf)	Initial Moisture (%)	Final Moisture (%)	γ_d (pcf)	S (%)
1000	17.1	24.6	97.6	92
2000	17.1	23.5	99.5	91
4000	17.1	22.8	100.3	91

EGLAB, INC.

Project Name: 15526-15544 Plummer Street, Los Angeles

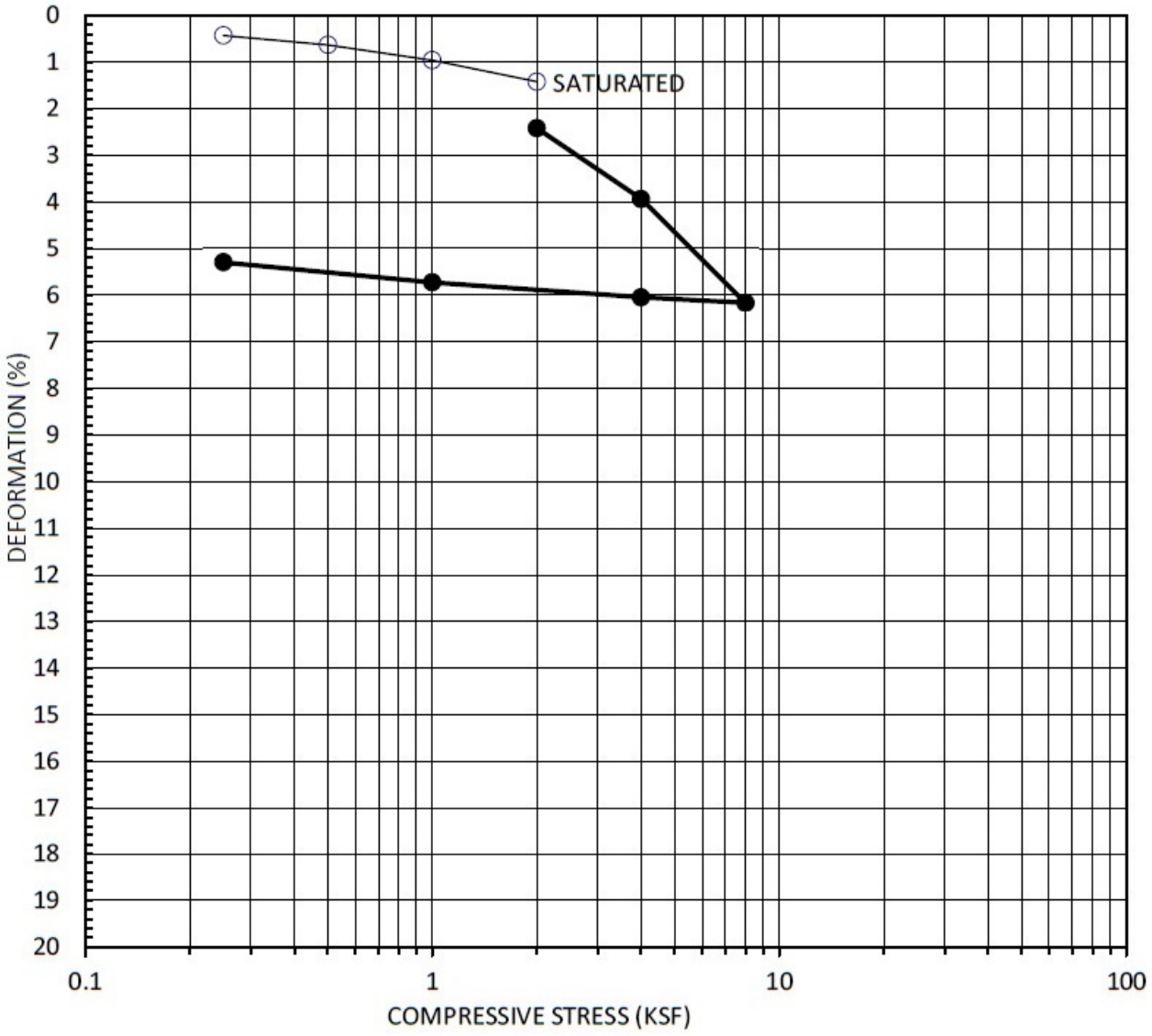
Client: LK Geotechnical

Project No.: 21-1212

EGLAB Project No.: 22-122-003

DIRECT SHEAR

01/22 (ASTM D3080) Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-1	N/A	10.0	ML	5.1	97.9	0.721

EGLAB, INC.

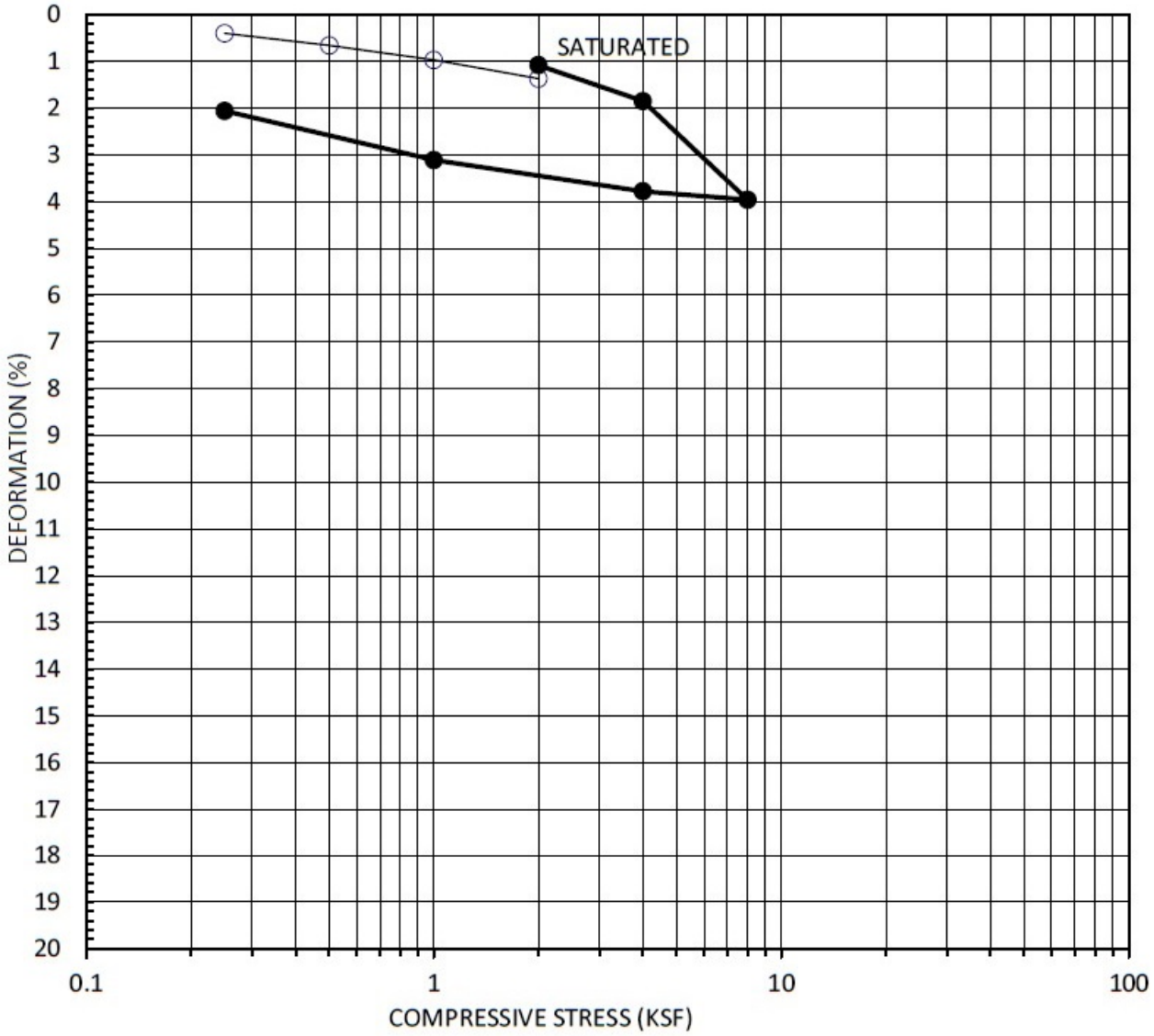
Project Name:
15526-15544 Plummer Street, Los Angeles
Client: LK Geotechnical, Inc.
Project No.: 21-1212
EGLAB Project No.: 22-122-003

CONSOLIDATION

(ASTM D2435)

01/22

Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-2	N/A	5.0	CL	7.8	103.3	0.631

EGLAB, INC.

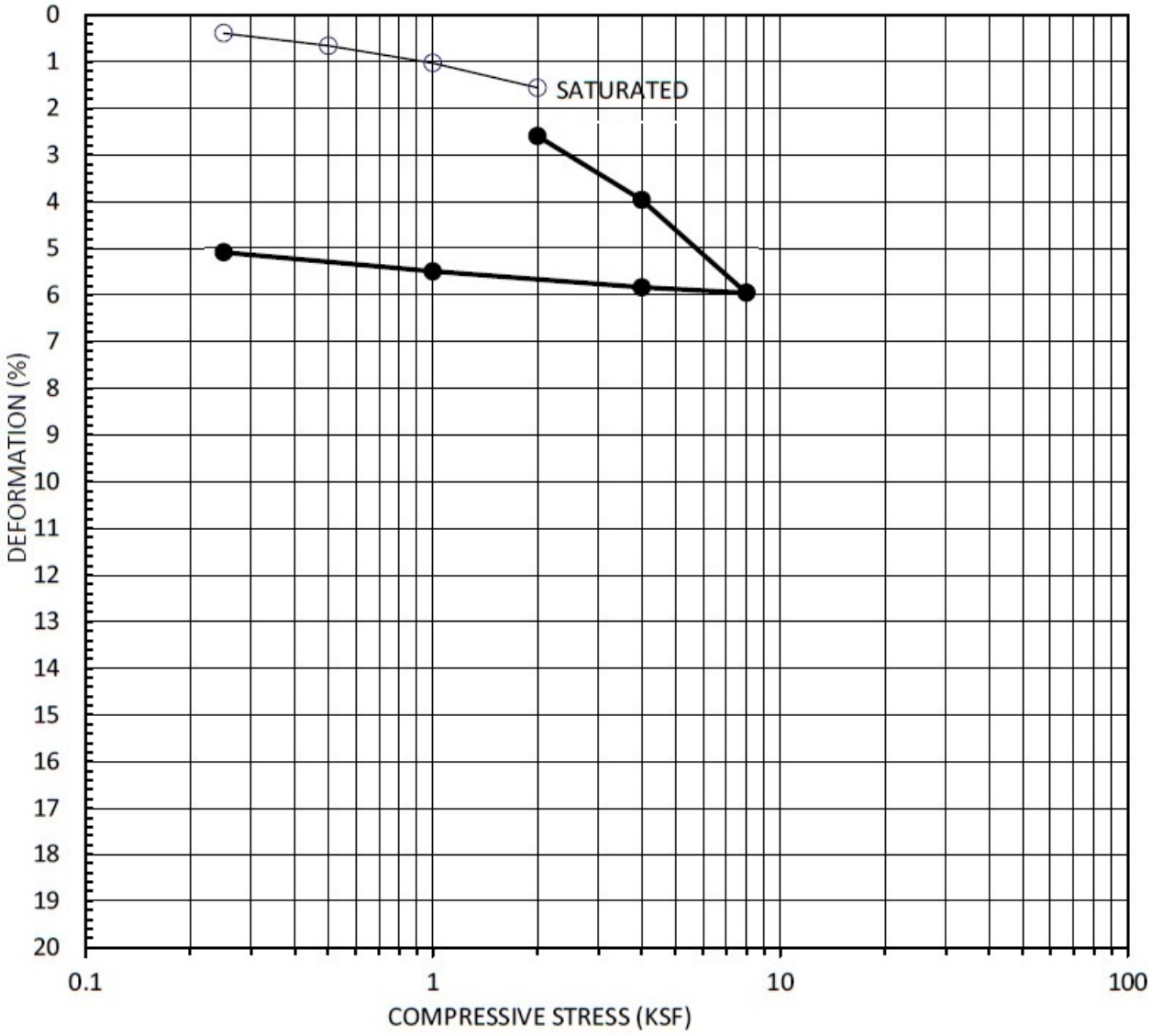
Project Name:
15526-15544 Plummer Street, Los Angeles
Client: LK Geotechnical, Inc.
Project No.: 21-1212
EGLAB Project No.: 22-122-003

CONSOLIDATION

(ASTM D2435)

01/22

Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-4	N/A	10.0	ML	7.5	83.9	1.008

EGLAB, INC.

Project Name:
15526-15544 Plummer Street, Los Angeles

Client: LK Geotechnical, Inc.

Project No.: 21-1212

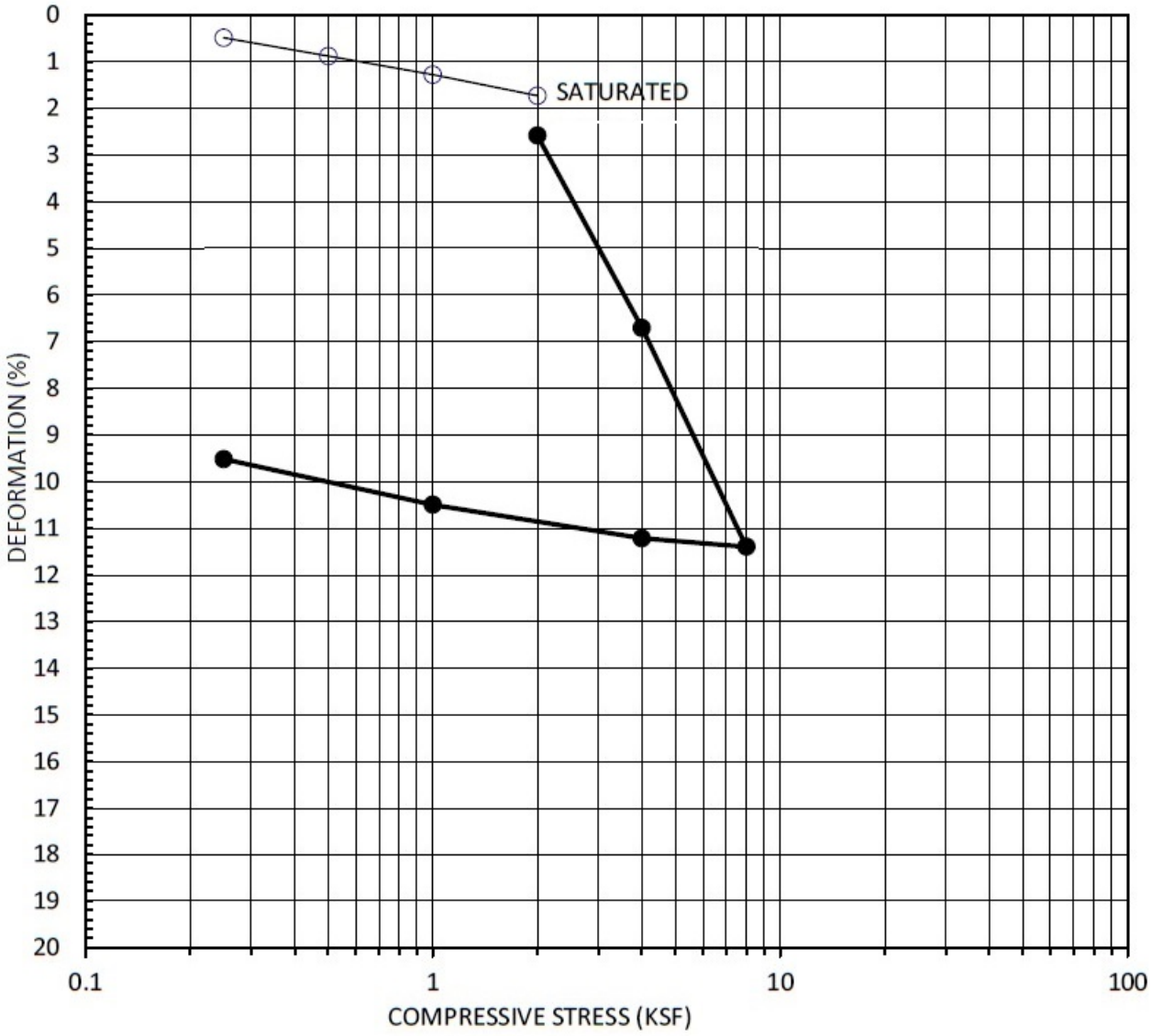
EGLAB Project No.: 22-122-003

CONSOLIDATION

(ASTM D2435)

01/22

Figure



Symbol	Boring No.	Sample No.	Depth (Ft.)	Soil Type	Init. Moisture Content (%)	Init. Dry Density (PCF)	Init. Void Ratio
○	B-5	N/A	5.0	CL	8.7	88.4	0.905

EGLAB, INC.

Project Name:
15526-15544 Plummer Street, Los Angeles

Client: LK Geotechnical, Inc.

Project No.: 21-1212

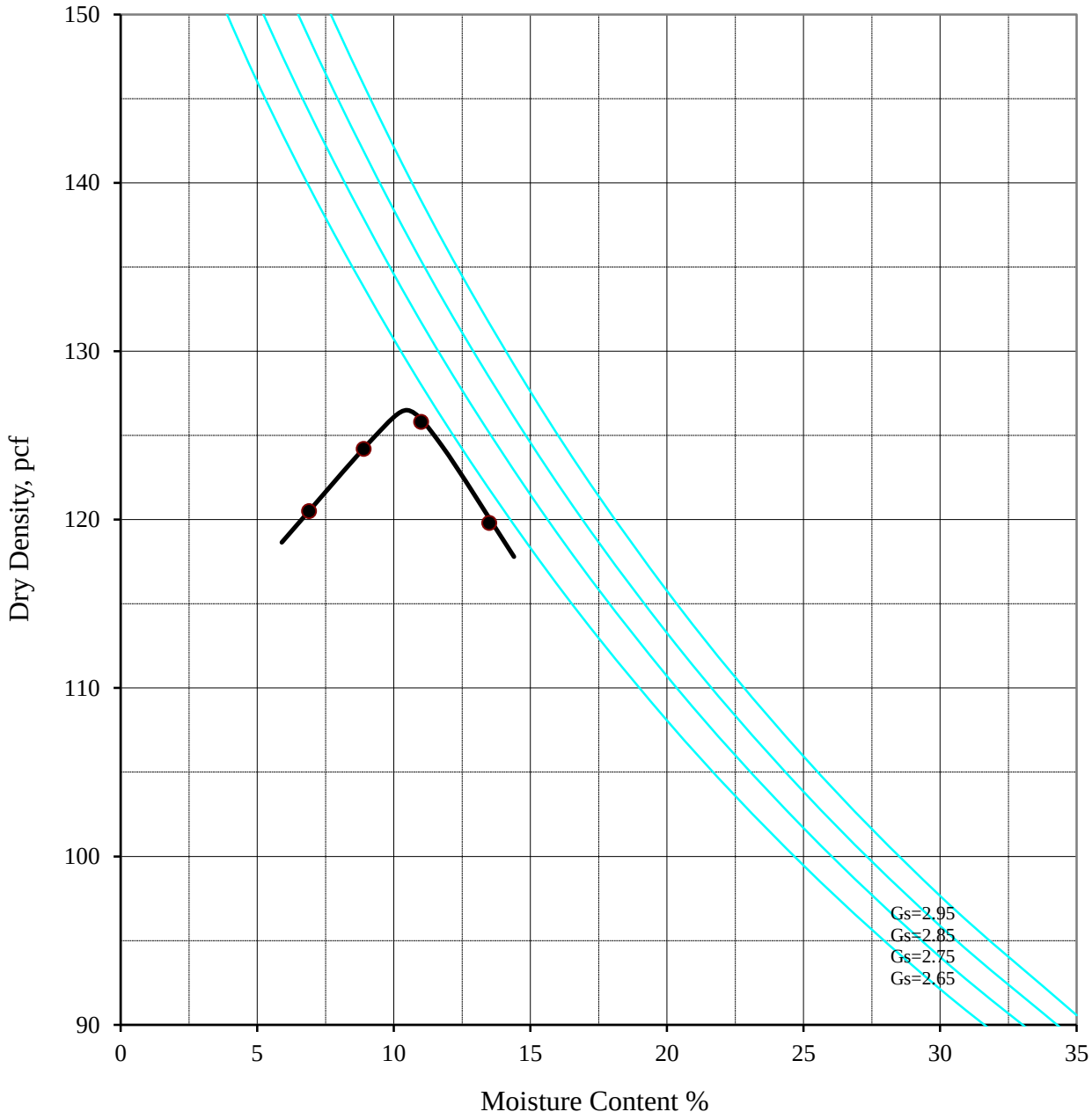
EGLAB Project No.: 22-122-003

CONSOLIDATION

(ASTM D2435)

01/22

Figure



Method "A"

Maximum Dry Density = **126.5** pcf Optimum Moisture Content = **10.5** %	Boring No: B-2 Sample: N/A Depth : 0-5.0 feet Description : Sandy Clay (CL), olive brown, trace of gravel
EGLAB, INC.	Project Name: 15526-15544 Plummer Street, Los Angeles Client Name: LK Geotechnical Engneering, Inc.
Modified Proctor **(ASTM D1557)**	Job No.: 21-1212 EGLAB Project No.: 22-122-003 Date : Jan-22 Figure

SUMMARY OF CORROSION TEST RESULTS

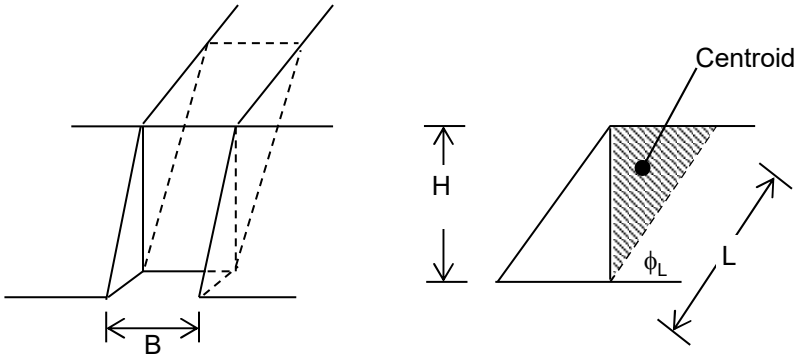
PROJECT NAME:	15526-15544 Plummer Street, Los Angeles	EGLAB JOB NO.:	22-122-003
PROJECT NO.:	21-1212	CLIENT:	LK Geotechnical, Inc.
DATE:	1/19/2022	Summarized By:	JT

BORING NO.	SAMPLE NO.	DEPTH (ft)	pH CalTrans 643	Chloride Content CalTrans 422 (ppm)	Sulfate Content CalTrans 417 (% by weight)	Minimum Resistivity CalTrans 643 (ohm-cm)
B-2	N/A	0-5.0	7.36	280	0.019	1,200

Appendix C
Engineering Calculations and Design Details

List of Plates

Plate No.	Plate Name
SC-1	Slot Cut Analysis



SLOT CUT SCHEMATIC DIAGRAM

Slot Cut Dimensions

Slot Cut Height, H =	7.0	ft
Slot Cut Width, B =	8.0	ft
Surcharge, q =		kips/ft

Soil Parameters

Unit weight of soil, γ =	120.0	pcf
Cohesion, C =	132.0	psf
Friction angle, ϕ =	27.0	degrees

Generalized Limit Equilibrium Analysis

Potential sliding plane angle, ϕ_L=	58.5	degrees
Potential sliding plane length, L =	8.2	ft
Depth of centroid, d =	2.3	ft

Unit Driving Force Calculations

Area of sliding, A =	15.0	ft^2
Weight of soil, W =	1.8	kips/ft
Driving force, F_D =	1.5	kips/ft

Unit Resistant Force Calculations

Resistance on sliding plane, R_B =	1.6	kips/ft
Resistance on side walls, R_W =	0.210	ksf

Factor of Safety Calulations

F.S. = $(R_B*B+2*A*R_W)/(F_D*B)$ =	**1.5**	**>1.25**	**O.K.**

LK Geotechnical

LK Geotechnical Engineering, Inc.
10120 National Blvd., Los Angeles, CA 90034
Tel: 310.866.8977; Fax: 310.204.2459

SLOT CUT ANALYSIS

15526-15544 Plummer Street

Los Angeles, California

DATE:	Feb. 2022	PROJECT #	21-1212	PLATE	SC-1