November 20, 2018

PROJECT NO. S-1747

GEOTECHNICAL INVESTIGATION REPORT

Site of Proposed Mixed-Use Building
3431-3451 W. 8th St., 749-753 S. Harvard Blvd., and 748 S. Hobart Blvd.
Los Angeles, California
(Tract: Wilshire Harvard Heights Block:-, Lot: Part of 200, 201 202, 110, 111, 112,113&114)

DON SOILS ENGINEERING CO.

DON SOILS ENGINEERING, CO
CONSULTING GEOTECHNICAL ENGINEERS
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November 20, 2018

Project No.: S-1747

Corbel Architect
3450 W. Wilshire Blvd. Suite 1000
Los Angeles, California

Subject: Geotechnical Investigation,
Proposed Mixed-Use Building
3431-3451 W. 8th St., 749-753 S. Harvard Blvd., and 748 S. Hobart Blvd.
Los Angeles, California

Gentlemen:

Submitted herewith is our geotechnical report summarizing the results of the subject investigation we performed at the site of your proposed mixed-use building.

Based on the findings of this investigation we conclude that the site is suitable for the proposed construction provided that the specific recommendations set forth herein are implemented. The proposed structures may be supported by conventional spread footings or mat footing.

The accompanying report presents relevant conclusions and recommendations for preliminary planning and foundation design.

We appreciate the opportunity to be of service on this project and we look forward to serving you again. If any questions arise concerning the interpretation of this report, please feel free to call.

Very truly yours,

DON SOILS ENGINEERING, CO.
Donghyun Yim
Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
DONGHYUN YIM
No. 59739
Exp. 12/31/2019
CIVIL
STATE OF CALIFORNIA

1. INTRODUCTION

This report presents the results of a geotechnical investigation performed at the site of your proposed mixed-use building to be constructed at 3431, 3447, 3451 W. 8th St., 749, 753 S. Harvard Blvd., and 748 S. Hobart Blvd. in the Korea Town District of the City of Los Angeles, California.

The purpose of this investigation was to determine the nature and engineering properties of the subsurface soils and to provide recommendations for the design and construction of foundations, slabs and earthwork.

The locations of our borings are shown with respect to the property lines and proposed structure depicted on Drawing A.

It is understood that the proposed development will consist of a new seven-story mixed-use (commercial +residential) building over two levels of subterranean parking (See Drawing B-1&B-2). 1

Structural loading is not decided yet. However, maximum column and wall loading estimated to be approximately 1000 kips and 8.0 kips per lineal foot, respectively.

2.0 SCOPE OF WORK

Our investigation included subsurface field exploration, soil sampling, laboratory testing, engineering analyses, site evaluation and preparation of this report. The scope of work included the following tasks:

- Six (6) test borings were drilled to depths ranging from 30 feet to 60 feet below the existing ground surface. The approximate locations of the test borings are shown on Drawing A, Plot Plan and Boring locations. Subsurface conditions encountered in the test borings were logged at the time of drilling. Relatively undisturbed samples of the subsurface materials were obtained from the borings at various intervals for laboratory testing. More detailed descriptions of the field exploration procedures and boring summaries are presented in Appendix A.

- Laboratory tests were conducted on selected soil samples. The tests included moisture-density determinations, shear strength tests, consolidation tests and expansion test. Descriptions and results of the laboratory tests are presented in Appendix B.

- Engineering analyses to evaluate the results of the field exploration, laboratory testing, earthwork and development of recommendations for foundations.

- The findings and recommendations developed during our site investigation are documented in this written report

3.0 EXISTING SITE CONDITIONS

The subject site is located at the west side of Harvard Blvd. and east side of Hobart Blvd. between 7th Street and 8th Street in the City of Los Angeles, California. The approximate site location is shown on the Vicinity Map, Figure A.

At the time of our field investigation, the site was occupied by two 2-story commercial buildings, two 1-story commercial buildings, and one 2-story single family home. These structures will be demolished. There was no basement in existing buildings.

The site is irregular in shape, measuring 286 feet wide along 8th St. and a maximum of approximately 245 feet deep along Harvard Blvd..

The lot is bounded to the north by two 2-story apartment buildings, to the east by Harvard Blvd., to the south by 8th Street, and Hobart Blvd. along the west property line.

3.1 Subsurface Material

The subsurface material encountered at the test boring locations consisted of uncertified fill overlying native soils.

The uncertified fill consisted of dark brown, compacted, silty, clayey sand. The depth of this unit is ranged to 1 foot.

The native soils encountered during boring consisted of layers of red brown to brown, very stiff, sandy, clayey silt, and gray brown, clayey to slightly clayey to trace clay, firm to dense sand to the depth explored.

3.2 Groundwater

Groundwater was encountered approximately at a depth of 26-29 feet. Historical shallow ground depth is approximately 20 feet below surface (see Figure B).

3.3 Liquefaction Analysis

From the State of California, Seismic Hazard Zones Official Map: Hollywood Quadrangle released March 25, 1999, the site is not located in the area as delineated to have potential of soil liquefaction during strong earthquakes (Figure C). Due to dense deposits of subsurface soils, the soil liquefaction potential at the subject lot is considered to be negligible.

3.4 Subsurface Variations

Based on the results of our subsurface exploration and experience, variations in the continuity and depth of subsurface deposits should be anticipated in interpolating or extrapolating subsurface soils conditions between or beyond test borings.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Evaluation

Based on the evaluation of the site conditions, the proposed structure may be supported by means of spread footings or mat foundation bearing on firm native sails in accordance with the following recommendations

4.2 Spread Footing

Shallow footings may be designed for a bearing value of 3,500 pounds per square foot and should be a minimum of 18 inches in width, 24 inches in depth below the lowest adjacent grade, and 24 inches into the recommended bearing material.

The bearing value is for dead plus live load and may be increased by one-third for momentary wind or seismic loads.

The weight of the concrete in the footings may be taken as 50 pounds per cubic foot and weight of the soil backfill may be neglected when determining the downward load on the footings.

The edge pressure of any eccentrically loaded footing should not exceed the bearing value recommended for either permanent or momentary loads.

Continuous footings shall be reinforced with at least four continuous No. 4 reinforcing bars, two placed near the bottom and the other two placed near the top.

Settlements of footings up to 3 feet wide continuous and 7 feet square are not expected to exceed 0.75 of an inch under the recommended fully applied bearing pressure.

Differential settlements between adjacent footings are not expected to exceed 1/4 of an inch.

4.2 Mat Foundation

An allowable bearing value of 5,000 pounds per square foot is recommended for mat foundation, placed at a depth of at least 2 feet below the final grade, bearing on the native soils at the proposed basement garage floor level. For elastic method of design , a modulus of subgrade reaction of 250 p.c.i. may be used.

4.3 Lateral Design

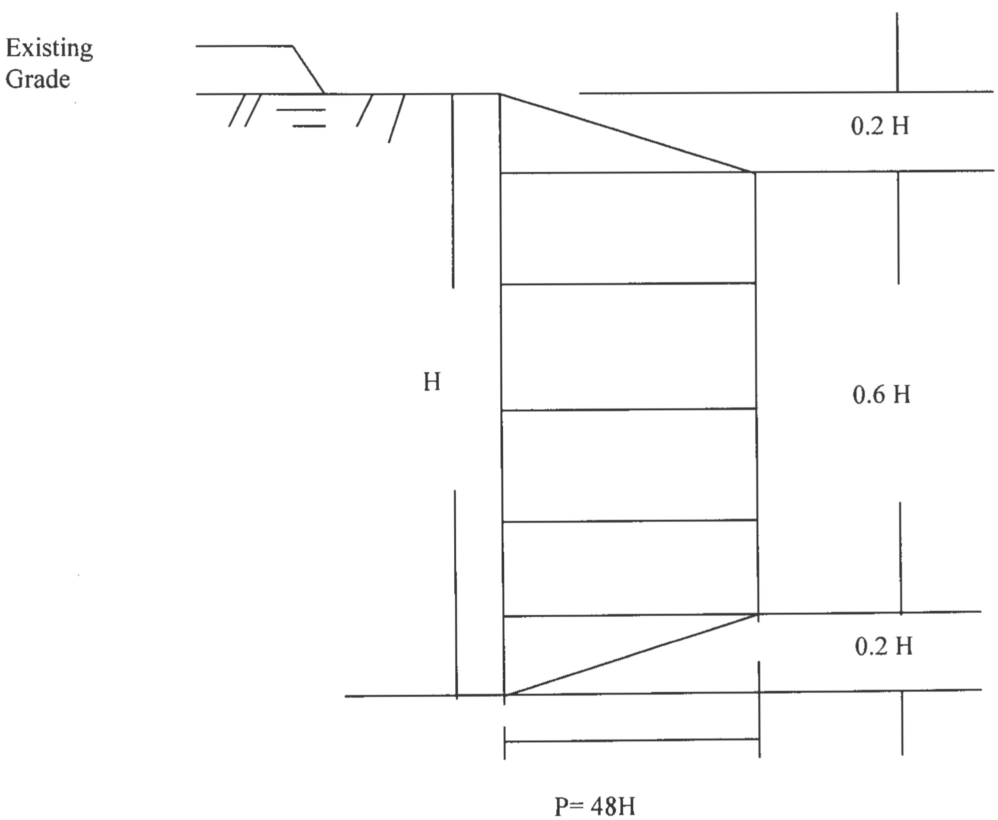
Resistance to lateral loading may be provided by friction acting at the base of the footings and by passive earth pressure against the sides of the footing.

Friction between the base of the footing and the underlying soil may be assumed as 0.35 times the dead load. The allowable passive earth pressure may be computed as 350 psf per foot of depth below lowest adjacent sub-grade, to a maximum of 5000 psf. Friction and passive pressure may be combined provided that the latter is limited to two-thirds of the allowable.

4.4 Retaining Wall

Lateral Pressures

Based on the calculations shown on plates D-1 retaining wall analyses, it is recommended that the basement walls be designed to resist a trapezoidal distribution of lateral earth pressure. The recommended pressure distribution, for the case where the grade is level behind the walls, is illustrated below with the maximum pressure equal to 48H in pounds per square foot, where H is the height of the wall in feet.



Cantilevered (Active) walls to 10 ft height such as ramp supporting a level backslope may be designed utilizing a triangular distribution of pressure. It may be designed using equivalent fluid pressure of 30 pounds per square foot per foot of depth (see Plate D-2 and D-3 for calculations).

The seismic load can be modeled as a thrust load applied at a point of 0.6H above the base of the wall. The peak ground acceleration was determined to be one-half of two-thirds of the maximum peak ground acceleration Ag=0.854x0.67x0.5=0.284. Earthquake load may be designed using equivalent fluid pressure of 26 pounds per square (see Plate D-1).

In addition, all basement walls should also be designed to resist applicable surcharge, not including at analysis.

Sub-drainage

Building walls below grade should be waterproofed or at least dampproofed, depending on the degree of moisture protection desired.

An adequate drainage system should be provided behind the walls to prevent the build-up of hydrostatic pressure. The drainage system may consist of a 4-inch perforated drain pip, PVC Schedule 40 or ABS SDR-3, encased in two cubic feet per lineal foot of coarse gravel or No. 4 crushed rock placed above and adjacent to the heel of the retaining wall footings.

Also a drainage system consisting of a manufactured drainage composite such as Miradrain along wall with gravel pocket (12"x12"x12") at drain location behind the wall can be usable.

Backfill

Prior to backfilling, the excavated ground between the retaining wall and the temporary cut bank should be cleared of all loose materials, construction debris, etc. Soil backfill should be compacted by mechanical means to at least 90 percent of the ASTM D-1557-12 laboratory standard. In-lieu of mechanical compaction, pea gravel or clean sand vibrated in suitable layers may be employed as backfill. Ideally, the top two feet of backfill exposed to water infiltration should consist of non-expansive and fine-grained material that will serve as a relatively impervious soil cover. Otherwise, the surface of the backfill should be mantled with concrete paving.

Any required soil backfill should be mechanically compacted, in layers not more than eight inches in thickness, to at least 90% of the maximum density obtainable by the ASTM Designation D1557-12 method of compaction. Flooding should not be permitted. Properly compaction of backfill will be necessary to minimize settlement of the backfill and to minimize settlement of overlying walks and paving. The excavated soils may be used for backfill; however, cobbles larger than four inches in diameter should be omitted from the backfill to minimize possible damage to the walls and waterproofing.

4.5 Floor Slabs on Grade

The firm native soils are considered to be suitable for direct support of floor slabs. Any loose soil disturbed by removal of structural elements and piping, etc. should be removed and replaced as properly compacted fill. If the recommendations presented herein are followed, the floor slab may be designed in a normal manner with steel reinforcing to be determined by the structural engineer.

The subsurface soils consist primary of slightly clayey sand. According to the expansion test (expansive index =13) at basement level, It is considered that subsurface soils have low expansion potential. However, in order to minimize cracking of concrete slab on grade, it is recommended that slabs-on-grade be a minimum of 4 inches thick and reinforced with at least No. 4 rebar, 16 inches on center each way.

A moisture barrier beneath slabs-on-grade, preferably consisting of a water-proof vapor barrier such as a polyethylene membrane of at least 10 mils in thickness, protected with at least one inch of clean sand over and under the membrane, is recommended in areas where concrete floor slabs will be covered with moisture sensitive coverings. The membrane should be properly lapped and sealed.

4.6 Seismic Design Criteria

Based on the Los Angeles Building Code, design information as follows:

Short Period Map Value Ss= 2.304g
1.0 sec Period Map Value S_1=0.817 g

The Site Class D
Seismic Category E

Value of Site Coefficient Fa=1.0
Value of Site Coefficient Fv=1.5

SMs = Fa x Ss = 2.304g
SM1=Fv x S_1= 1.225 g

SDs =2/3 x SMs =1.536 g
SD1=2/3 x SDs =0.817 g

4.7 Temporary Excavations

Temporary excavations to a maximum depth of 29 feet below the existing ground surface for constructing basement including excavation of perimeter footings are anticipated.

Unsurcharged temporary cuts can be made vertically to a maximum height of 6 feet without support. Cut deeper than 6 feet shall have the upper portion trimmed back to 1H:1V. This is based on the stability calculation shown on Plate D-10 and Plate D-11.

Excavation for the proposed subterranean parking may require shoring to provide a stable excavation due to the depth of the excavation and the proximity of the adjacent structures.

Shoring

The method of shoring would consist of steel soldier piles, placed in drilled holes and backfilled with concrete. The following information on the design and installation of the shoring is necessarily general.

Lateral Pressures

For the design of shoring, we recommend the use of a trapezoidal distribution of earth pressure. Shoring that are restrained against movement or rotation at the top should be designed to resist a trapezoidal distribution of lateral earth pressure. The recommended pressure distribution, for the case where the grade is level behind the walls, equal to 25 H in pounds per square along north property lines and 21 H in pounds per square along east, west and south property lines, where H is the height of the wall in feet.

Cantilevered shoring supporting a level backslope may be designed utilizing a triangular distribution of pressure. Shoring may be designed using equivalent fluid pressure of 38 pounds per square foot per foot of depth along north property line, 29 pounds per square foot per foot of depth along south property line, and 32 pounds per square foot per foot of depth along east and west property lines plus applicable surcharges not including in this analysis

Anchor Design

Tie-back anchors may be used to resist lateral loads. Either friction anchors or belled anchors could be used. However, it has been our experience that friction anchors involve fewer installation problems and provides more uniform support than belled anchors.

For design purposes, it may be assumed that the active wedge adjacent to the shoring is defined by a plane drawn at 58 degrees with the vertical through the bottom of the excavation. Friction anchors would extend at least 20 feet beyond the potential active wedge and to a greater length if necessary to develop the desire capacities.

The capacities of the anchors should be determined by testing of the initial anchors as outlined in a following paragraph. For preliminary design purposes, it may be estimated that drilled friction anchors will develop an average friction value of 700 pounds per square foot. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads. If the anchors are spaced at least six feet on centers, no reduction in the capacity of the anchors need be considered due to group action.

Anchor Installation

The anchors may be installed at angles of 15 to 40 degrees below the horizontal. The anchors should be filled with concrete placed by pumping from the tip out, and the concrete should extend from the tip of the anchor to the active wedge. In order to minimize chances of caving, we suggest that the portion of the anchor shaft within the active wedge be backfilled with sand or slurry before testing the anchor. This portion of the shaft should be filled tightly and flush with the face of the excavation. The sand backfill should be placed by pumping; the sand may contain a small amount of cement to facilitate pumping.

Anchor Testing

Our firm should select at least one of the initial anchors for a 24-hour 200% test and additional anchors (approximately 10 % of tie-back number) for quick 200% tests. The purpose of the 200% tests is to verify the friction value assumed in design. The anchors should be tested to develop twice the assumed friction value. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

The total deflection during the 24-hour 200% test should not exceed 12 inches. During the 24-hour test, the anchor deflection should not exceed 0.75 inch measured after the 200% load is applied. If the anchor movement after the 200% load has been applied for 12 hours is less than one-half inch, and the movement over the previous 4 hours has been less than 0.1 inch, the 24-hour test may be terminated.

For the quick 200% tests, the 200% test load should be maintained for 30 minutes. The total deflection of the anchor during the 200% quick test should not exceed 12 inches; the deflection after the 200% test load has been applied should not exceed 0.25 inch during the 30-minute period.

All of the anchors should be pre-tested to at least 150% of the design load; the total deflection during the test should not exceed 12 inches. The rate of creep under the 150% should not exceed 0.1 inch over a 15-minute period in order for the anchor to be approved for the design loading.

After a satisfactory test, each anchor should be locked-off at the design load. The locked-off should be verified by rechecking the load in the anchor. If the locked-off load varies by more than 10% from the design load, the load should be reset until the anchor is locked-off within 10% of the design load.

The installation of the anchors and the testing of the completed anchor should be observed by our firm.

Design of Soldier Piles

For the design of soldier piles spaced at least two diameters on centers, the allowable lateral bearing value (passive value) of the soils below the level of excavation may be assumed to be 350 pounds per square foot per foot of depth, up to a maximum of 5000 pounds per square foot. To develop the full lateral value, provision should be taken to assure firm contact between the solider piles and the undisturbed soils. Structural concrete should be used for the portion of a solider pile that is below the excavation level: lean mix concrete may be used above that level.

The frictional resistance between the solider piles and the retained earth may be used in resisting a portion of the downward component of the anchor load. The coefficient of friction between the soldier piles and the retained earth may be taken as 0.40. This value is based on the assumption that uniform full bearing will be developed between the steel soldier beam, the lean-mix concrete, and the retained earth. In addition, the soldier piles below the excavation level may be used to resist downward loads. The frictional resistance between the concrete solider piles and the soils below the excavation level may be taken as equal to 700 pounds per square foot.

Lagging

Continuous lagging should be used adjacent to the existing building. Lagging shall be installed every 4-foot of excavation

The soldier piles should be designed for the full anticipated pressures. However, the pressure on the lagging will be less due to arching in the soils. We recommend that the lagging be designed for the recommended earth pressure but limited to a maximum value of 400 pounds per square foot.

Deflection

It is difficult to accurately predict the amount of deflection of a shored embankment. It should be realized, however, that some deflection will occur. It is estimated that the deflection could be on the order of half inch for the shoring area surcharged from adjacent building or traffic or one inch for the unsurcharged shoring area at the top of the shored embankment. If greater deflection occurs during construction, additional bracing may be necessary to minimize settlement of the adjacent building and the utilities in the adjacent streets. If desired to reduce the deflection of the shoring, a greater active pressure could be used in the shoring design.

Monitoring

Some means of monitoring the performance of the shoring system is recommended. The monitoring should consist of periodic surveying of lateral and vertical locations of the tops of all the soldier piles and the lateral movement along the entire lengths of selected soldier piles. Also, some means of periodically checking the load on selected anchors may be necessary. We will be pleased to discuss this further with the design consultants and the contractor when the design of the shoring system has been finalized.

4.8 Earthwork

Site grading is expected to consist primarily of excavation of the site for subterranean within the proposed construction and backfill of utility trenches. Suggested guidelines for backfill, site drainage, and utility trench backfill are presented below:

<u>Backfill</u>

Where backfilling is required, excavated on site clayey or sandy fill soils are probably suitable for backfill. Any required soil backfill should be mechanically compacted, in layers not more than eight inches in thickness, to at least 90% of the maximum density obtainable by the ASTM D1557-12 method of compaction. Flooding should not be permitted. Properly compaction of backfill will be necessary to minimize settlement of the backfill and to minimize settlement of overlying walks and paving.

Loose soil, organics, and debris should be removed prior to backfilling. Cobbles larger than four inches in diameter should be omitted from the backfill to minimize possible damage to the walls and waterproofing.

Backfill should be placed and compacted in accordance with the recommended specifications of Appendix C.

<u>Site Drainage</u>: Adequate positive drainage should be provided from the structure to prevent ponding and percolation of water into the soil. The ground immediately adjacent to the foundation shall be sloped away from the building at slope not less than 5 percent for a minimum distance of 10 feet from the structure. If it is not possible due to physical obstruction or property lines, alternative method of diverting water away from the foundation should be provided. Swale might be usable with a minimum 2 % of slope within 10 feet of building foundation. Paved areas within 10 feet of the building foundation shall be sloped a minimum of 2 % away from the building.

Utility Trenches: Buried utility conduits should be bedded and backfilled around the conduit in accordance with the project specifications.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, we would recommend the utilization of lightweight mechanical equipment or shading of the conduit with clean granular material which could be thoroughly jetted in-place above the conduit prior to initiating mechanical compaction procedures. Where conduit underlies concrete slabs-on-grade and pavement, the remaining trench backfill above the pipe should be placed and compacted in accordance with Appendix C.

4.9 Stormwater Infiltration System

Historical shallow groundwater depth is approximately 20 feet below surface. Los Angeles City requires that the top of the infiltration pit/trench/well should be 10 feet below foundation, and the bottom of the infiltration pit/trench/well should be less than 10 feet above groundwater, unless approved by the Bureau of Sanitation, Department of Public Works. The proposed building has approximately 20-27 feet deep basement. Therefore, storm water infiltration system is unfeasible at the subject site.

4.10 Plan Review and Observations During Construction

This report has been prepared to aid in the evaluation of this site and to assist the structural engineer in the design of the structure. It is recommended that this office be provided the opportunity to review the final design drawings and specifications to determine if the recommendations of this report have been properly implemented.

All temporary excavations and footing excavations should be observed by a representative of this office to see that construction procedures follow the design recommendations.

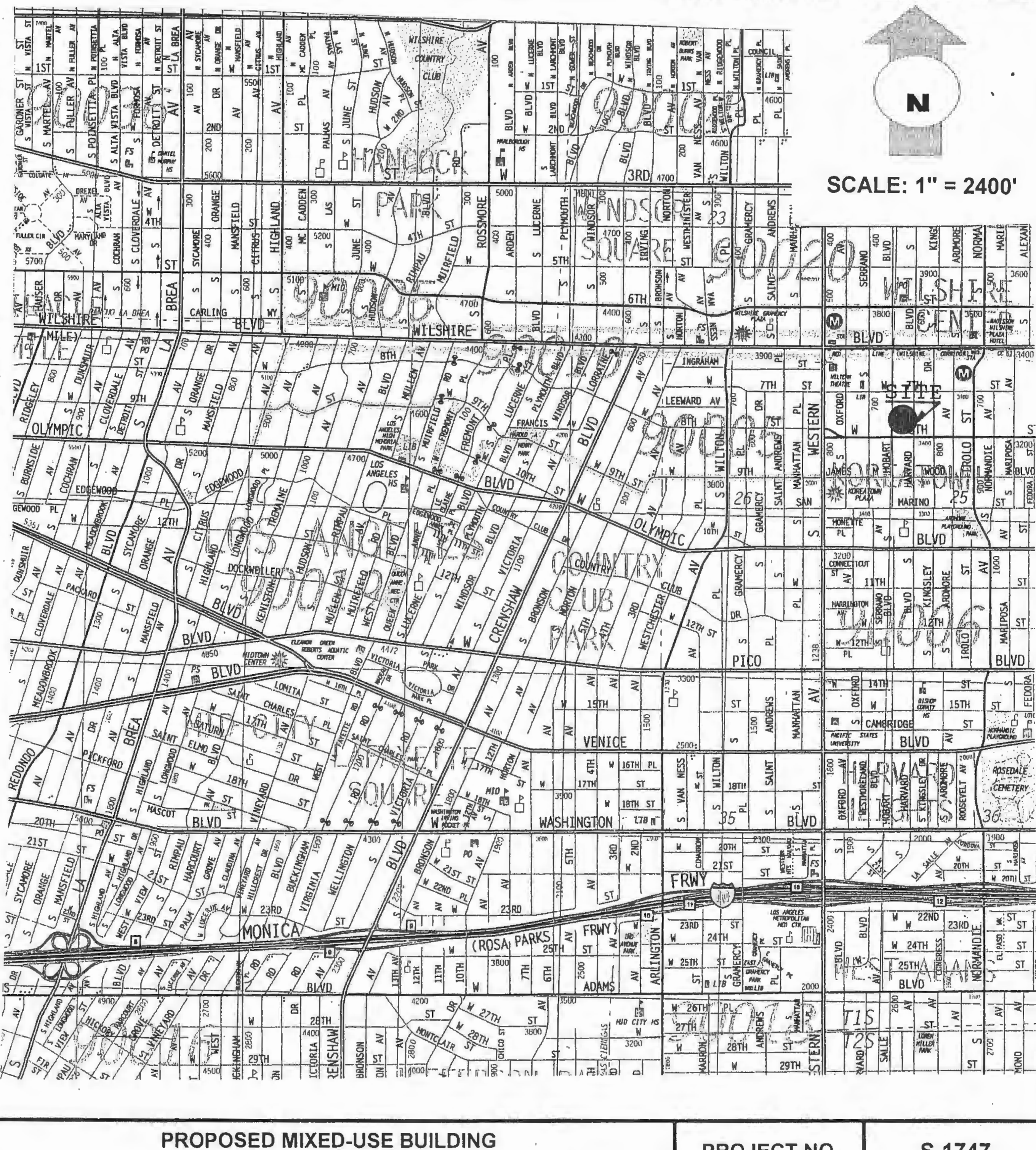
5.0 CLOSURE

The findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practices. We make no other warranty, either expressed or implied. Our conclusions and recommendations are based on the results of the field and laboratory investigations, combined with an interpolation of soil conditions between and beyond boring locations. If conditions encountered during construction appear to be different from those encountered by the borings, this office should be notified so we may take appropriate measures.

APPENDIX " A "

FIELD EXPLORATION

VICINITY MAP



SCALE: 1" = 2400'

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.	S-1747
	FIGURE	A

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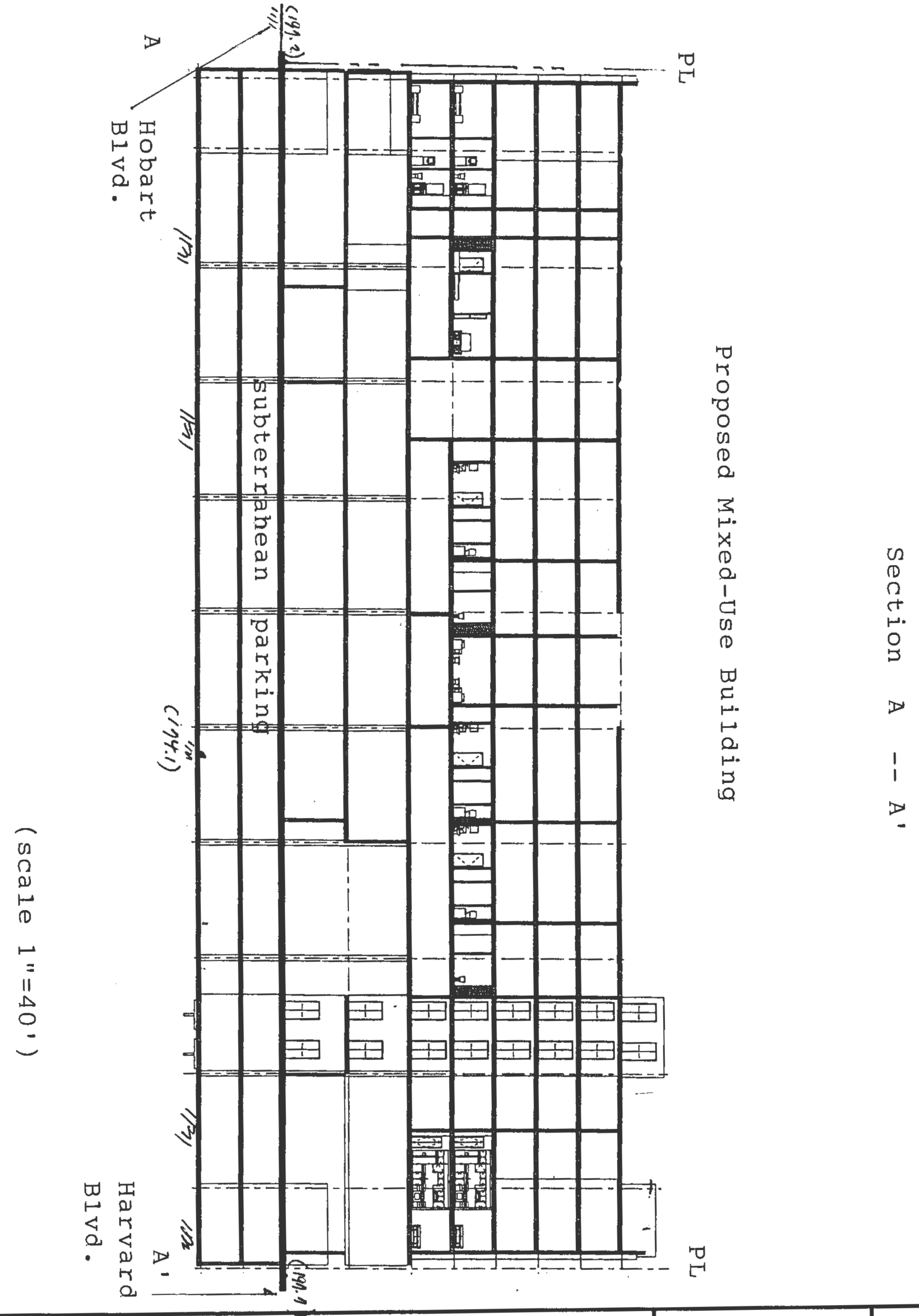
CROSS SECTIONS



PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART BLVD. **LOS ANGELES, CALIFORNIA**	**PROJECT NO.**	**S-1747**
	DRAWING	**B-1**

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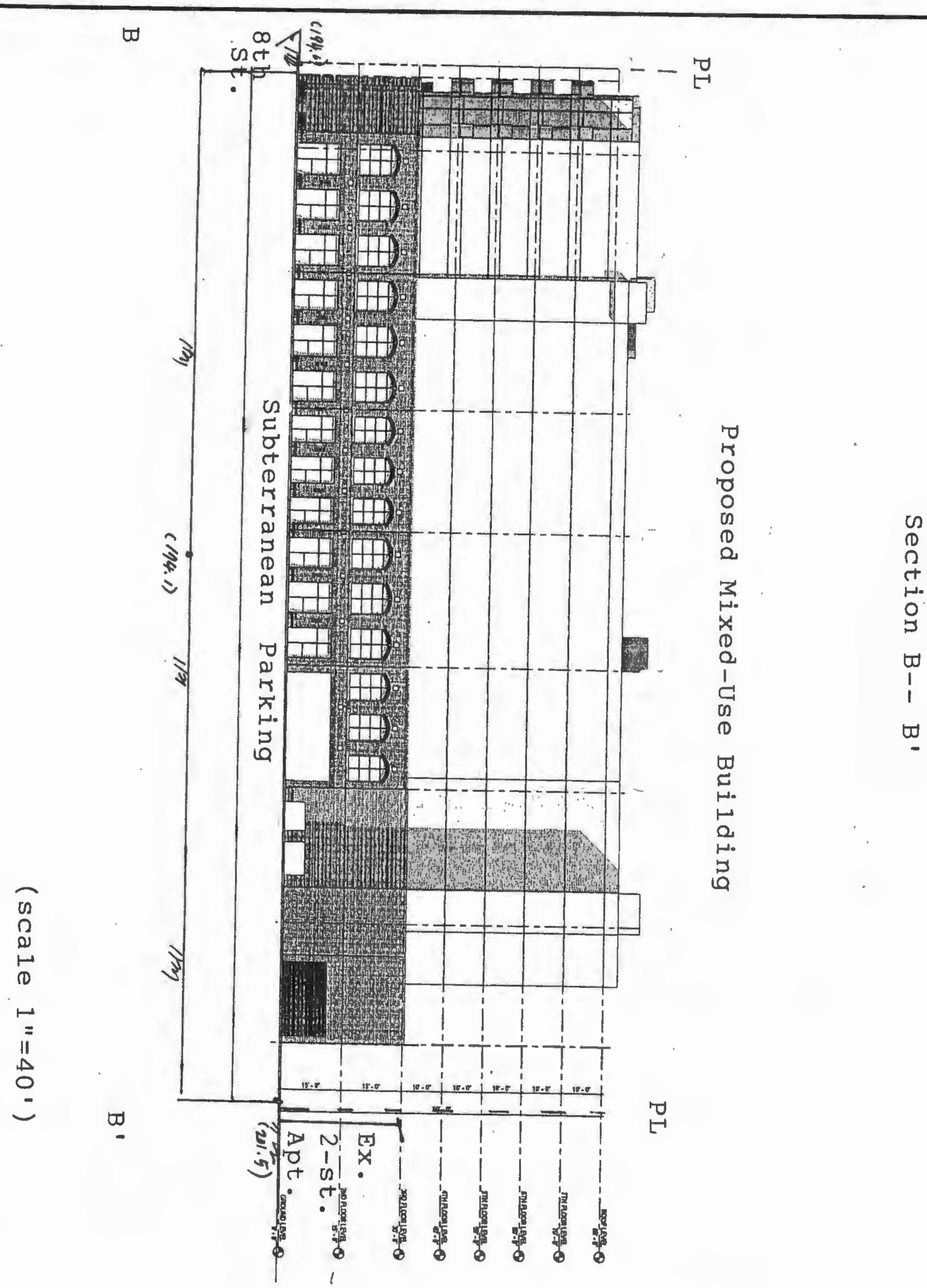
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

CROSS SECTIONS



PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART BLVD. **LOS ANGELES, CALIFORNIA**	**PROJECT NO.**	**S-1747**
	DRAWING	**B-2**

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North American Datum 1983, California Teale Albers projection. Shaded topographic relief derived from USGS 10 meter NED. Topographic base map from USGS, 1966, photorevised, 1981. Street data from US Census Bureau TIGER/Line, 2014.

Scale 1: 24,000

Contour Interval 20 Feet

California Geological Survey
Geologic Information and Publications
801 K Street, MS 14-34
Sacramento, CA 95814-3532
www.conservation.ca.gov/cgs

STATE OF CALIFORNIA

California Geological Survey

Earthquake Zones of Required Investigation
Hollywood Quadrangle

THIS MAP SHOWS BOTH ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES AND SEISMIC HAZARD ZONES ISSUED FOR THE HOLLYWOOD QUADRANGLE

This map shows the location of Alquist-Priolo (AP) Earthquake Fault Zones and Seismic Hazard Zones, collectively referred to here as Earthquake Zones of Required Investigation. The Geographic Information System (GIS) digital files of these regulatory zones released by the California Geological Survey (CGS) are the "Official Maps." GIS files are available at the CGS website. These zones will assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of surface fault rupture and earthquake-triggered ground failure as required by the AP Earthquake Fault Zoning Act (Public Resources Code Sections 2621-2630) and the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6). For information regarding the general approach and recommended methods for preparing these zones, see California Geological Survey (CGS) Special Publication 42, *Fault-Rupture Hazard Zones in California*, and Special Publication 118, *Recommended Criteria for Delineating Seismic Hazard Zones in California*.

For information regarding the scope and recommended methods to be used in conducting required site investigations refer to CGS Special Publication 42, Appendix C *Guidelines for Evaluating the Hazard of Surface Fault Rupture*, and CGS Special Publication 117A, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. For a general description of the AP and Seismic Hazards Mapping acts, the zonation programs, and related information, please refer to the website at www.conservation.ca.gov/cgs/.

MAP EXPLANATION

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONES

Earthquake Fault Zones
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture: Solid Line in Black or Red where Accurately Located; Long Dash in Black or Solid Line in Purple where Approximately Located; Short Dash in Black or Solid Line in Orange where Inferred; Dotted Line in Black or Solid Line in Rose where Concealed; Query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

SEISMIC HAZARD ZONES

Liquefaction Zones
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslide Zones
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

OVERLAPPING ALQUIST-PRIOLO AND SEISMIC HAZARD ZONES

Overlap of Earthquake Fault Zone and Liquefaction Zone
Areas that are covered by both Earthquake Fault Zone and Liquefaction Zone.

Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

Note: Mitigation methods differ for each zone – AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.

ADDITIONAL INFORMATION

For additional information on the zones of required investigation presented on this map, the data and methodology used to prepare them, and additional references consulted, please refer to the following:

The Hollywood Fault in the Hollywood 7.5' Quadrangle, Los Angeles County, California. California Geological Survey, Fault Evaluation Report FER-253.

For more information on the Alquist-Priolo Earthquake Fault Zoning Act please refer to:

Seismic Hazard Zone Report for the Hollywood 7.5-minute Quadrangle, Los Angeles County, California. California Geological Survey, Seismic Hazard Zone Report 026.

For more information on the Seismic Hazards Mapping Act please refer to:

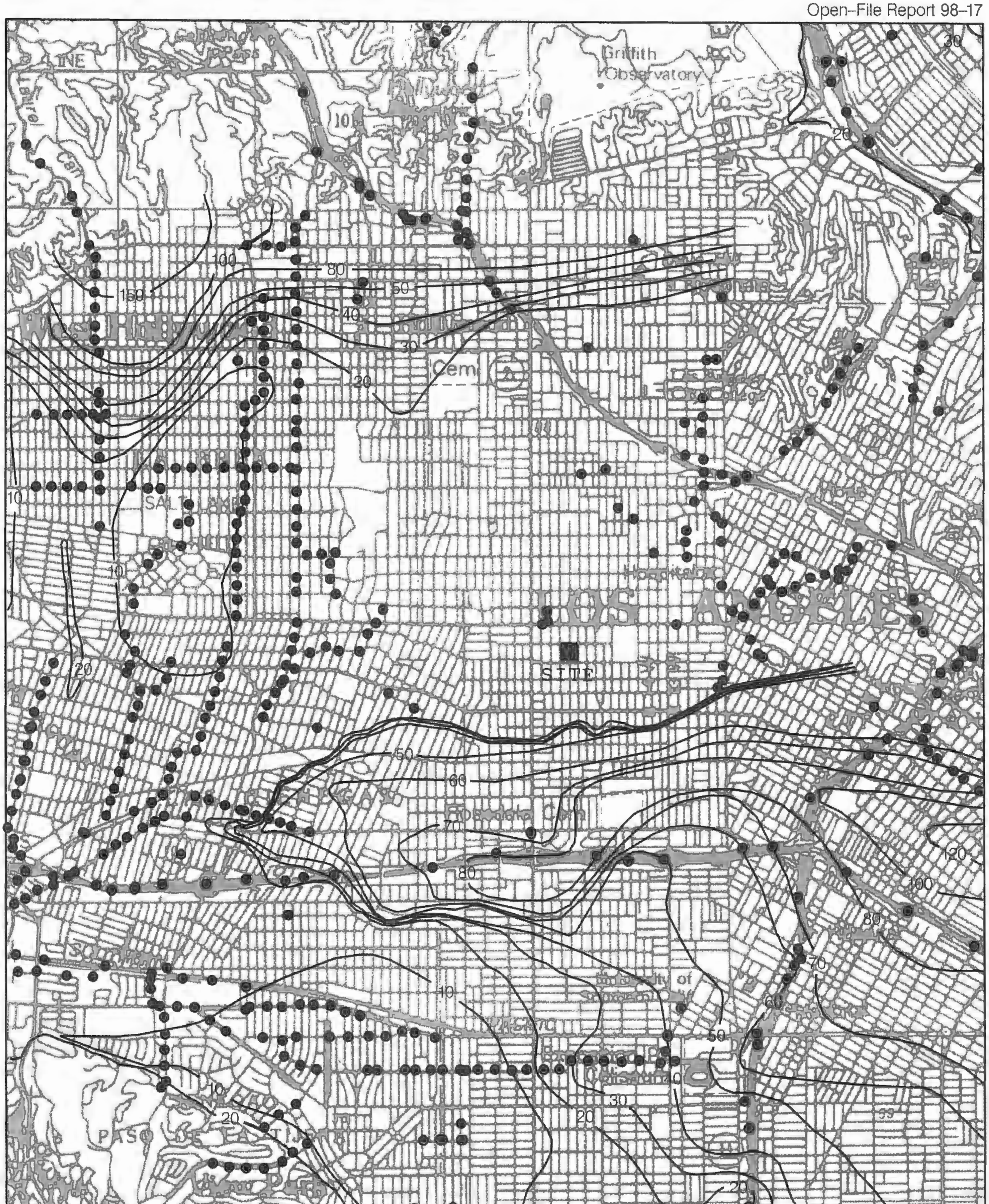
HOLLYWOOD QUADRANGLE

EARTHQUAKE FAULT ZONES	SEISMIC HAZARD ZONES
Delineated in compliance with Chapter 7.5 Division 2 of the California Public Resources Code (*Alquist-Priolo Earthquake Fault Zoning Act*)	Delineated in compliance with Chapter 7.8, Division 2 of the California Public Resources Code (*Seismic Hazards Mapping Act*)
OFFICIAL MAP	**OFFICIAL MAP**
Released: November 6, 2014	**Released: March 25, 1999**
STATE GEOLOGIST	STATE GEOLOGIST

IMPORTANT

PLEASE NOTE THE FOLLOWING FOR ZONES SHOWN ON THIS MAP

Figure B



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, Hollywood Quadrangle.

Figure C

● Borehole Site

30 Depth to ground water in feet

ONE MILE

SCALE

APPENDIX " A "

FIELD EXPLORATION

APPENDIX A

Field Exploration

The field exploration included a site reconnaissance and subsurface drilling program. During the site reconnaissance, the surface conditions were noted, and the location of the test borings was determined. The test borings were approximately located using existing boundary features as a guide.

Test borings were advanced using a hollow stem auger drilling equipment. Soils were continuously logged by an experienced engineer and classified in the field by visual examination in accordance with the Unified Soil Classification System. The field descriptions have been modified, where appropriate, to reflect laboratory test results.

Relatively undisturbed samples of the subsurface soils were obtained at frequent intervals in the borings using a drive sampler (2.4-inch diameter, 3-inch outside diameter) lined with sample rings. The thin-walled steel sampler was driven into the bottom of the bore hole with successive drops of a driving weight. The driving energy required for one foot of sampler penetration, computed from the recorded driving blows for each sample, is shown on the log of boring sheets, in the column "N." The soil was retained in brass rings (2.4-inch in diameter, 1.0-inch in height). The central portion of the sample was retained and carefully sealed in waterproof plastic containers for shipment to the laboratory.

Logs of test borings are presented on the log of test boring sheets Plates A-1 through A-13. The test boring summary sheet also includes descriptions of the soils, pertinent flied data, and supplementary laboratory results.

LOG OF BORING 1

DIGGING EQUIPMENT: 4" ϕ Power-Drive Hand Auger — DATE EXCAVATED: September 15-16, 2018

DRIVING WEIGHT: 50 lb w/30" drop — SURFACE ELEVATION: 197.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, brwn,compacted, 4" gravel, 3"asphalt				
				ML	**Silt,** sandy, f-sli.c, dry to slightly moist, red brown, very stiff				
X			65			116.4	4.8		
5					brown				
X			61			103.7	7.6		
					clayey, gray brown				
10 X			62			110.4	8.7		
				SC	**Sand**, f-m, slightly clayey, slightly moist, firm to dense gray brown				
15 X			56			101.9	8.9		
					f-c,slightly clay to trace clay				
20 X			65		slightly clayey, fine	99.0	14.6		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING **3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.** **LOS ANGELES, CALIFORNIA**	**PROJECT NO.:**	**S-1747**
	PLATE:	**A-1**

DON SOILS ENGINEERING, CO.

CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 1 (Cont.)

DIGGING EQUIPMENT: 4" ϕ Power-Drive Hand Auger

DRIVING WEIGHT: 50 lb w/30" drop

DATE EXCAVATED: September 15-16, 2018

SURFACE ELEVATION: 197.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				SC					
					fine to coarse, moist				
25 X			77			112.8	16.4		
					Groundwater, wet				
30 X			80			106.2	16.2		
					End of Boring at 35 feet below surface				
					Groundwater at 26 feet below surface				
					No Caving				
35									
40									

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING
3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.
LOS ANGELES, CALIFORNIA

PROJECT NO.:	**S-1747**
PLATE:	**A-2**

DON SOILS ENGINEERING, CO.

CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 2

DIGGING EQUIPMENT: 4" ϕ Power-Drive Hand Auger | DATE EXCAVATED: september 9-10, 2018

DRIVING WEIGHT: 50 lb w/30" drop | SURFACE ELEVATION: 201.7

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, brwn,compacted, 4" gravel, 3"asphalt				
				SM	**Sand**, f-sli.c, silty, scattered gravels, brown, slightly moist				
X			57		fiirm to dense	104.7	3.0		
5					brown to red brown				
X			68			123.2	6.5		
10 X			65		slightly moist to moist	117.4	8.4		
				SC	slightly clayey, sli. Gravelly				
15 X			58		clayey	107.4	9.9		
20 X			68		fine, gray brown	116.6	8.6		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING **3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.** **LOS ANGELES, CALIFORNIA**	**PROJECT NO.:**	**S-1747**
	PLATE:	**A-3**

DON SOILS ENGINEERING, CO.

CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 2 (Cont.)

DIGGING EQUIPMENT: 6" ϕ Power-Drive Hand Auger
DRIVING WEIGHT: 50 lb w/30" drop
DATE EXCAVATED: July 24, 2007
SURFACE ELEVATION: 201.7

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				SC					
					f-m, slightly clayey, scattered gravels				
25 X			50		moist	116.0	13.0		
					clayey, moist to wet				
30 X			60		Groundwater	117.6	16.3		
					End of Boring at 30 feet below surface				
					Groundwater at 29 ft below surface, No Caving				
35									
40									

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING **3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.** **LOS ANGELES, CALIFORNIA**	**PROJECT NO.:**	**S-1747**
	PLATE:	**A-4**

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CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 3

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger DATE EXCAVATED: Septeber 20, 2018
DRIVING WEIGHT: 140 lb w/30" drop SURFACE ELEVATION: ℄ 199.4

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, dark brown, moderately compact				
				ML	**Silt**, clayey, slighty sandy, f-m, slightly moist, brown				
					firm				
5 X			36		firm to dense	122.7	10.4		
				SC	**Sand**, f-m, clayey, slightly moist, firm to dense				
					light brown				
10 X			28			107.4	16.2		
15 X			58		slightly clayey to trace clay, dense	121.1	11.2		
					slightly clayey, gray brown				
20 X			77			125.4	10.0		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-5

DON SOILS ENGINEERING, CO.

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LOG OF BORING 3 (Cont.)

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger | DATE EXCAVATED: Septeber 20, 2018

DRIVING WEIGHT: 140 lb w/30" drop | SURFACE ELEVATION: ⊥ 199.4

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					f-sli. coarse, clayey, gray, very dense				
25 X			100			116.1	12.3		
					slightly clayey				
30 X			100		**Groundwater**	117.1	16.5		
35 X			40	CL	**Clay**, sandy, f-m, dark gray brown, very stiff, slightly moist	116.7	15.5		
40 X			38			118.7	13.3		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-6

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LOG OF BORING 3 (cont.)

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger — DATE EXCAVATED: Septeber 20, 2018

DRIVING WEIGHT: 140 lb w/30" drop — SURFACE ELEVATION: ±199.4

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				CL					
				SC	**Sand**, f-m, slightly clayey to trace clay, wet, firm to dense				
45 X			40			120.8	11.6		
50 X			45		clayey, wet	99.3	27.0		
55 X			55		slightly clayey	121.5	10.2		
					clayey, dense				
60 X			100		End of boring at 60 ft below surface	111.6	18.2		
					Groundwater at 29 ft below surface				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING
3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.
LOS ANGELES, CALIFORNIA

PROJECT NO.: S-1747
PLATE: A-7

DON SOILS ENGINEERING, CO.

CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 4

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger — DATE EXCAVATED: Septeber 20, 2018

DRIVING WEIGHT: 140 lb w/30" drop — SURFACE ELEVATION: 198.4

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, dark brown, moderately compact				
				SM	**Sand,** silty, slightly sandy, fine, slightly moist, brown				
					firm				
5 X			18		sandy,f-c, scat. Gravels	128.5	5.0		
					firm to dense				
10 X			41			125.5	7.9		
15 X			75	SC	gravelly, slightly clayey	115.6	5.1		
					dense, gray brown				
20 X			80		slightly clayey to trace clay	116.1	10.9		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-8

DON SOILS ENGINEERING, CO.

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LOG OF BORING 4 (Cont.)

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger   DATE EXCAVATED: Septeber 20, 2018
DRIVING WEIGHT: 140 lb w/30" drop   SURFACE ELEVATION: 198.4

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				SC					
					slightly clayey, slightly gravelly				
25 X			100			109.3	7.6		
30 X			100		trace clay, Groundwater	115.2	15.8		
35			52		sligtly clayey	114.5	13.8		
40			40		End of Boring at 25 feet below surface	119.2	12.8		
					No Groundwater, No Caving				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-9

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CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 5

DIGGING EQUIPMENT: 4" ϕ Power-Drive Hand Auger — DATE EXCAVATED: September 22-23, 2018

DRIVING WEIGHT: 50 lb w/30" drop — SURFACE ELEVATION: 196.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, brwn,compacted, 4" gravel, 3"asphalt				
–				ML	**Silt,** sandy, f-m, dry to slightly moist, red brown, very stiff				
X			63			115.7	5.2		
–									
5					brown				
X			63	SM	**Sand**, f-m, silty, red brown, slightly moist, firm to dense	112.3	8.4		
–									
–									
–					fine, dense				
10 X			72			106.0	5.0		
–									
–									
–									
–									
15 X			76	SW	f-sli.c trace clay,gray white	118.9	2.9		
–					dry to slightly moist				
–									
–									
–									
20 X			70		gray brown	102.2	2.6		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING **3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.** **LOS ANGELES, CALIFORNIA**	**PROJECT NO.:**	**S-1747**
	PLATE:	**A-10**

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LOG OF BORING 5 (Cont.)

DIGGING EQUIPMENT: 4" ϕ Power-Drive Hand Auger | DATE EXCAVATED: September 15-16, 2018

DRIVING WEIGHT: 50 lb w/30" drop | SURFACE ELEVATION: 196.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				SW					
				SC	f-c, slightly clayey, moist				
25 X			77			111.2	13.6		
					Groundwater, wet				
30 X			80			116.3	15.3		
					End of Boring at 30 feet below surface				
					Groundwater at 26 feet below surface				
					No Caving				
35									
40									

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-11

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LOG OF BORING 6

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger — DATE EXCAVATED: September 30, 2018

DRIVING WEIGHT: 140 lb w/30" drop — SURFACE ELEVATION: 196.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
					Fill, sand, clayey, silty, dark brown, moderately compact				
—				ML	**Sand,** silty, slightly sandy, fine, slightly moist, brown				
X			68		firm	118.4	4.8		
5					sandy,f-c, scat. Gravels				
X			34	SM	firm to dense	114.7	7.9		
					fine, dense				
10 X			36			112.5	5.0		
					slightly clayey, gray brown				
15 X			55		f-sli.c , trace clayey,lt. brown	102.4	2.3		
20 X			70		slightly clayey, fine, moist	121.5	10.8		
					continue				

LEGEND: B = bedding; J = joint; F = fault; SS = slide surface;

γ = dry unit weight(pcf); MC = moisture content(%);

S = degree of saturation(%); Rc = relative compaction(%);

N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.:	S-1747
	PLATE:	A-12

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CONSULTANT FOUNDATION ENGINEERS & ENGINEERING GEOLOGIST

LOG OF BORING 6 (Cont.)

DIGGING EQUIPMENT: 8" ϕ Truck Mount Hollow Stem Auger — DATE EXCAVATED: September 30, 2018

DRIVING WEIGHT: 140 lb w/30" drop — SURFACE ELEVATION: 196.2

DEPTH IN FEET	UND.	BULK	N	USC	MATERIAL DESCRIPTION	γ	MC	S	RC
				SC					
					fine to coarse, moist				
25 X			85			110.3	15.8		
					Groundwater, wet				
30 X			80			104.6	16.9		
35 X			45		clayey	115.8	14.9		
40 X			42		End of Boring at 30 feet below surface	116.4	16.3		
					Groundwater at 26 feet below surface				
					No Caving				

LEGEND: B = bedding;
γ = dry unit weight(pcf); MC = moisture content(%);
S = degree of saturation(%); Rc = relative compaction(%);
N = blows per foot; USC = unified soil classification

PROPOSED MIXED-USE BUILDING **3431-3451 W. 8TH ST., 749-753 S. HARVARD BLVD. AND 748 S. HOBARD BLVD.** **LOS ANGELES, CALIFORNIA**	**PROJECT NO.:**	**S-1747**
	PLATE:	**A-13**

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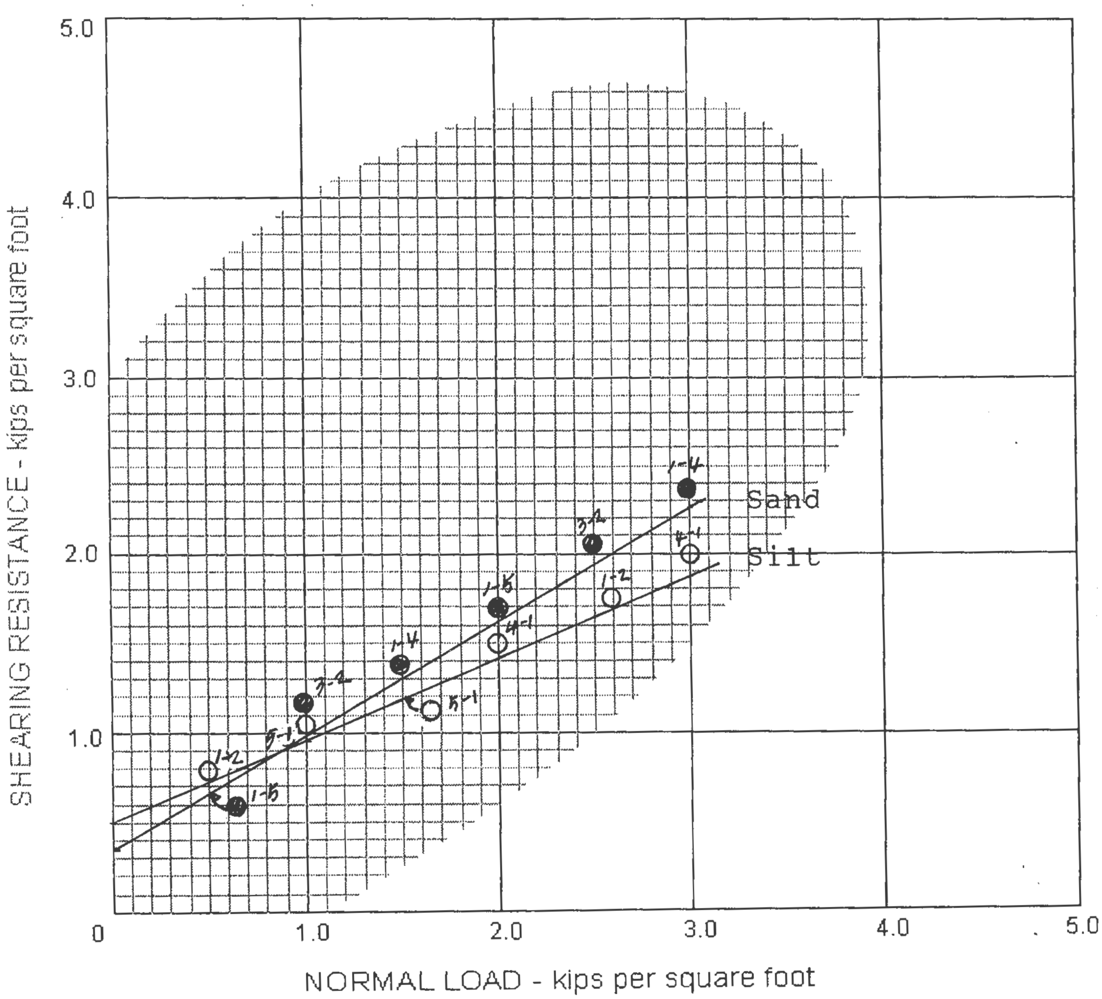
APPENDIX " B "

LABORATORY TEST PROGRAM

DIRECT SHEAR TEST

TEMPORARY EXCAVATION (ULTIMATE STRENGTH)



BORING NO	DEPTH(FT)	DRY DENSITY(PCF)	FIELD/TEST MOISTURE(%)	COHESION(P.S.F)	FRICTION(DEG.)
Silt					
5-1	3	115.7	5.2/24.8		
4-1	5	128.5	5.0/28.8	500	25
1-2	6	103.7	7.6/28.7		
Sand					
3-2	10	107.4	16.2/26.7	350	32
1-4	15	101.9	8.9/21.2		
1-5	20	99.0	14.9/26.2		

Tested under saturated drained condition

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART LOS ANGELES, CALIFORNIA	PROJECT NO.	S-1747
	PLATE	B-1

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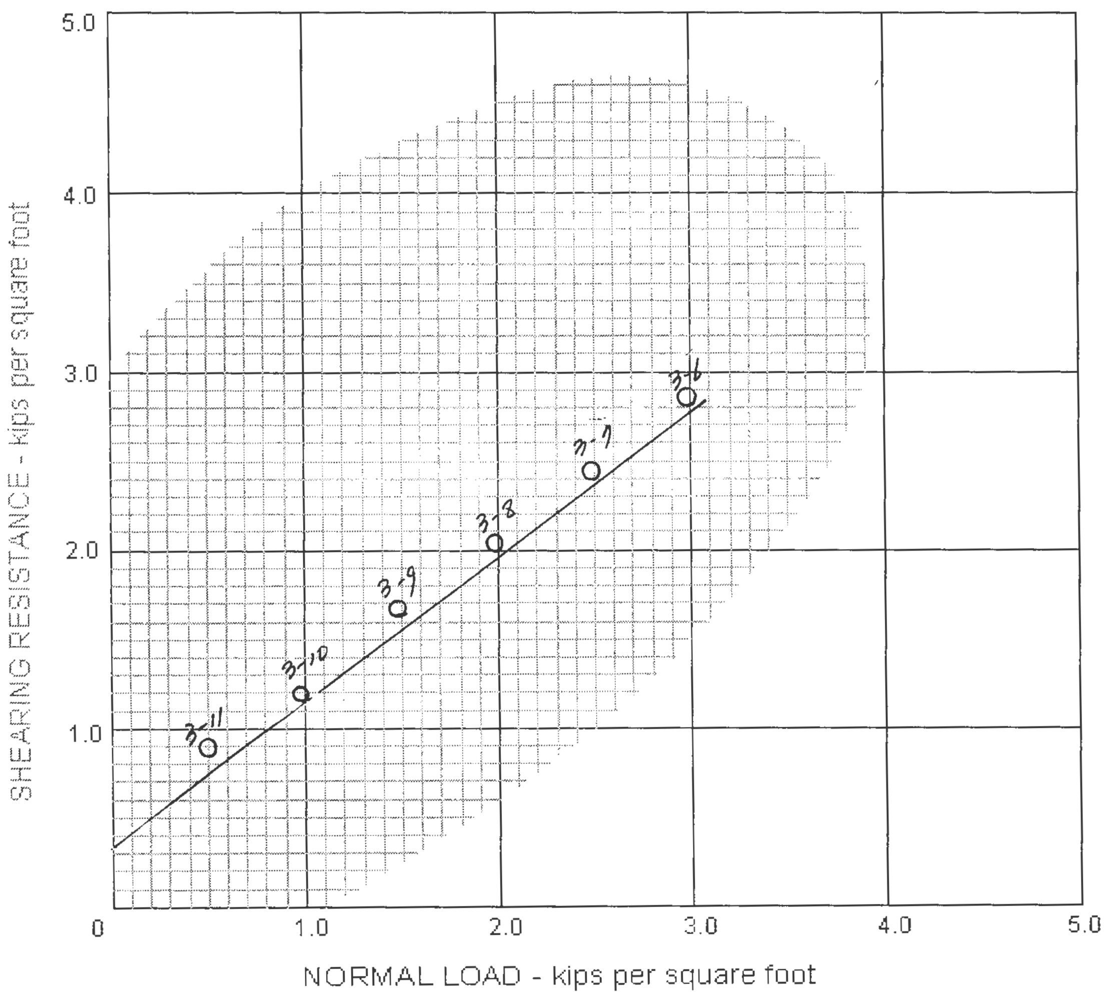
DIRECT SHEAR TEST

BEARING (ULTIMATE STRENGTH)



BORING NO	DEPTH(FT)	DRY DENSITY(PCF)	FIELD/TEST MOISTURE(%)	COHESION(P.S.F)	FRICTION(DEG.)
3-6	30	117.1	16.5		
3-7	35	116.7	15.5		
3-8	40	111.6	18.2	350	39
3-9	45	120.8	11.6		
3-10	50	99.3	27.0		
3-11	55	121.5	10.2		

Tested under field moisture condition

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART LOS ANGELES, CALIFORNIA	PROJECT NO.	S-1747
	PLATE	B-2

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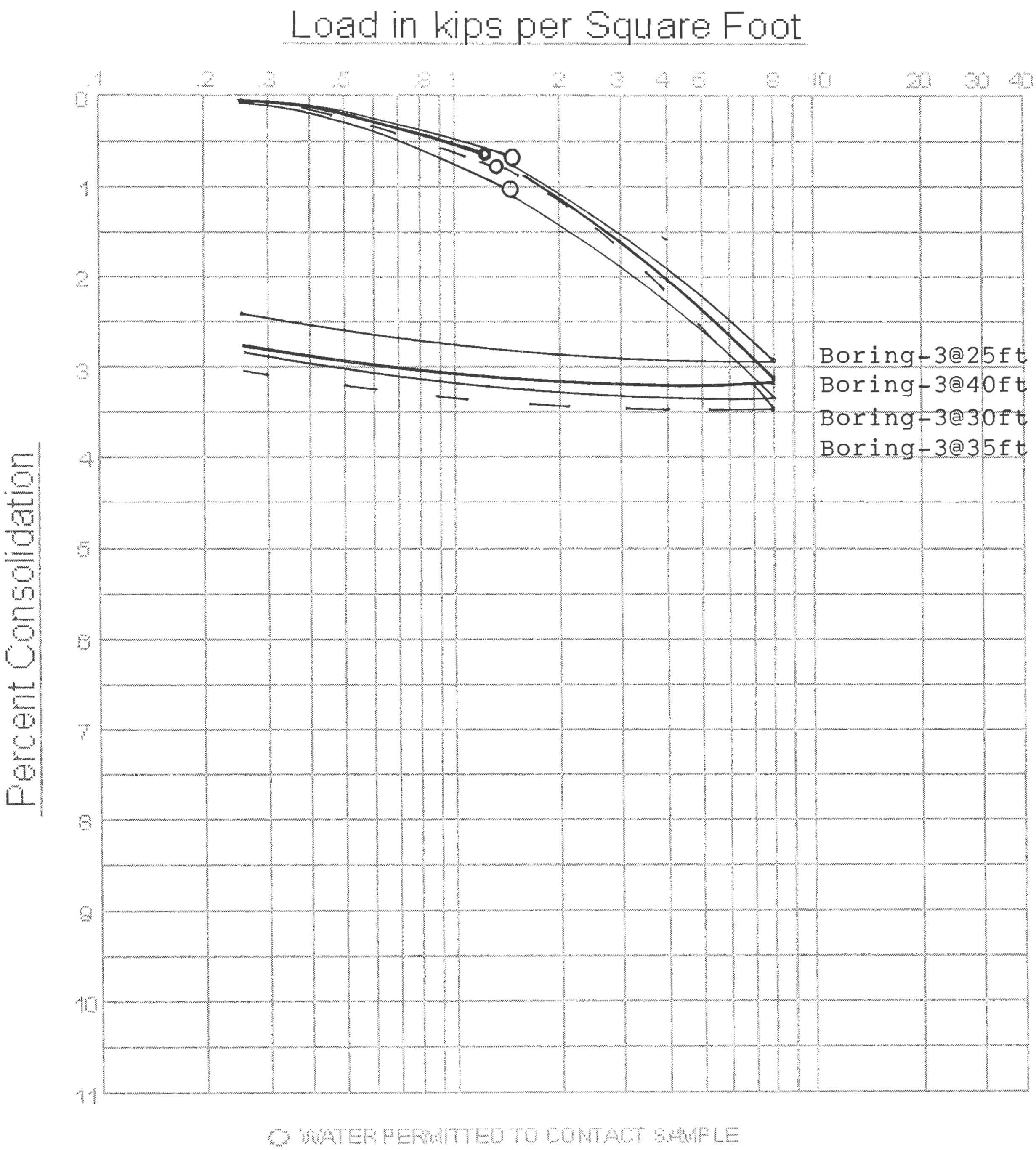
CONSOLIDATION TESTS



PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART BLVD. LOS ANGELES, CALIFORNIA	PROJECT NO.	S-1747
	PLATE	B-3

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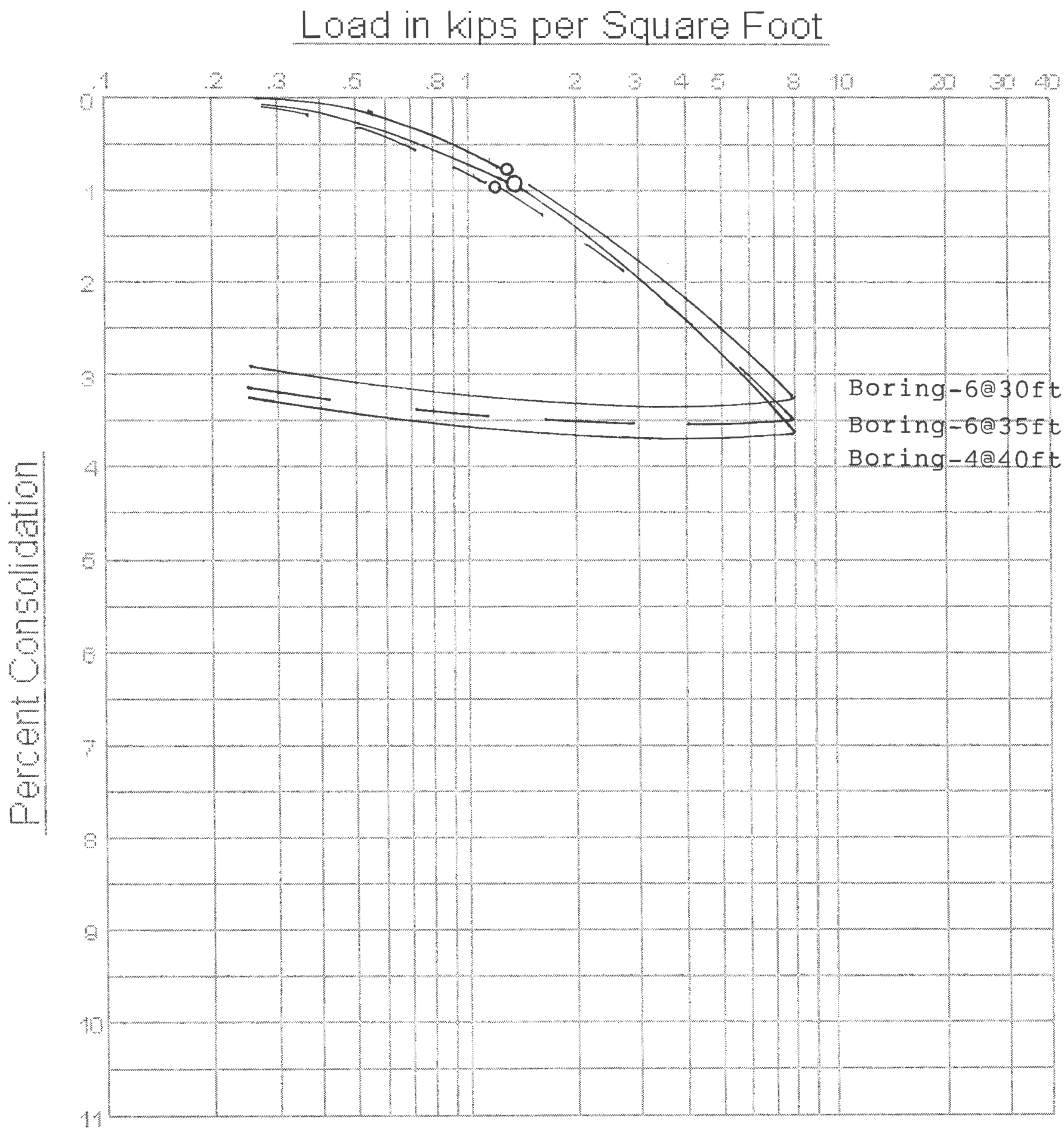
CONSOLIDATION TESTS



○ WATER PERMITTED TO CONTACT SAMPLE

PROPOSED MIXED-USE BUILDING 3431-3451 W. 8TH ST., 749-753 HARVARD BLVD. AND 748 S. HOBART BLVD. **LOS ANGELES, CALIFORNIA**	**PROJECT NO.**	**S-1747**
	PLATE	**B-4**

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APPENDIX B

Sampling

Undisturbed samples are obtained by driving a sampling tube by means of a heavy driving weight into undisturbed soils at various intervals below the surface. The number of blows of the weight falling from a specified height required to drive the sample tube through a measured distance, is shown on the Log of Borings. The sampling tube consists of steel barrel 2.50 inches inside diameter with a lining of one-inch long thin brass rings. A special cutting tip is placed on one end and a ball valve on the other. The sampling tube is driven approximately 18 inches into the soil and a section of the central portion of the sample is taken for laboratory tests, the soil being still confined in the brass rings after extraction from the sampling tube. The samples are taken to the laboratory in close fitting water-proof containers in order to maintain field conditions until completion of tests.

Classification

The soils are visually classified in accordance with the Unified Soil Classification System. For particular samples, classification tests such as sieve and hydrometer analysis to determine grain size distribution, liquid and plastic limits and shrinkage are used as an aid in substantiating the visual field and laboratory identifications.

Unit of Weight and Moisture

One or more one-inch long sections of the sample are cut, trimmed, weighed, oven-dried and reweighed. From these measurements, the equivalent unit weight of the solids in pounds per cubic foot and the percent moisture are calculated.

Shearing Resistance

Direct shear tests are most often employed, using a controlled rate of strain. Each sample is sheared under a load approximately equivalent to the expected overburden pressure. By varying the load on particular sample the internal angle of friction and cohesion are computed. Where applicable, the shear tests samples are saturated to simulate expected extreme moisture conditions.

Consolidation

A one-inch high ring of soil is placed in the consolidation apparatus. Loads are applied in increments to the face of the specimen. Deformation, or changes in thickness of the specimens are recorded at selected time intervals. Water is introduced or extracted from the sample through porous disks placed against the top and bottom faces of the specimen.

Expansion

UBC Standard No. 18-2 is employed in which sample is compacted in 4-inch internal diameter mold at near 50 percent saturation and then, under a surcharged load of 144 psf, allowed to absorb moisture until saturated. The amount of vertical deformation or swell is measured.

APPENDIX " C "

GRADING SPECIFICATIONs

APPENDIX C

Grading Specification

The bottom of all excavations to be backfilled shall be inspected and approved by the soil Engineer prior to placement of new fill. Certain cities require their Grading Inspector to approve the bottom of excavation prior to placement of new fill. The contractor shall request such inspections in timely manner.

1. Areas to be graded or paved shall be grubbed and stripped of all vegetation, debris and other deleterious materials. All loose soils disturbed by the removal of structural element, piping, cesspool and trees, if any, shall be removed.

2. Within the proposed areas to graded (wherever applicable), all of the unsuitable soil for structural support as described in the General Evaluation of this report shall be removed.

3. All imported soil shall consist of clean, granular, non-expansive soil free of vegetation and other deleterious material. No rock over 3 inches in greatest dimension shall be used in the upper 3 feet of the fill, and no rock over 6 inches in greatest dimension will be permitted below that except with specific approval of the Soil Engineer of the type, amount and manner of placement. No soil shall be imported to the site without prior approval by the Soil Engineer.

4. It is recommended that the degree of compaction be at least 90 percent.

5. The compaction characteristics of all fill soils shall be determined by ASTM D-1557-91. The field density and degree of compaction shall be determined by ASTM D-1556. The compacted fill should be tested and approved.

6. Density tests for compacted fill shall be made at intervals not exceeding 2 feet of fill height or every 500 cubic yards of earth material.

7. No jetting or water tamping of fill soils shall be permitted.

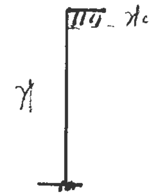
8. Observation and testing of all compaction shall be under the direction of the Soil Engineer, who shall be notified at least 24 hours in advance of the start of grading. A joint meeting between a representative of the client, the contractor, and the Soil Engineer is recommended prior to grading to discuss specific procedures and scheduling.

9. At all times, the contractor shall have a responsible field superintendent on the project, in full charge of the work, with authority to make decisions. He shall cooperate fully with the Soil Engineer in carrying out the work.

10. No fill shall be placed, spread or rolled during unfavorable weather. When the work is interrupted by rain, operations shall not be resumed until the Soil Engineer indicates that conditions will permit satisfactory results.

APPENDIX " D "

ENGINEERING CALCULATION



RETAINING WALL ANALYSIS

Input Data

Cohesion (psf)	$C := 350$	
Friction Angle(deg)	$\phi := 25$	$\phi := \phi \cdot deg$
Density(pcf)	$\gamma := 120$	

Tension crack

$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right)$ $\quad Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma}$ $\quad Zo = 9.16$

Wal height(ft)	$H := 20$
Tension Crack (ft)	$Hc := 1$

(1) At Rest

$H1 := H - Hc$ (ft)

$Ko := 1.0 - \sin(\phi)$ $\quad Ko = 0.577$

$$Po1 := Hc \cdot \frac{\gamma \cdot H1 \cdot Ko}{1000}$$

$$Po2 := 0.5 \cdot \frac{\gamma \cdot Ko \cdot H^2}{1000}$$

$Po := Po1 + Po2$ Kips

$EFP := 2 \cdot (Po1 + Po2) \cdot \frac{1000}{H^2}$ $\quad EFP = 75.8$ pcf

(2) Earthquake

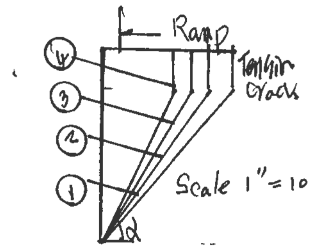
Peak ground acceration	$PGA := 0.854$ g
Horizontal Acceleration(g)	$kh := \frac{1}{3} \cdot PGA$
Factor of safety	$FS := 1.0$
Wal Height(ft)	$H = 20$

$Pe := \frac{3}{8} \cdot \gamma \cdot H^2 \cdot kh$ $\quad Pe = 5.12 \cdot 10^3$ pcf

$EFPEQ := 2 \cdot Pe \cdot \frac{FS}{H^2}$ $\quad EFPEQ = 25.6$

Plate D-1

RETAINING ANALYSIS
(Active)



Input Data

Cohesion (psf) $C := 350$

Friction Angle(deg) $\phi := 25$ $\phi := \phi \cdot deg$

Density(pcf) $\gamma := 120$

Tension crack

$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right)$ $Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma}$ $Zo = 9.16$ (use 2.0 ft)

1) For $\alpha := 50$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 10.44$ ft $H := 10$ ft $W := 5.33$ k (including traffice surcharge)
surcharge=0.3 k

$FS := 1.5$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 0.661$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$

$EFP = 13.2$ pcf

2) For $\alpha := 55$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 9.77$ ft $H := 10$ ft $W := 4.50$ k (including surcharge)

$FS := 1.5$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 0.729$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$ $EFP = 14.6$ pcf

CONTINUE

CONTINUED

RETAINIG WALL ANALYSIS
(Active)

3) For $\alpha := 60 \quad o$

$\alpha := \alpha \cdot deg$

$L := 9.24 \quad ft \quad H := 10 \quad ft \qquad W := 3.76$ k (including surcharge)

$FS := 1.5$

$$Cm := \frac{C}{FS \cdot 1000} \quad (ksf) \qquad \phi m := atan\left(\frac{tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot sin(\alpha)) \cdot tan(\alpha - \phi m) - (Cm \cdot L \cdot cos(\alpha))$$

$Pa = 0.671 \quad kips$

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad EFP = 13.4 \quad pcf$$

4) For $\alpha := 65 \quad ^{o}$

$\alpha := \alpha \cdot deg$

$L := 8.83 \quad ft \quad H := 10 \quad ft \qquad W := 3.10$ k (including surcharge)

$FS := 1.5$

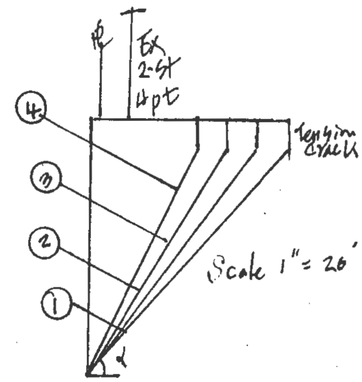
$$Cm := \frac{C}{FS \cdot 1000} \quad (ksf) \qquad \phi m := atan\left(\frac{tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot sin(\alpha)) \cdot tan(\alpha - \phi m) - (Cm \cdot L \cdot cos(\alpha))$$

$Pa = 0.485 \quad kips$

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad EFP = 9.71 \quad pcf$$

TEMPORARY EXCAVATION ANALYSIS
(Surcharged along North Property Line)



Input Data

Cohesion (psf) $C := 350$

Friction Angle(deg) $\phi := 25 \qquad \phi := \phi \cdot deg$

Density(pcf) $\gamma := 120$

Tension crack

$$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right) \qquad Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma} \qquad Zo = 9.16 \quad \text{(use 3.0 ft)}$$

1) For $\alpha := 50$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 33.94\,ft \quad H := 29 \quad ft \qquad W := 44.34$ k (including building surcharge)
surcharge =2.0 k

$FS := 1.25$

$$Cm := \frac{C}{FS \cdot 1000} \quad (ksf) \qquad \phi m := atan\left(\frac{\tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$$

$Pa = 14.895$ kips

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad EFP = 35.4 \quad pcf$$

2) For $\alpha := 55$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 31.74\,ft \quad H := 29 \quad ft \qquad W := 37.33$ k (including surcharge)

$FS := 1.25$

$$Cm := \frac{C}{FS \cdot 1000} \quad (ksf) \qquad \phi m := atan\left(\frac{\tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$$

$Pa = 15.588$ kips

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad EFP = 37.1 \quad pcf$$

CONTINUE

TEMPORARY EXCAVATION ANALYSIS

CONTINUED

3) For $\alpha := 60$ o

$\alpha := \alpha \cdot deg$

$L := 30.02\ ft \quad H := 29\ \ ft \qquad W := 31.13$ k (including surcharge)

$FS := 1.25$

$Cm := \dfrac{C}{FS \cdot 1000}$ (ksf) $\qquad \phi m := atan\left(\dfrac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 15.488$ kips

$EFP := 2 \cdot \dfrac{Pa \cdot 1000}{H^2} \qquad EFP = 36.8$ pcf

4) For $\alpha := 65$ o

$\alpha := \alpha \cdot deg$

$L := 28.68\ ft \quad H := 29\ \ ft \qquad W := 25.53$ k (no surcharge)

$FS := 1.25$

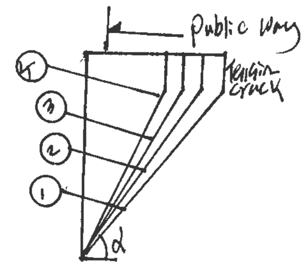
$Cm := \dfrac{C}{FS \cdot 1000}$ (ksf) $\qquad \phi m := atan\left(\dfrac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 14.569$ kips

$EFP := 2 \cdot \dfrac{Pa \cdot 1000}{H^2} \qquad EFP = 34.65$ pcf

TEMPORARY EXCAVATION ANALYSIS
(Surcharged along South Property Line)



Input Data

Cohesion (psf) $C := 350$

Friction Angle(deg) $\phi := 25$ $\phi := \phi \cdot deg$

Density(pcf) $\gamma := 120$

Tension crack

$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right)$ $Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma}$ $Zo = 9.16$ (use 3.0 ft)

1) For $\alpha := 50$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 24.80$ ft $H := 22$ ft $W := 24.7$ k (including traffic surcharge)
surcharge =0.3 k

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 6.52$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$

$EFP = 26.9$ pcf

2) For $\alpha := 55$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 23.19$ ft $H := 22$ ft $W := 20.63$ k (including surcharge)

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 6.815$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$ $EFP = 28.2$ pcf

CONTINUE

TEMPORARY EXCAVATION ANALYSIS

CONTINUED

3) For $\alpha := 60$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 21.63\ ft$ $H := 22$ ft $W := 17.07$ k (including surcharge)

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 6.734$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$ $EFP = 27.8$ pcf

4) For $\alpha := 65$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 20.96\ ft$ $H := 22$ ft $W := 13.84$ k (no surcharge)

$FS := 1.25$

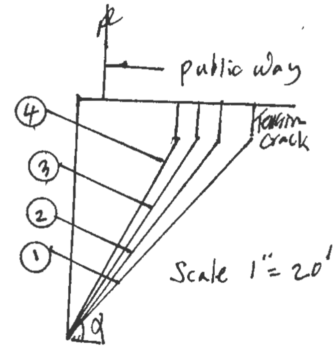
$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 5.906$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$ $EFP = 24.4$ pcf

TEMPORARY EXCAVATION ANALYSIS (Surcharged along East &West Property Line)



Input Data

Cohesion (psf) $C := 350$

Friction Angle(deg) $\phi := 25$ $\phi := \phi \cdot deg$

Density(pcf) $\gamma := 120$

Tension crack

$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right)$ $Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma}$

$Zo = 9.16$ (use 3.0 ft)

1) For $\alpha := 50$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 28.7$ ft $H := 25$ ft $W := 31.8$ k (including traffic surcharge)
surcharge =0.3 k

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 9.368$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$

$EFP = 30$ pcf

2) For $\alpha := 55$ ^{0}

$\alpha := \alpha \cdot deg$

$L := 26.85$ ft $H := 25$ ft $W := 26.6$ k (including surcharge)

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = 9.759$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$

$EFP = 31.2$ pcf

CONTINUE

TEMPORARY EXCAVATION ANALYSIS

CONTINUED

3) For $\alpha := 60 \quad ^{o}$

$\alpha := \alpha \cdot deg$

$L := 25.40\ ft \quad H := 25 \quad ft \qquad W := 21.95$ k (including surcharge)

$FS := 1.25$

$$Cm := \frac{C}{FS \cdot 1000} \qquad (ksf) \qquad\qquad \phi m := atan\left(\frac{\tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$$

$Pa = 9.48 \qquad kips$

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad\qquad EFP = 30.3 \quad pcf$$

4) For $\alpha := 65 \quad ^{o}$

$\alpha := \alpha \cdot deg$

$L := 24.27\ ft \quad H := 25 \quad ft \qquad W := 17.80$ k (no surcharge)

$FS := 1.25$

$$Cm := \frac{C}{FS \cdot 1000} \qquad (ksf) \qquad\qquad \phi m := atan\left(\frac{\tan(\phi)}{FS}\right)$$

$$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$$

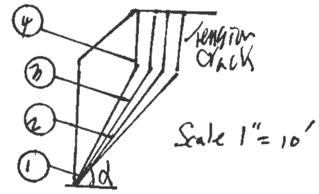
$Pa = 8.585 \qquad kips$

$$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2} \qquad\qquad EFP = 27.47 \quad pcf$$

EXCAVATION ANALYSIS

Input Data

Cohesion (psf)	$C := 350$	
Friction Angle(deg)	$\phi := 25$	$\phi := \phi \cdot deg$
Density(pcf)	$\gamma := 120$	



Tension crack

$N\phi := \tan\left(\frac{\pi}{4} + \frac{\phi}{2}\right)$ $\quad Zo := 2 \cdot \frac{C \cdot N\phi}{\gamma}$ $\quad Zo = 9.16$ (use 3.0 ft)

1) For $\alpha := 50$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 7.83$ ft $H := 6$ ft $\quad W := 2.97$ k (no surcharge)

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\quad \phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = -0.678$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$

$EFP = -37.7$ pcf

2) For $\alpha := 55$ ^{o}

$\alpha := \alpha \cdot deg$

$L := 7.32$ ft $H := 6$ ft $\quad W := 2.39$ k (no surcharge)

$FS := 1.25$

$Cm := \frac{C}{FS \cdot 1000}$ (ksf) $\quad \phi m := \operatorname{atan}\left(\frac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = -0.686$ kips

$EFP := 2 \cdot \frac{Pa \cdot 1000}{H^2}$ $\quad EFP = -38.1$ pcf

CONTINUE

EXCAVATION ANALYSIS

CONTINUED

3) For $\alpha := 60 \quad ^{o}$

$\alpha := \alpha \cdot deg$

$L := 6.92 \text{ ft} \quad H := 6 \text{ ft} \qquad W := 1.88$ k (no surcharge)

$FS := 1.25$

$Cm := \dfrac{C}{FS \cdot 1000}$ (ksf) $\qquad \phi m := atan\left(\dfrac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = -0.802$ kips

$EFP := 2 \cdot \dfrac{Pa \cdot 1000}{H^2} \qquad EFP = -44.6$ pcf

4) For $\alpha := 65 \quad ^{o}$

$\alpha := \alpha \cdot deg$

$L := 6.62 \text{ ft} \quad H := 6 \text{ ft} \qquad W := 1.41$ k (no surcharge)

$FS := 1.25$

$Cm := \dfrac{C}{FS \cdot 1000}$ (ksf) $\qquad \phi m := atan\left(\dfrac{\tan(\phi)}{FS}\right)$

$Pa := (W - Cm \cdot L \cdot \sin(\alpha)) \cdot \tan(\alpha - \phi m) - (Cm \cdot L \cdot \cos(\alpha))$

$Pa = -1.049$ kips

$EFP := 2 \cdot \dfrac{Pa \cdot 1000}{H^2} \qquad EFP = -58.28$ pcf