APPENDIX E

Geotechnical Engineering Investigation

Solis Report- March 24, 2023

CPC-2018-1511-ZC-ZV-ZAA-CU-CUB-SPR
ENV-2018-1512-ND
Site Address: 3216 W. Street
Mixed Use- (Apartment/Hotel) Project

PACIFIC GEOTECH, INC.
GEOTECHNICAL ENGINEERING CONSULTANT

E-mail: info@PGIsoil.com

March 24, 2023
Project No.: 1586-S

EWAI, LLC
500 S. Shatto Pl, Suite 411
Los Angeles, CA 90020

Attention: Joseph Park

SUBJECT: Update Report
Proposed Mixed-Use Building
3216 W. 8th St, Los Angeles, CA 90005
Tract: 2140
Lot: FR 45 (Arb 2), FR 46 (Arb 2), FR 47 & FR 48

REFERENCE: Soils Report Approval Letter, Log # 100703, dated 11/27/2017

Geotechnical Engineering Investigation Report, dated 10/23/2017

Dear Mr. Park,

This report is intended to update the above reference Geotechnical Engineering Investigation report dated October 23, 2017 at the subject site. The Grading Division of the Department of Building and Safety previously conditionally approved the above reference Geotechnical Engineering Investigation report for the proposed six-story mixed-use building over three levels of basement parking garage on the above Soils Report Approval Letter, Log # 100703 dated November 27, 2017.

The new proposed project is to construct a seven-story mixed-use building over three levels of basement parking garage. The updated site plan and third level (lowest level) basement plan are presented on Site Plan, Plate 1 and Basement Plan, Plate 2, respectively. Cross sections depicting the existing and proposed grades are presented on Plate 3 and 4.

Based on our evaluation of the current site conditions and findings of the previous investigation, it is concluded that the proposed new development of the subject property is feasible for the intended use from a geotechnical engineering viewpoint provided the following updated conclusions and additional recommendations are incorporated into design criteria and project specifications and are implemented during construction.

CONCLUSION AND RECOMMENDATIONS

The proposed building may be supported on conventional spread footings founded into the competent bedrock at the proposed basement garage floor level. The soil engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide additional recommendations for the correction of hazards found during grading.

1.0 Seismic Design Parameters

Based on 2020 City of Los Angeles Building Code and ASCE/SEI 7-16, the site is classified as Site Class C and the following seismic design parameters are applicable:

SEISMIC COEFFICIENTS (2022 California Building Code)		
Nature of Occupancy (Table 1604.5, CBC 2022)	II	
Importance Factors (Table 1.5-2 ASCE 7-16)	1.0	
	Short Period (0.2s)	One-Second Period
Earth Materials and Site Class (Table 20.3-1 ASCE 7-16)	Softrock – S_C	
Mapped Maximum Considered Earthquake (MCE) Spectral Response Acceleration (Section 1613.2.1, CBC 2022)	S_s = 1.970 (g)	S_1 = 0.700 (g)
Site Coefficients (Table 1613.2.3 (1) & 1613.2.3 (2), CBC 2022)	F_a = 1.2	F_v = 1.4
Adjusted MCE Spectral Response Acceleration (Equations 16-20 & 16-21, CBC 2022)	S_{MS} = 2.364 (g)	S_{M1} = 0.980 (g)
Design Acceleration (Equations 16-22 & 16-23, CBC 2022)	S_{DS} = 1.576 (g)	S_{D1} = 0.653 (g)
Seismic Design Category (Table 1613.2.5 (1) & 1613.2.5 (2), CBC 2022)	D	

A ground motion hazard analysis is not required for structures other than seismically isolated structures and structures with damping systems where structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Equation 12.8-2 for values of T less than or equal to $1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with Equation 12.8-3 for T_L greater than or equal to T greater than $1.5T_s$ or Equation 12.8-4 for T greater than T_L.

2.0 Foundation Design

2.1 Conventional Spread Footing

An allowable bearing value of 4,500 pounds per square foot is recommended for continuous footings of at least 24 inches in width and isolated pad footings of at least 48 inches square, placed at a depth of at least 24 inches below the lowest adjacent final grade or top of slab bearing into the competent sandstone bedrock. This value may be increased by 200 pounds per square foot for each additional foot in width and 400 pounds per square foot for each additional foot in depth over the minimum, to a maximum of 6,000 pounds per square foot.

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

2.2 Lateral Design

Resistance to lateral loading may be provided by passive earth pressure within the bedrock and by friction acting at the base of foundations and slabs on grade. Passive earth pressure may be computed as an equivalent fluid having a density of 400 pounds per cubic foot to a maximum of 2,000 pounds per square foot.

Friction between the base of the footings and/or floor slabs and the underlying bedrock may be assumed to be 0.35 times the dead load. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one-third.

2.3 Footing Reinforcement

Continuous footings should be reinforced with at least four No. 4 bars; two near the top and two near the bottom of the footings. Reinforcement of isolated footings shall be utilized as deemed necessary by the Structural Engineer for the project.

2.4 Foundation Settlement

Total and differential settlement between adjacent footings is expected to be negligible if footings are placed in the bedrock as recommended.

3.0 Slabs-on-Grade

Concrete slabs constructed on grade should be a minimum thickness of 4 inches and should be cast over undisturbed competent bedrock. On-grade concrete slabs shall be placed on a 2-inch clean sand bed over a moisture barrier membrane to mitigate expansion potential.

3.1 Slab Reinforcement

Concrete slabs on grade should be reinforced with at least No. 4 bars spaced 12 inches on centers, both ways. All slab reinforcement should be supported on concrete chairs or brick to ensure the desired placement near mid-depth.

3.2 Moisture Barrier

The floor slabs shall be underlain by a 4-inch thick layer of granular material. A minimum 10-mil synthetic sheet should be placed below the floor slab to serve as a vapor retarder where required to protect moisture sensitive floor coverings and to minimize moisture passing through the floor slab. The vapor retarder shall be in accordance with ASTM E 1745-97.

4.0 Basement Wall/Retaining Wall

Retaining walls should be designed to resist the lateral earth pressure exerted by the retained soils plus any surcharge loads from adjacent structures or vehicular traffic within a distance equal to the depth of retaining wall.

Basement walls and other walls in which horizontal movement is restricted at the top shall be designed for a triangular-shaped at-rest pressure of 75 pounds per square foot per foot of depth as calculated.

At-rest pressure $= \gamma K_o$

$= \gamma\,(1-\sin\phi)$

$= 75$ pounds per cubic foot

Freestanding retaining walls free to move and rotate at the top may be designed for an active earth pressure of 55 pounds per square foot per foot of depth as calculated.

Active pressure $= \gamma_t K_a$

$= \gamma_t \tan^2 (45-\phi/2)$

$= 55$ pounds per cubic foot

The recommended values above for both at-rest and active pressures are greater than the calculated value analyzed by a limit equilibrium method (Free-Body Diagram and Vectors), considering the surcharge load from the adjacent building as presented on Plate 5.

4.1 Seismic Earth Pressure

It is recommended that retaining walls exceeding 6 feet in height be designed for seismic earth pressure due to earthquake motions in addition to static earth pressure.

The seismic lateral earth pressure coefficient is determined to be one-half of two-thirds of the maximum peak ground acceleration.

K_h $= (0.5)\ (0.67)\ (1.008g)$

$= 0.336g$

γ_{eqp} $= (0.75)\ K_h\ \gamma_{soil}$

$= (0.75)\ (0.336g)\ 120$

$= 30$ pounds per cubic foot.

The seismic lateral earth pressure can be applied assuming an inverted triangular distribution, with the resultant applied at a height of 2/3 H measured from the bottom of wall footings.

4.2 Wall Drainage

Retaining walls should be provided with a subdrain system consisting of perforated pipes covered with gravel to prevent entrapment of water in the backfill. The perforated pipe shall be 4-inch diameter, PVC Schedule 40 or ABS SDR-35 pipe placed near the bottom of the drainage material. The pipe should be embedded in drainage material of at least one foot thick.

Pipe perforations shall be at 45-degree angles (approximately) to one another on opposing sides of the pipe every 8 to 12 inches. The pipe perforations should be placed with the holes down, and should not be greater than 1/4 inch in diameter. The subdrain should outlet at appropriate discharge locations or at a sump equipped with an adequate pumping system.

For shored walls, weep holes consisting of 3-inch non-perforated pipe encased in at least a one cubic foot of gravel pocket may be used. The weep-hole pipe should be placed in a maximum 8-foot interval at the bottom of the walls and on the footing, and connected to 4-inch non-perforated pipe beneath the floor slab leading to a sump.

4.3 Wall Backfill

Prior to backfilling, the excavation between retaining walls and the temporary cut bank should be cleared of all loose materials, debris, and construction materials, etc. Proper compaction of the backfill will be necessary to reduce settlement of the backfill. Some settlement of the backfill should be anticipated and any utilities and sidewalks supported therein should be designed to accept differential settlement, particularly at the points of entry to the structure.

All wall backfill should be placed in horizontal lifts not more than 8 inches in thickness, watered as necessary to achieve near optimum moisture conditions, and mechanically compacted to at least 90 percent of the ASTM D-1557 standard. Flooding or jetting of backfill materials should be avoided. Probing and testing should be performed by the project soils engineer to verify proper compaction.

4.4 Waterproofing

Moisture affecting below grade walls is one of the most common post-construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water inside the building. Waterproofing shall be applied behind the subterranean garage wall prior to backfilling. Particular care shall be taken in the design and installation of waterproofing to avoid moisture problems or actual water seepage into the building through any normal shrinkage cracks which may develop in the concrete walls, floor slabs, foundations or construction joints.

The design and inspection of waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant shall be retained in order to recommend a product or method which would provide protection to the subterranean garage.

5.0 Temporary Excavation

Temporary cuts for construction of basement retaining walls including footing excavations are anticipated to be approximately 40 feet. Temporary cuts which remove lateral support on the adjacent property shall be shored.

Trench excavation should be in accordance with all applicable requirements of the State of California Construction and General Industry Safety Order, the Occupational Safety and Health Act of 1970, the Construction Safety Act, and all other public agencies having jurisdiction. Construction specifications should clearly establish the responsibilities of the contractor for construction safety in accordance with CAL/OSHA requirements.

It should be understood that the contractor shall supervise and direct the work and he shall be responsible for all construction means, methods, techniques, sequences and procedures. The contractor will be solely and completely responsible for conditions at the job site, including safety of all persons and property during the performance of the work. Periodic or continuous inspection by Pacific Geotech, Inc. 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.

5.1 Shoring

One method of shoring would consist of steel soldier piles. The soldier pile may be designed as cantilevered or laterally braced utilizing raker braces. Lateral active earth pressures to be used for laterally braced or cantilevered shoring are presented on Plate 6. The recommended values are greater than the calculated value analyzed by a limit equilibrium method (Free-Body Diagram and Vectors) presented on Plate 7.

An allowable load of gravity tieback anchors can be calculated utilizing a friction force of 450 pounds per square foot beyond the active pressure plane which is estimated 35 degrees from the vertical. An allowable load of post grout tieback anchors can be calculated utilizing a friction force of 2,500 pounds per square foot or the bond length.

Drilled cast-in-place soldier piles shall not be placed closer than 3 diameters on center. The minimum diameter of the piles is 12 inches. Structural concrete shall be used for the soldier piles below the excavation level; lean-mix concrete may be employed above that level.

An allowable passive value for the soils below the bottom plane of excavation may be assumed to be the value provided in the Lateral Design section, this value may be doubled provided pile spacing on centers are greater than 3 times the pile diameter. To develop the full lateral value, provisions shall be implemented to assure firm contact between the soldier piles and the undisturbed soils.

It is recommended that the soldier piles be designed so that the deflection does not exceed half an inch at the top of the shoring if the shoring is surcharged from adjacent structures and one inch if the shoring is unsurcharged from adjacent structures.

Monitoring of the movements of the shoring system, the ground surface behind the shoring and adjacent buildings is recommended in areas where adjacent structures and/or utilities may be affected by the excavation. The monitoring may consist of survey points and/or inclinometers behind the shoring. This monitoring should be started before the actual excavation has begun and should continue until the excavation has been substantially backfilled.

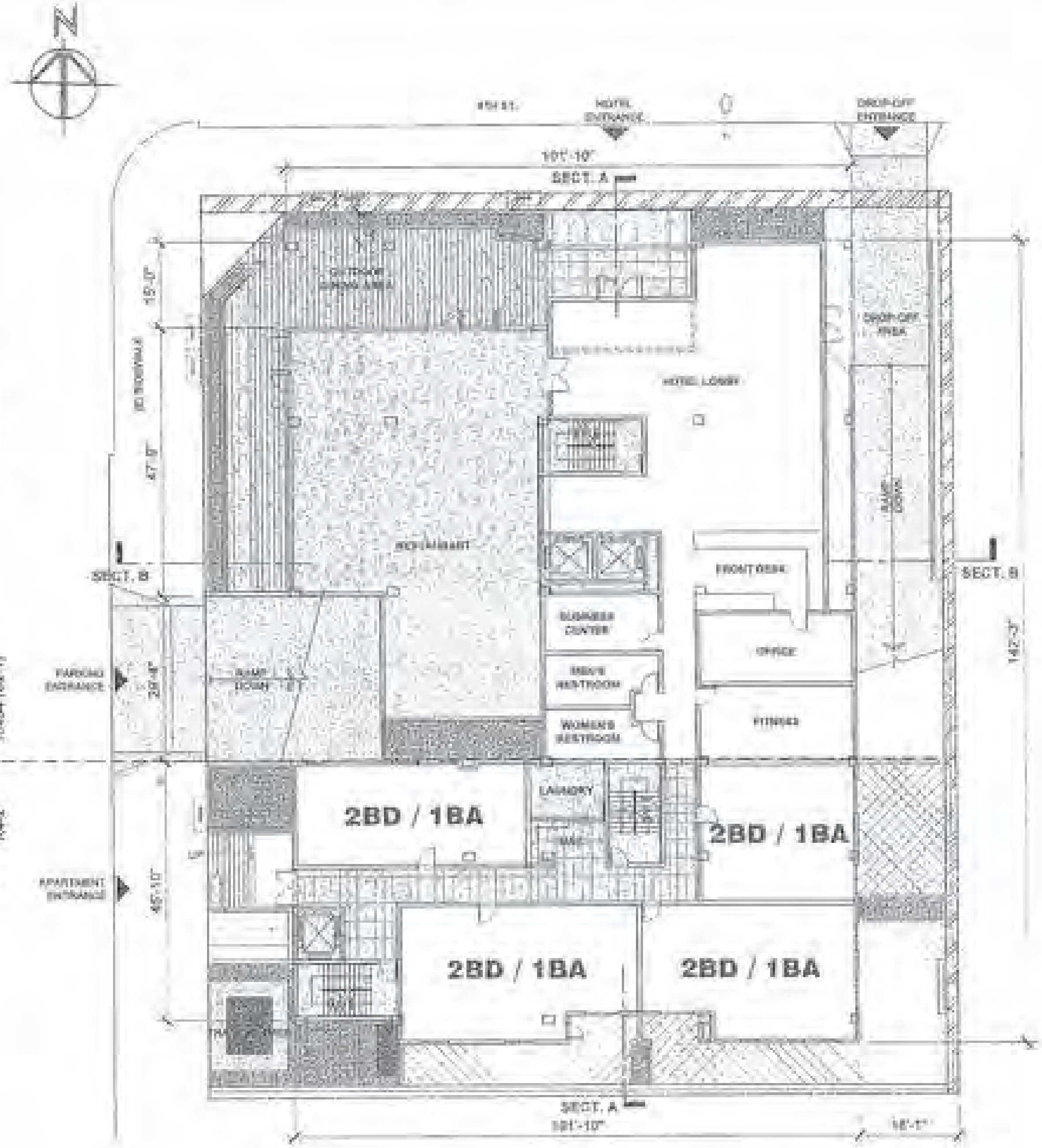
Sincerely,

PACIFIC GEOTECH, INC.

Jirayus Pukkanasut, PE
RCE No.: 73728

REGISTERED PROFESSIONAL ENGINEER
JIRAYUS PUKKANASUT
No. 73728
Exp. 06/30/23
CIVIL
STATE OF CALIFORNIA

SITE PLAN

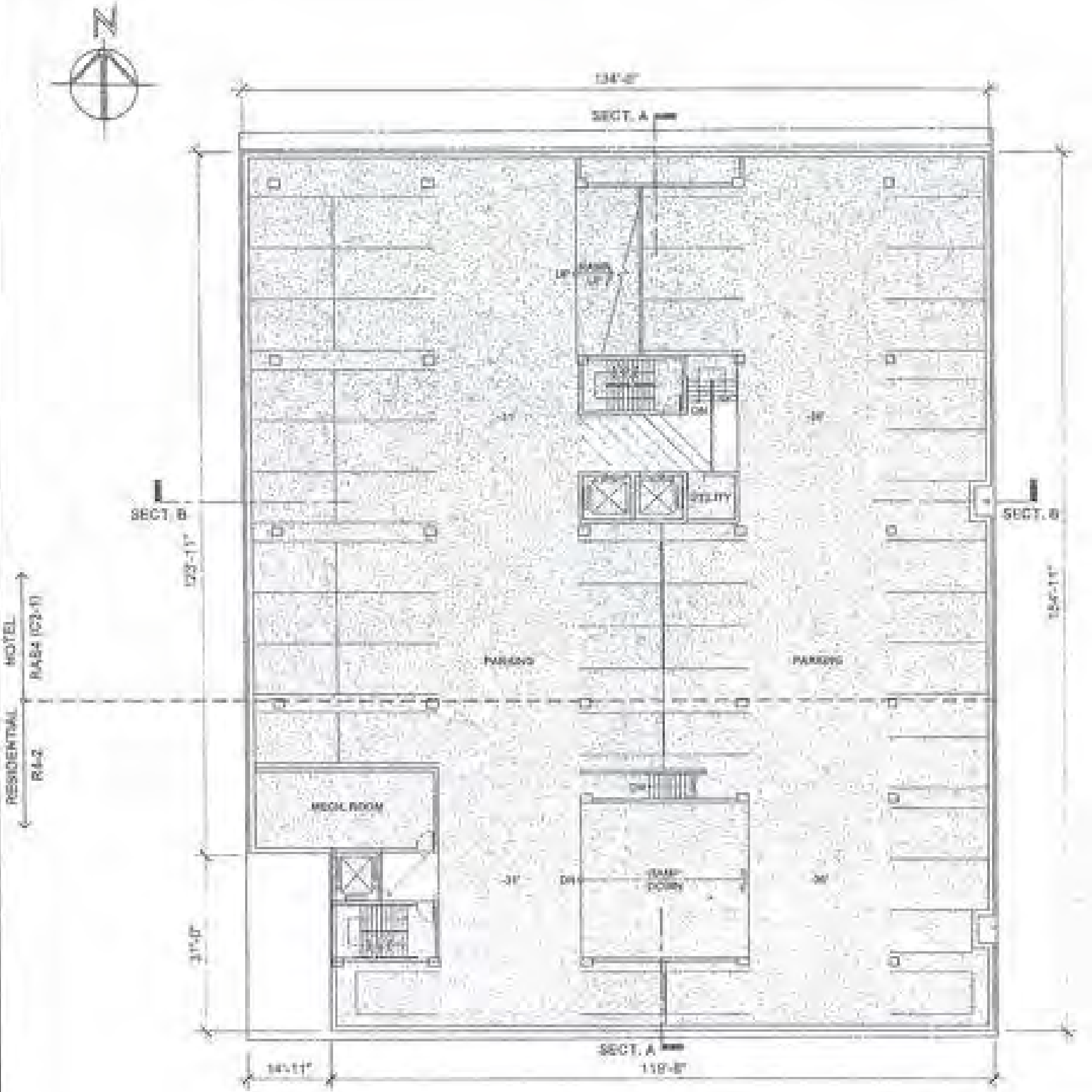


SCALE: 1"=30'

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	1

PACIFIC GEOTECH, INC

BASEMENT PLAN



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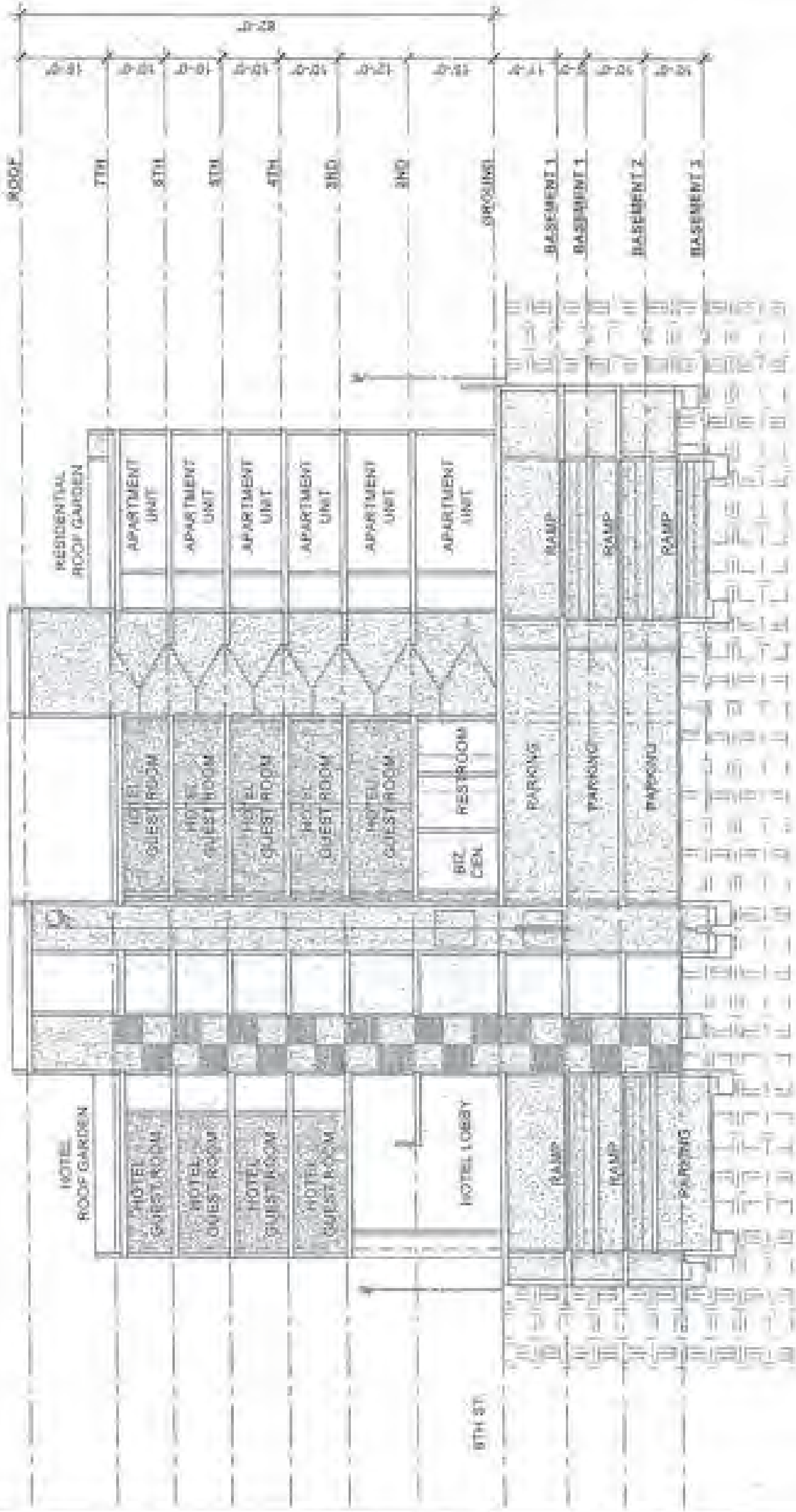
PROJECT LOCATION	3216 W. 8th St Los Angeles, California	**PROJECT No.**	1586-S	**PLATE**	2

CROSS SECTION A - A

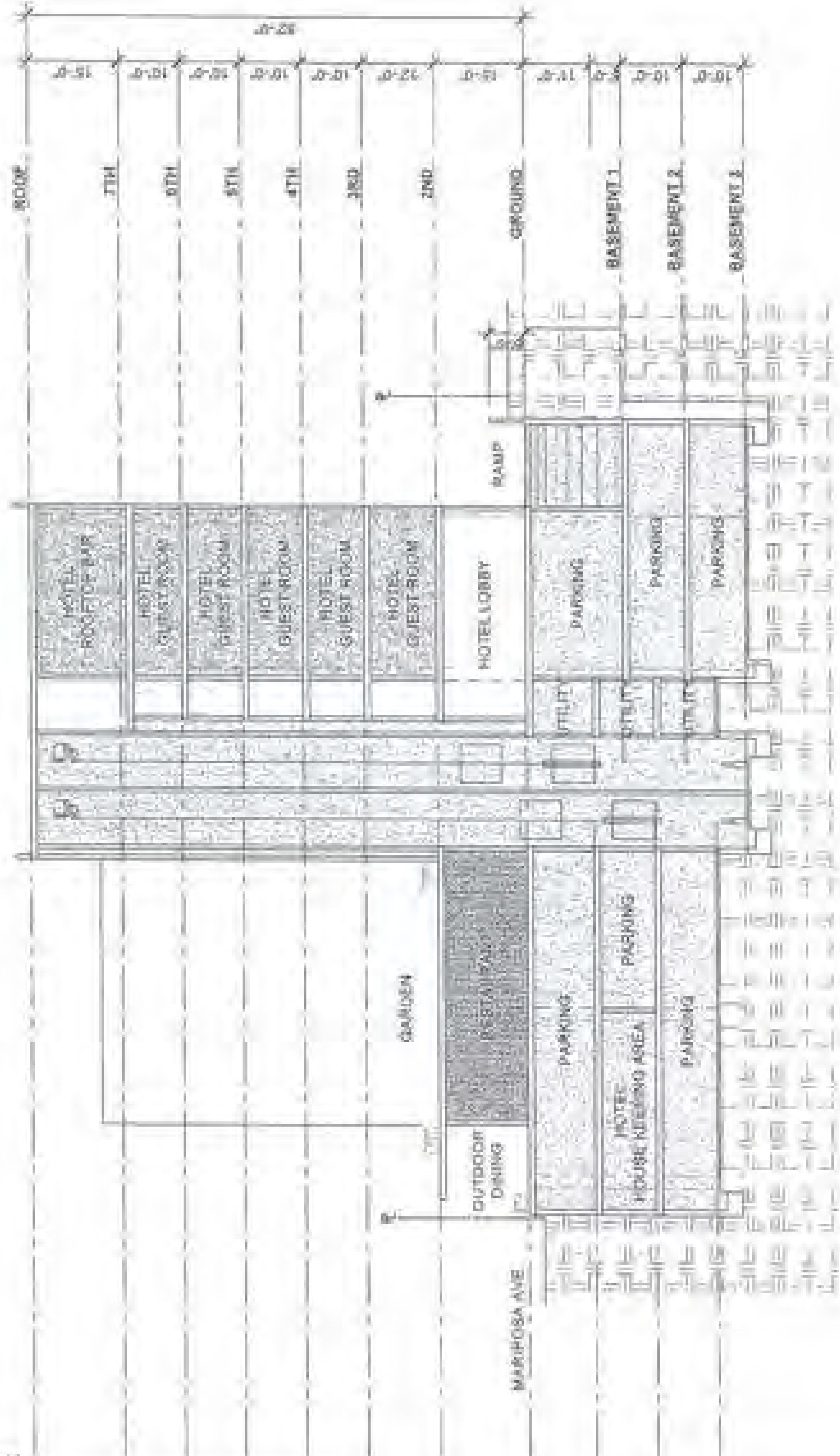


SCALE: 1"=30'

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	3

PACIFIC GEOTECH, INC

CROSS SECTION B - B

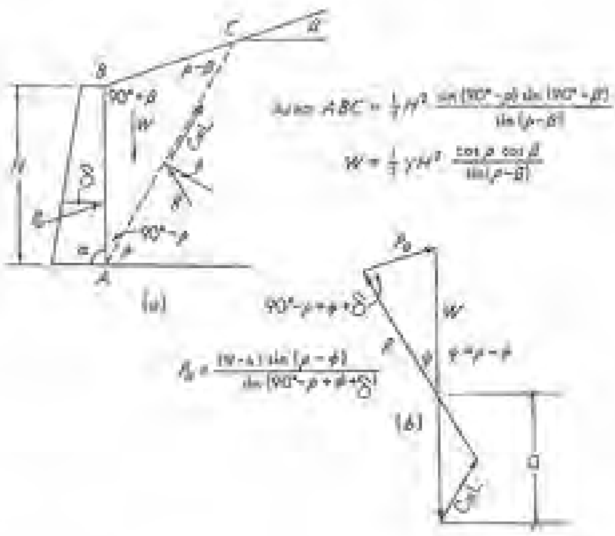


SCALE: 1"=30'

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	3

PACIFIC GEOTECH, INC

LATERAL EARTH PRESSURE ANALYSIS FOR RETAINING WALL



SOIL PARAMETERS

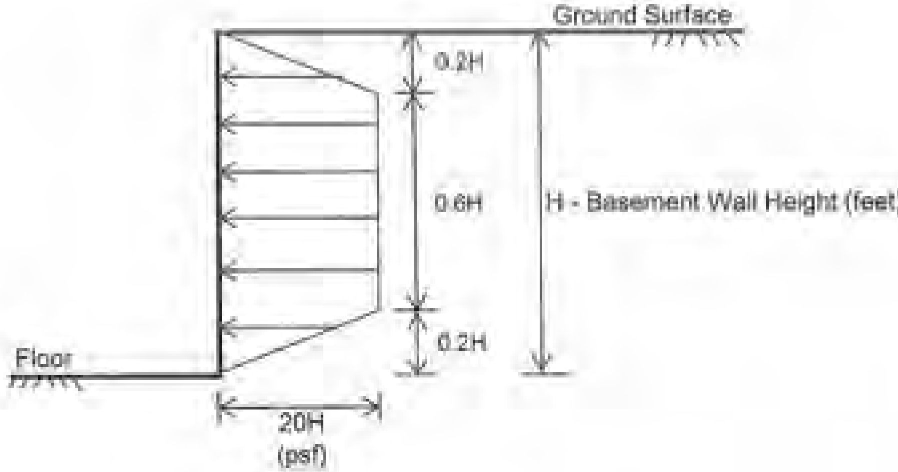
Cohesion, C	=	240.0	pounds per square foot
Angle of Friction, ϕ	=	36.0	degrees
Wet Density of Soil, γ	=	120.0	pounds per cubic foot

ANALYSES

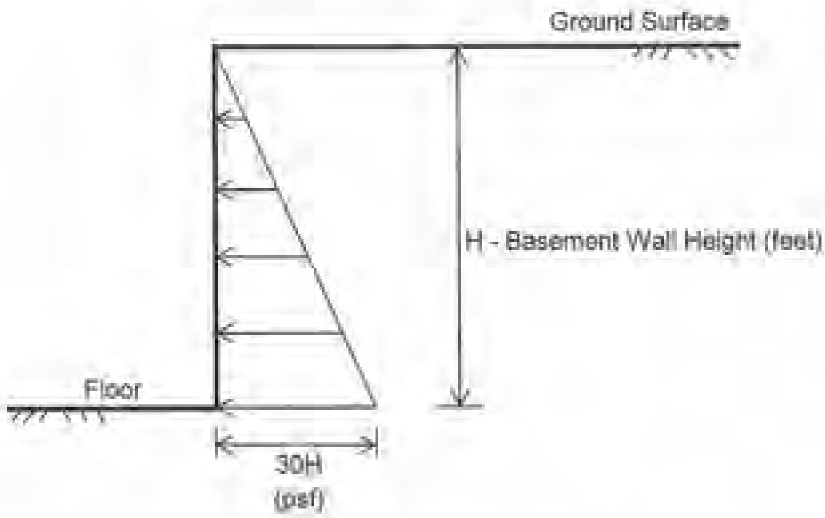
Mobilized Cohesion, C_m	=	160.0	degrees	
Mobilized Angle of Friction, ϕ_m	=	24.0	pounds per square foot	
Angle of Wall Friction, $\delta=2\phi/3$	=	24.0	degrees	
Slope Angle, β	=	0.0	degrees	
Angle of Active Failure Plane, ρ	=	63.0	degrees	$(=45+{}^{\phi}/2)$
Length of Failure Plane, L	=	40.4	feet	
Wall Height, H	=	36.0	feet	
Weight of Failure Wedge, W	=	39.6	kips	
Surcharge Load, Q	=	3.0	kips	
Total Weight of Failure Wedge, W_t	=	42.6	kips	
Factor-of-Safety, FS	=	1.5		
$W = (0.5gH^2 \cos\rho \cos\beta) / \sin(\rho - \beta)$	=	39.6	kips	
$a = (C_m L) \sin(90 + \phi_m) / \sin(\rho - \phi_m)$	=	9.4	kips	
$P_a = (W_t - a) \sin(\rho - \phi_m) / \sin(90 - \rho + \phi_m + \delta)$	=	21.7	kips	
$EFP_{wall} = 2P_a / H^2$	=	33.4	pounds per cubic foot	

PROJECT LOCATION	3218 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	5

LATERAL EARTH PRESSURE DIAGRAM
(Shoring Wall)



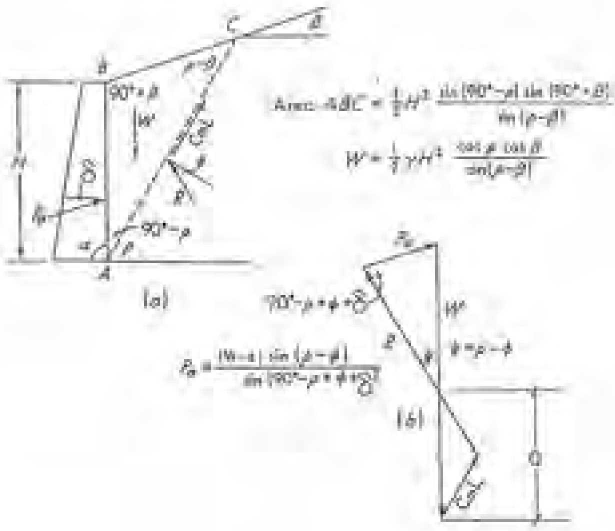
BRACED SHORING



CANTILEVERED SHORING

PROJECT LOCATION	3216 W 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	6

LATERAL EARTH PRESSURE ANALYSIS FOR SHORING WALL



SOIL PARAMETERS

Cohesion, C	=	240.0	pounds per square foot
Angle of Friction, ϕ	=	36.0	degrees
Wet Density of Soil, γ	=	120.0	pounds per cubic foot

ANALYSES

Mobilized Cohesion, C_m	=	192.0	degrees	
Mobilized Angle of Friction, ϕ_m	=	28.8	pounds per square foot	
Angle of Wall Friction, $\delta=2\phi/3$	=	24.0	degrees	
Slope Angle, β	=	0.0	degrees	
Angle of Active Failure Plane, ρ	=	63.0	degrees	$(=45+{}^{\phi}/2)$
Length of Failure Plane, L	=	44.9	feet	
Wall Height, H	=	40.0	feet	
Weight of Failure Wedge, W	=	48.9	kips	
Surcharge Load, Q	=	3.0	kips	
Total Weight of Failure Wedge, W_t	=	51.9	kips	
Factor-of-Safety, FS	=	1.25		
$W = (0.5gH^2 \cos\rho \cos\beta) / \sin(\rho - \beta)$	=	48.9	kips	
$a = (C_mL) \sin(90 + \phi_m) / \sin(\rho - \phi_m)$	=	13.4	kips	
$P_a = (W_t - a) \sin(\rho-\phi_m) / \sin(90-\rho+\phi_m+\delta)$	=	22.0	kips	
$EFP_{wall} = 2P_a/H^2$	=	27.5	pounds per cubic foot	

REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION

Proposed Mixed Use Building
3216 W. 8th St
Los Angeles, California

for

EWAI
2855 W. 7th St
Los Angeles, CA 90005

Project No.: 1586-S
October 23, 2017

PGI PACIFIC GEOTECH, INC.
GEOTECHNICAL ENGINEERING CONSULTANT

15038 CLARK AVE, HACIENDA HEIGHTS, CA 91745 • TEL 626-333-8507 • FAX 626-333-5056
E-mail: info@PGIsoil.com

October 23, 2017
Project No.: 1586-S

EWAI
2855 W. 7th St
Los Angeles, CA 90005

Attention: Sean Yoon

SUBJECT: Geotechnical Engineering Investigation
Proposed Mixed Use Building
3216 W. 8th St, Los Angeles

Dear Mr. Yoon:

In accordance with your request and authorization, a Geotechnical Engineering Investigation has been conducted for the above-referenced project. The accompanying report presents the findings of our study, and our conclusions and recommendations pertaining to the geotechnical aspects of construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

We appreciate the opportunity to be of service on this project. If you have questions regarding the content of this report or if we may be of additional assistance, please do not hesitate to call at any time.

Sincerely,

PACIFIC GEOTECH, INC.

REGISTERED PROFESSIONAL ENGINEER
JIRAYUS PUKKANASUT
No. 73726
Exp. 06/30/19
CIVIL
STATE OF CALIFORNIA

Jirayus Pukkanasut, PE
RCE No. 73728

Table of Contents

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical engineering investigation for a proposed mixed use building at the subject site. The location of the site relative to surrounding streets and landmarks is shown on the Vicinity Map, Plate 1. The purpose of the investigation is to evaluate subsurface soil conditions and, based on the conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of design and construction.

The scope of services authorized for this project includes a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analyses to provide criteria for preparing design of the building foundations.

Recommendations presented in this report are based on the architectural plans provided by the client. The design information shall be reviewed with actual building details and site plan details. We should be notified of discrepancies to evaluate the impact upon the geotechnical recommendations.

This report has been prepared for use in design of the described project. It may not contain sufficient information for other purposes. Our professional services have been performed in accordance with generally accepted engineering procedures under similar circumstances. No other warranty, expressed or implied, is made as to the professional advice included in this report.

2. PROJECT DESCRIPTION

The proposed project is to construct a mixed use building at the location as shown on the Site Plan and Boring Location, Plate 2. The proposed building will be six-story in height over three levels of basement parking garage.

The basement floor will be approximately 40 feet below grade. Cross sections depicting the existing and proposed grades are shown on Plates 3 and 4.

3. SITE DESCRIPTION

The subject property is located on the southeast corner of 8th St and mariposa Ave in the Koreatown area of the city of Los Angeles, California. The site is bounded on the north side by 8th St, the west side by Mariposa Ave, and on the other two sides by developed lots with apartment buildings and hotel. The site is essentially flat and currently occupied by a two-story apartment building and parking lot in which will be demolished for a new construction.

4. SUBSURFACE EXPLORATION

Field exploration for the subject site consists of five test borings drilled to a depth of 50 feet by means of a hollow stem auger. The approximate test boring locations are indicated on the Site Plan and Boring Location, Plate 2. The exploration was logged by our field engineer and undisturbed ring samples and disturbed SPT samples were obtained for laboratory testing and inspection. Logs of the test borings are enclosed in the APPENDIX.

5. SUBSURFACE CONDITIONS

5.1 Soil Conditions

The subsurface soils disclosed at the test borings consist generally of alternate layers of dense, brown to grayish brown, fine to coarse, slightly clayey, silty to silty to clean sand to very fine-sandy, slightly clayey silt to silty clay to a depth of 39 feet underlain by hard, gray to greenish gray, fine- to medium-grained, slightly silty to clean sandstone bedrock to the depth explored of 50 feet.

5.2 Groundwater

No groundwater was encountered in all test borings to the depth of 50 feet below the existing grade.

The historically high groundwater table at the site is approximately 20 feet published by the State of California, Department of Conservation, Division of Mines and Geology, Open-File Report 98-10, Seismic Hazard Evaluation of the Hollywood Quad.

6. LABORATORY TESTING

Laboratory testing was programmed following a review of the field investigation, and after considering the probable foundation system to be evaluated. Selected soil samples were tested for the following properties:

- Field Moisture and Unit Weight (ASTM D-2216)
- Shear Resistance (ASTM D-3080)
- Consolidation Characteristics (ASTM D-2435)

The test results of moisture content and unit weight are tabulated in the Log of Boring, and shearing resistance and consolidation characteristics are plotted on Direct Shear, and Consolidation, respectively, in APPENDIX.

7. EARTHQUAKE HAZARDS

7.1 Faulting

Based on criteria established by the California Geological Survey, faults may be categorized as active, potentially active, or inactive. Active faults are those that show evidence of surface displacement within the last 11,000 years. Potentially active faults are those that show evidence of last displacement within the last 1.6 million years. Faults showing no evidence of displacement within the last 1.6 million years may be considered inactive for most purposed, except for some critical structures.

In 1972, the Alquist-Priolo Earthquake Fault Zoning Act was enacted. The act defines active and potentially active faults essentially the same way as that used by the California Geological Survey. The site is not located within a designated Alquist-Priolo Earthquake Fault Zone. No active or potentially active faults are known to exist within the site. The probability of surface rupture at the site from faulting is considered to be very low.

According to the "Maps of Known Active Fault Near Source zones in California and Adjacent Portions of Nevada" (Feb. 1998), the site is located within Fault zone which is the Puente Hills Blind Thrust. The proposed structure shall be designed in accordance with the Earthquake Regulations of the 2014 City of Los Angeles Building Code and the seismic design parameters provided in this report.

7.2 Soil Liquefaction

Based on the State of California "Seismic Hazard Zones" map, the site is not in an area where historic occurrences of liquefaction, or local geologic, geotechnical or groundwater condition indicate a potential for liquefaction.

8. CONCLUSION AND RECOMMENDATIONS

Based on our evaluation of the site conditions and findings of this investigation, it is concluded that the development of the subject property is feasible from the geotechnical engineering viewpoint provided the following conclusions and recommendations are incorporated into design criteria and project specifications and are implemented during construction.

The proposed building may be supported on conventional spread footings founded in the existing sandstone bedrock at the proposed basement garage level.

8.1 Seismic Design Parameters

Based on the 2014 City of Los Angeles Building Code and site soil properties, the site is classified as Site Class C and the following seismic design parameters are applicable:

SEISMIC COEFFICIENTS (2014 City of Los Angeles Building Code)		
Nature of Occupancy (Table 1604.5, CBC 2013)	II	
Importance Factors (Table 1.5-2 ASCE 7-10)	1.0	
	Short Period (0.2s)	One-Second Period
Earth Materials and Site Class (Table 20.3-1 ASCE 7-10)	Soft Rock – S_C	
Mapped Maximum Considered Earthquake (MCE) Spectral Response Acceleration (Figures 1613.3.1(1) through 1613.3.1(6))	S_s = 2.315 (g)	S_1 = 0.819 (g)
Site Coefficients (Table 1613A.3.3(1) and 1613A.3.3(2))	F_a = 1.0	F_v = 1.3
Adjusted MCE Spectral Response Acceleration (Equations 16A – 37 and 16A-38)	S_{MS} = 2.315 (g)	S_{M1} = 1.065 (g)
Design Acceleration (Equations 16A-39 and 16A-40)	S_{DS} = 1.543 (g)	S_{D1} = 0.710 (g)
Seismic Design Category (Table 1613A.3.5(1) and 1613A.3.5(2))	E	

8.2 Soil Expansion

The onsite surface soils/bedrock at the proposed garage level consist generally of sandstone bedrock. These soils/bedrock will have no expansion potential. No special design is required to mitigate expansion potential.

8.3 Foundation Design

8.3.1 Conventional Spread Footings

An allowable bearing value of 4,500 pounds per square foot is recommended for continuous footings of at least 24 inches in width and isolated pad footings of at least 48 inches square, placed at a depth of at least 24 inches below the lowest adjacent final grade or top of slab bearing in the existing sandstone bedrock. This value may be increased by 200 pounds per square foot for each additional foot in width and 400 pounds per square foot for each additional foot in depth over the minimum, to a maximum of 6,000 pounds per square foot.

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

8.3.2 Lateral Design

Resistance to lateral loading may be provided by passive earth pressure within the soils/bedrock and by friction acting at the base of foundations and slabs on grade. Passive earth pressure may be computed as an equivalent fluid having a density of 400 pounds per cubic foot to a maximum of 1,600 pounds per square foot.

Friction between the base of the footings and/or floor slabs and the underlying soil may be assumed to be 0.38 times the dead load. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one-third.

8.3.3 Footing Reinforcement

Continuous footings should be reinforced with at least four No. 4 bars: two near the top and two near the bottom of the footings. Reinforcement of isolated footings shall be utilized as deemed necessary by the Structural Engineer for the project.

8.3.4 Foundation Settlement

Total and differential settlement between adjacent footings is expected to be negligible if footings are placed in the bedrock as recommended.

8.4 Slabs on Grade

To prevent hydrostatic pressure (uplift pressure) since the proposed lowest basement finish floor level and foundations will be near the historically highest groundwater, it is recommended that at least 6-inch thick crushed rock or gravel shall be placed beneath the lowest floor slabs and foundations. Perforated pipes at a 20-foot interval in both directions shall be placed at the bottom of the crushed rock or gravel for drainage and connected to sump pump. Perforated pipes shall also be wrapped with geo-textile fabric to prevent clogging.

Concrete slabs constructed on grade should be a minimum thickness of 4 inches and should be cast over undisturbed natural soil/bedrock. On-grade concrete slabs shall be placed on a 2-inch clean sand bed over a moisture barrier membrane to mitigate expansion potential.

Subgrade soils disturbed due to installation of utility lines or from footing excavations should either be completely removed or be properly compacted prior to concrete pour.

It should be recognized that minor cracks normally occur in concrete slabs due to shrinkage during curing or redistribution of stresses and thus, some cracks should be anticipated. Such cracks are not necessarily indicative of excessive vertical movements.

It is cautioned that slabs in areas to receive ceramic tile or other rigid, crack sensitive floor coverings be designed and constructed to reduce hairline cracking. Extra reinforcing and careful control of concrete slump to reduce shrinkage are recommended.

8.4.1 Slab Reinforcement

Concrete slabs on grade should be reinforced with at least No. 4 bars spaced 12 inches on centers, both ways. All slab reinforcement should be supported on concrete chairs or brick to ensure the desired placement near mid-depth.

The above criteria are recommended to minimize potential distress to floor slabs related to the effects of subgrade soil conditions. The Structural Engineer for the project may need to address other factors that may require modification of the above recommendations.

8.4.2 Moisture Barrier

The floor slab shall be underlain by a 4-inch thick layer of granular material. A minimum 10-mil synthetic sheet should be placed below the floor slab to serve as a vapor retarder where required to protect moisture sensitive floor coverings and to minimize moisture passing through the floor slab. The vapor retarder shall be in accordance with ASTM E 1745-97. The sheets of the vapor retarder material should be evaluated for holes and/or punctures prior to placement and the edges overlapped and taped. If materials underlying the vapor retarder contain sharp, angular particles, a layer of clean sand approximately 2 inches thick should be provided to protect it from puncture.

An additional 2-inch thick layer of clean sand may be needed between the slab and the vapor retarder to promote proper curing per ASTM E 1745-97. The clean sand layers above and below the vapor retarder may be used as a substitute for the granular material below the slab.

8.5 Basement/Retaining Wall

The basement retaining walls will be 40 feet in height (see Cross Sections, Plates 3 and 4)

Retaining walls should be designed to resist the lateral earth pressure exerted by the retained soils plus any surcharge loads from adjacent structures or vehicular traffic within a distance equal to the depth of retaining wall.

8.5.1 Lateral Earth Pressure

At-rest Pressure

Basement walls and other walls in which horizontal movement is restricted at the top shall be designed for a triangular-shaped at-rest pressure of 73 pounds per square foot per foot of depth as calculated below:

At-rest pressure $= \gamma K_o$

$= \gamma(1\text{-sin } \phi)$

$= 120 \times (1\text{-sin } 23)$

$= 73$ pounds per cubic foot.

Active Pressure

Freestanding retaining walls free to move and rotate at the top may be designed for an active earth pressure of 53 pounds per square foot per foot of depth as calculated below.

Active pressure $= \gamma_t K_a$

$= \gamma_t \tan^2(45-\phi/2)$

$= 120 \times \tan^2(45-23/2)$

$= 53$ pounds per cubic foot.

The recommended values above for both at-rest and active pressures are greater than the calculated value analyzed by a limit equilibrium method (Free-Body Diagram and Vectors), considering the surcharge load from the adjacent building as presented on Plate 5.

Seismic Earth Pressure

It is recommended that retaining walls exceeding 6 feet in height be designed for seismic earth pressure due to earthquake motions in addition to static earth pressure. The seismic earth pressure is determined to be $12.9H^2$ as calculated below:

The peak ground acceleration was determined to be one-half of two-thirds of the maximum peak ground acceleration.

$K_h = 0.5 \times 0.67 \times 0.859g$

$= 0.286g$

$P_e = (3/8)\, K_h\, \gamma\, H^2$

$= (3/8)(0.286)(120)\, H^2$

$= 12.9H^2$

P_e acts at 0.6H above the wall base.

8.5.2 Wall Drainage

Retaining walls should be provided with a subdrain system consisting of perforated pipes covered with gravel to prevent entrapment of water in the backfill.

The perforated pipe shall be 4-inch diameter, PVC Schedule 40 or ABS SDR-35 pipe placed near the bottom of the drainage material. The pipe should be embedded in drainage material of at least one foot thick.

Pipe perforations shall be at 45-degree angles (approximately) to one another on opposing sides of the pipe every 8 to 12 inches. The pipe perforations should be placed with the holes down, and should not be greater than 1/4 inch in diameter. The subdrain should outlet at appropriate discharge locations or at a sump equipped with an adequate pumping system.

For shored walls, weep holes consisting of 3-inch non-perforated pipe encased in at least a one cubic foot of gravel pocket may be used. The weep-hole pipe should be placed in a maximum 8-foot interval at the bottom of the walls and on the footing, and connected to 4-inch non-perforated pipe beneath the floor slab leading to a sump.

8.5.3 Wall Backfill

Prior to backfilling, the excavation between retaining walls and the temporary cut bank should be cleared of all loose materials, debris, and construction materials, etc.

Proper compaction of the backfill will be necessary to reduce settlement of the backfill. Some settlement of the backfill should be anticipated and any utilities and sidewalks supported therein should be designed to accept differential settlement, particularly at the points of entry to the structure.

All wall backfill should be placed in horizontal lifts not more than 8 inches in thickness, watered as necessary to achieve near optimum moisture conditions, and mechanically compacted to at least 90 percent of the ASTM D-1557 standard. Flooding or jetting of backfill materials should be avoided. Probing and testing should be performed by the project soils engineer to verify proper compaction.

8.5.4 Waterproofing

Moisture affecting below grade walls is one of the most common post-construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water inside the building. Waterproofing shall be applied behind the subterranean garage wall prior to backfilling.

Particular care shall be taken in the design and installation of waterproofing to avoid moisture problems or actual water seepage into the building through any normal shrinkage cracks which may develop in the concrete walls, floor slabs, foundations or construction joints. The design and inspection of waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant shall be retained in order to recommend a product or method which would provide protection to the subterranean garage.

8.6 Temporary Excavation

Temporary cuts for basement walls including footing excavation are anticipated to be approximately 42 feet. Temporary cuts which remove lateral support on the adjacent property shall be shored (See section 8.7 Shoring).

8.7 Shoring

One method of shoring would consist of steel soldier piles. The soldier pile may be designed as cantilevered or laterally braced utilizing raker braces. Lateral active earth pressures to be used for laterally braced or cantilevered shoring are presented on Plate 6. The recommended values are greater than the calculated value analyzed by a limit equilibrium method (Free-Body Diagram and Vectors) presented on Plate 7.

In addition to the recommended earth pressure, the upper 10 feet of the shoring adjacent to traffic area shall be designed to resist a uniform lateral pressure of 100 pounds per square foot, acting as a result of an assumed 300 pounds per square foot surcharge behind the shoring due to normal street traffic. If the traffic is kept back at least 10 feet from the face of the shoring, the traffic surcharge may be omitted.

An allowable load of gravity tieback anchors can be calculated utilizing a friction force of 450 pounds per square foot beyond the active pressure plane which is estimated 35 degrees from the vertical. An allowable load of post grout tieback anchors can be calculated utilizing a friction force of 2,500 pounds per square foot for the bond length.

Drilled cast-in-place soldier piles shall not be placed closer than 3 diameters on center. The minimum diameter of the piles is 12 inches. Structural concrete shall be used for the soldier piles below the excavation level; lean-mix concrete may be employed above that level.

An allowable passive value for the soils below the bottom plane of excavation may be assumed to be the value provided in the Lateral Design section, this value may be doubled provided pile spacing on centers are greater than 3 times the pile diameter. To develop the full lateral value, provisions shall be implemented to assure firm contact between the soldier piles and the undisturbed soils.

It is recommended that the soldier piles be designed so that the deflection does not exceed half an inch at the top of the shoring if the shoring is surcharged from adjacent structures and one inch if the shoring is unsurcharged from adjacent structures.

Monitoring of the movements of the shoring system, the ground surface behind the shoring and adjacent buildings is recommended in areas where adjacent structures and/or utilities may be affected by the excavation. The monitoring may consist of survey points and/or inclinometers behind the shoring. This monitoring should be started before the actual excavation has begun and should continue until the excavation has been substantially backfilled.

8.8 Drainage

Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, 2-percent swales shall be provided to divert water away from the foundations.

It is important that drainage patterns established at the time of fine-grading are maintained throughout the life of the structures. Property owners should be aware that improperly designed and maintained irrigation systems for landscaping may cause distress to the foundation system and cracking of concrete slabs.

Where slabs or pavement are not feasible adjacent to the buildings, the ground surface should be provided with a minimum gradient of 2 percent away from the structures.

8.9 Trench Backfill

Utility trenches shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D-1557 standard density. Density testing, along with probing, should be performed by a Pacific Geotech representative, to verify proper compaction.

If utility contractors indicate that it is undesirable to use compaction equipment in proximity to a buried conduit, we recommend using a light weight mechanical equipment or covering the conduit with clean granular material prior to initiating mechanical compaction procedures.

Where utility trenches are proposed parallel to building footings (interior and/or exterior trenches), the bottom of the trench should not extend below a 1 horizontal to 1 vertical plane projection downward from the outside bottom edge of the adjacent footing. Where this condition occurs, the adjacent footing should be deepened.

8.10 Storm Water Infiltration

The site is infeasible for a stormwater infiltration system as the site is underlain by impermeable sandstone bedrock. The infiltration rate is very low and not acceptable.

9. GEOTECHNICAL INSPECTION

This report presents recommendations based on the assumption that the subsurface conditions do not deviate appreciably from those found during our current site exploration. The possibility of different localized soil conditions cannot be discounted. It is the responsibility of the owner or his representative to bring any deviations or unexpected conditions observed during construction to the attention of Pacific Geotech. This way any required supplemental recommendations can be made with a minimum of delay to the project. Construction should be observed and/or tested at the following stages by Pacific Geotech.

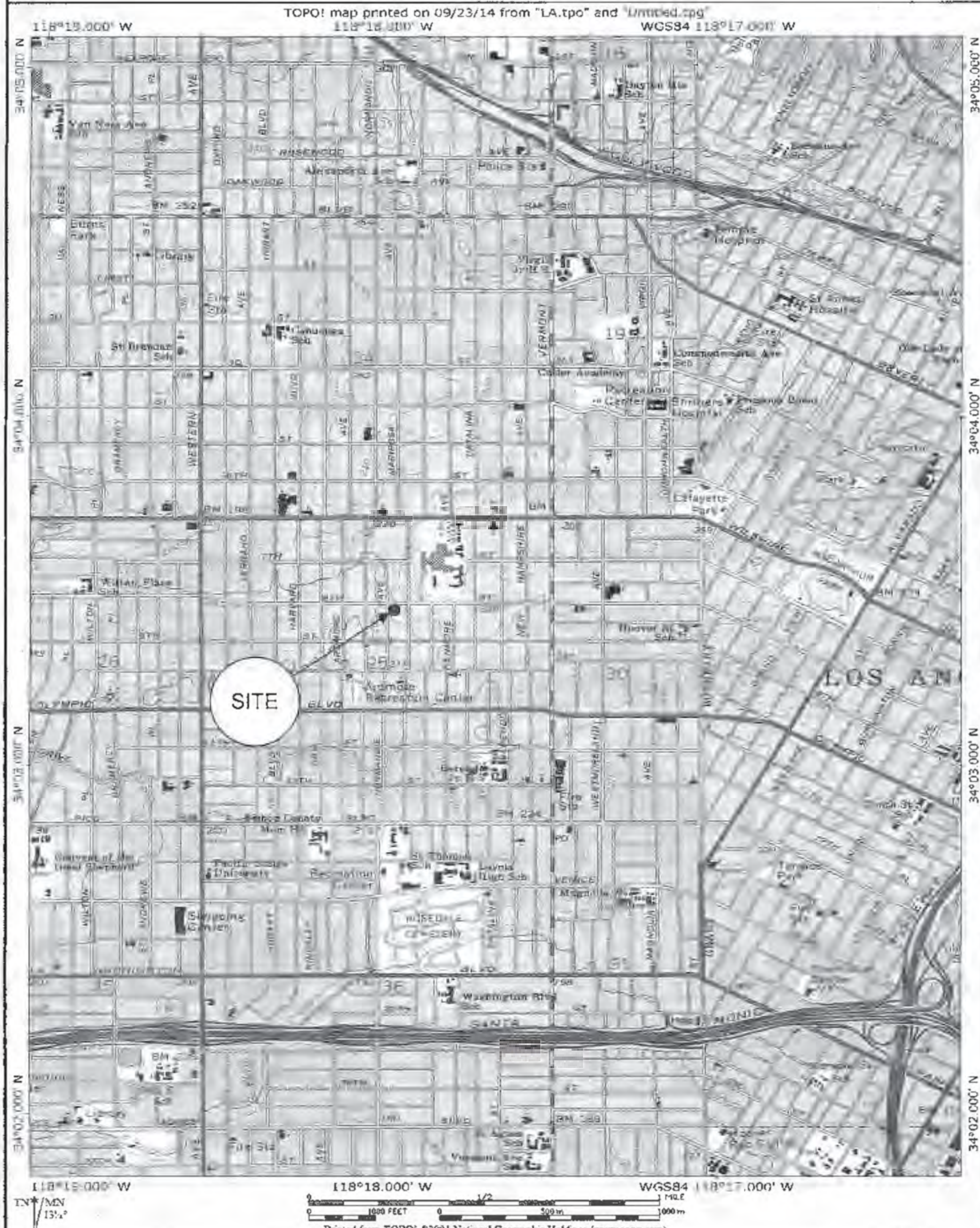
- All footing excavations before placement of steel
- Trench backfills
- When any unusual conditions are encountered

If any of these inspections to verify site geotechnical conditions are not performed by Pacific Geotech, liability for the safety and stability of the project is limited only to the actual portions of the project approved by Pacific Geotech.

It is the responsibility of the property owner and the contractor to review the recommendations herein, and to inform Pacific Geotech of the starting date of construction, the pre-construction conference, and anticipated period during which testing and/or observations by Pacific Geotech will be needed.

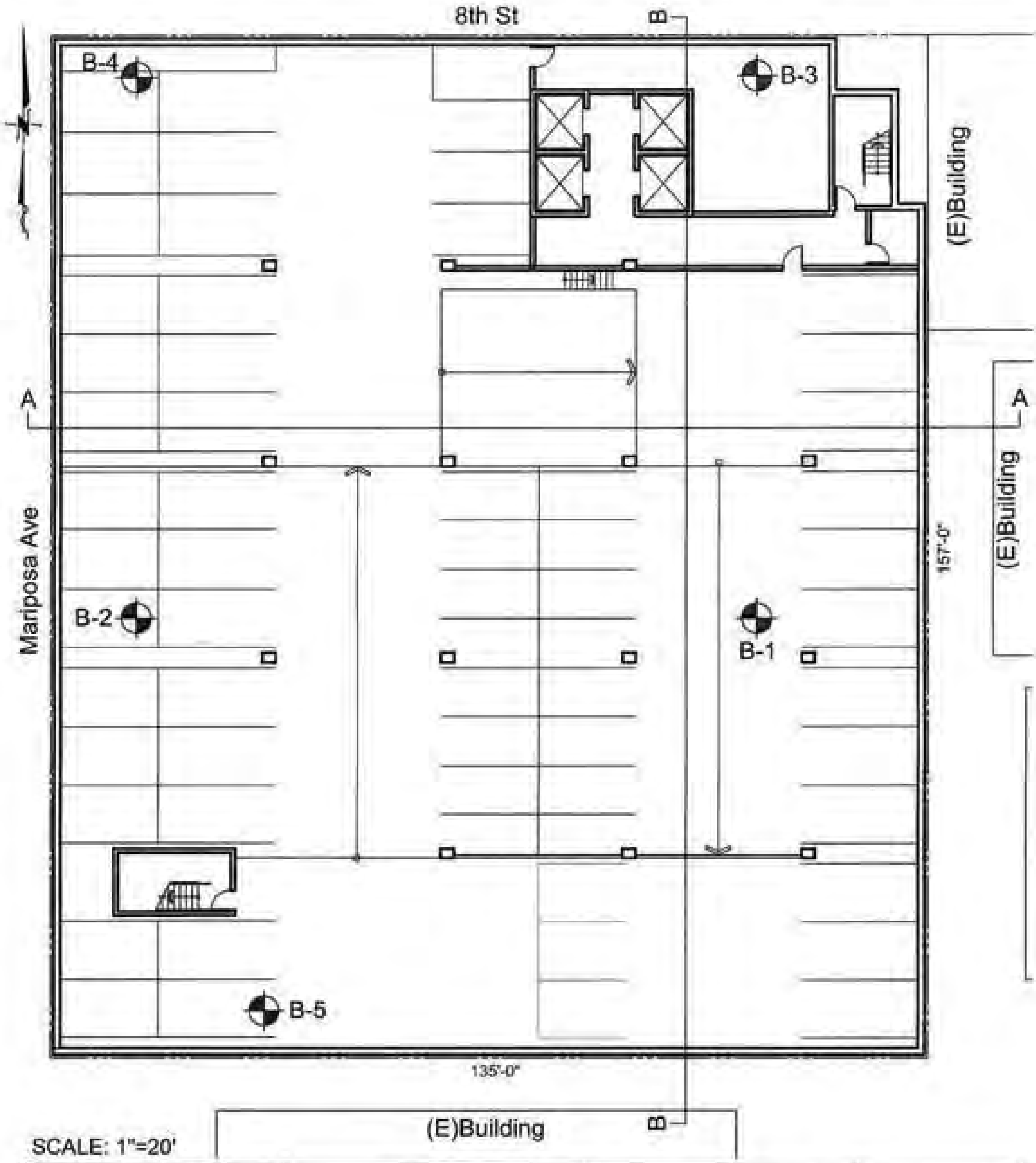
The report is subject to review by controlling public agencies having jurisdiction.

VICINITY MAP



PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	1

SITE PLAN & BORING LOCATION

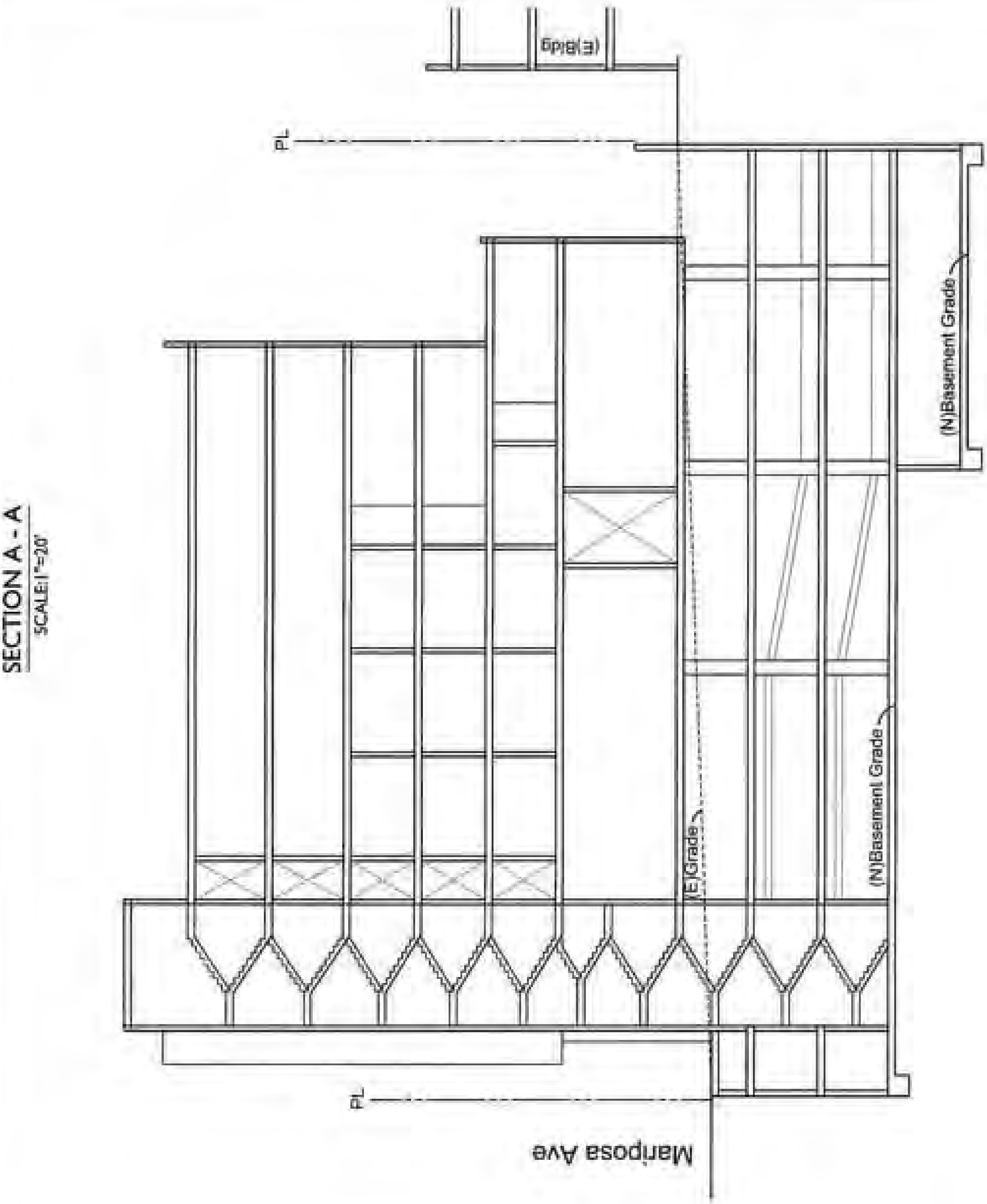


SCALE: 1"=20'

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No. 1586-S	PLATE 2

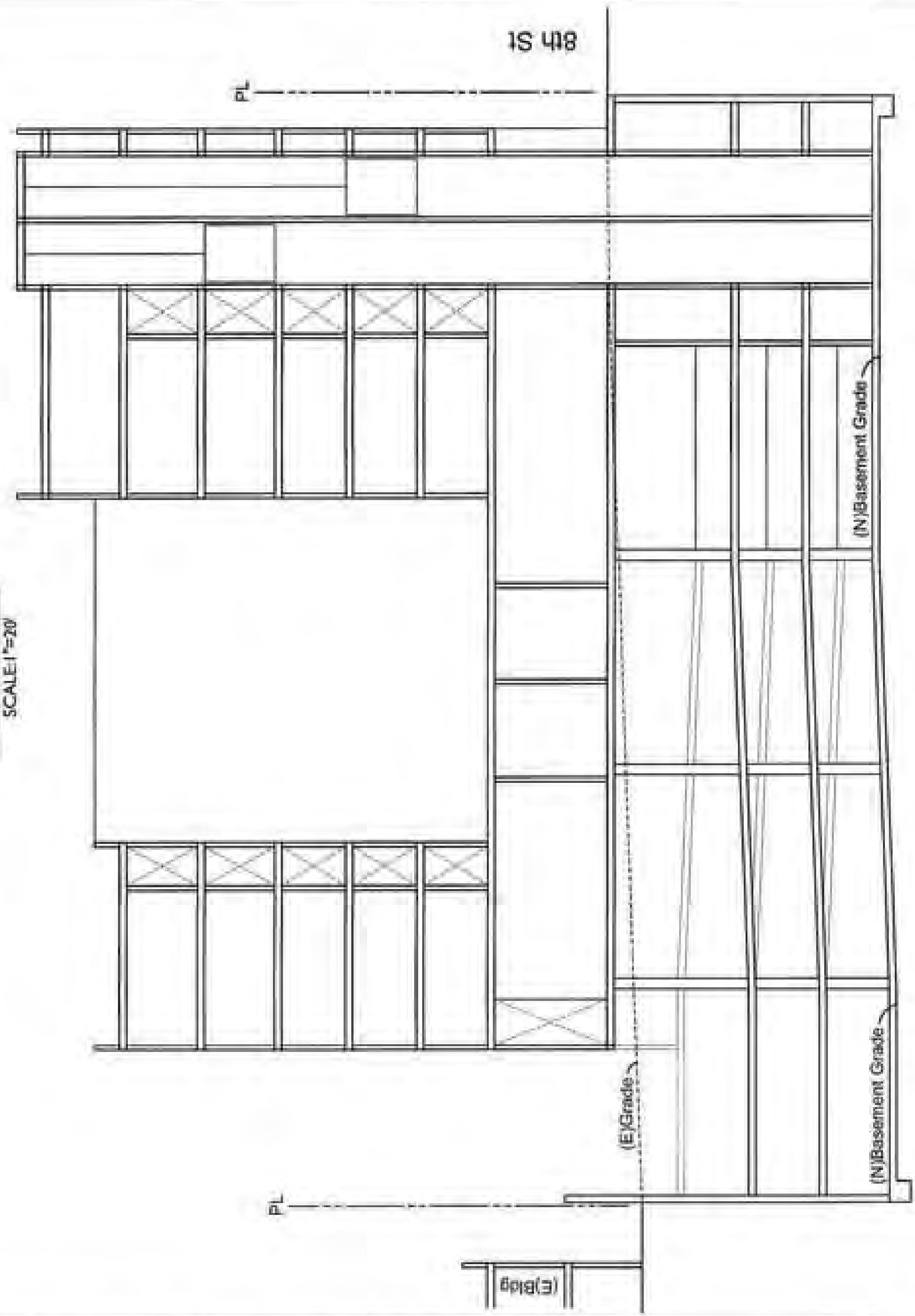
PACIFIC GEOTECH 15038 CLARK AVE, HACIENDA HEIGHTS, CA 91745

CROSS SECTION



PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	3

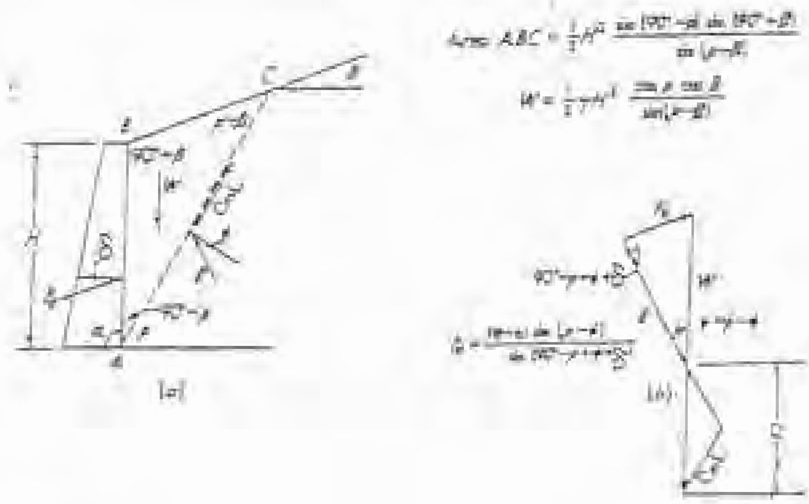
CROSS SECTION



SECTION B - B
SCALE:1"=20'

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	**PROJECT No.**	1586-S	**PLATE**	4

LATERAL EARTH PRESSURE ANALYSIS FOR RETAINING WALL



SOIL PARAMETERS

Cohesion, C	=	460.0	pounds per square foot
Angle of Friction, ϕ	=	23.0	degrees
Wet Density of Soil, γ	=	120.0	pounds per cubic foot

ANALYSES

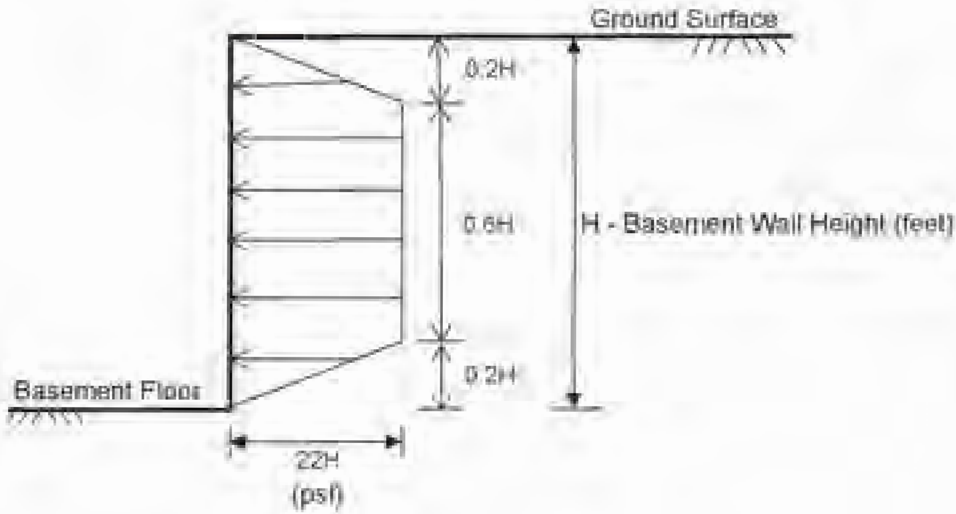
Mobilized Cohesion, C_m	=	308.7	degrees	
Mobilized Angle of Friction, ϕ_m	=	15.3	pounds per square foot	
Angle of Wall Friction, $\delta=2\phi/3$	=	15.3	degrees	
Slope Angle, β	=	0.0	degrees	(Level Backslope)
Angle of Failure Plane, ρ	=	56.5	degrees	(=45+ $^{\phi}/2$)
Length of Failure Plane, L	=	48.0	feet	
Wall Height, H	=	40.0	feet	
Weight of Failure Wedge, W	=	63.6	kips	
Surcharge Load, Q	=	3.0	kips	
Total Weight of Failure Wedge, W_t	=	66.6	kips	
Factor-of-Safety, FS	=	1.5		

$W = (0.5gH^2 \cos\rho \cos\beta) / \sin(\rho - \beta)$	=	63.6	kips
$a = (C_m L) \sin(90 + \phi_m) / \sin(\rho - \phi_m)$	=	21.6	kips
$P_a = (W_t - a) \sin(\rho - \phi_m) / \sin(90 - \rho + \phi_m + \delta)$	=	32.9	kips

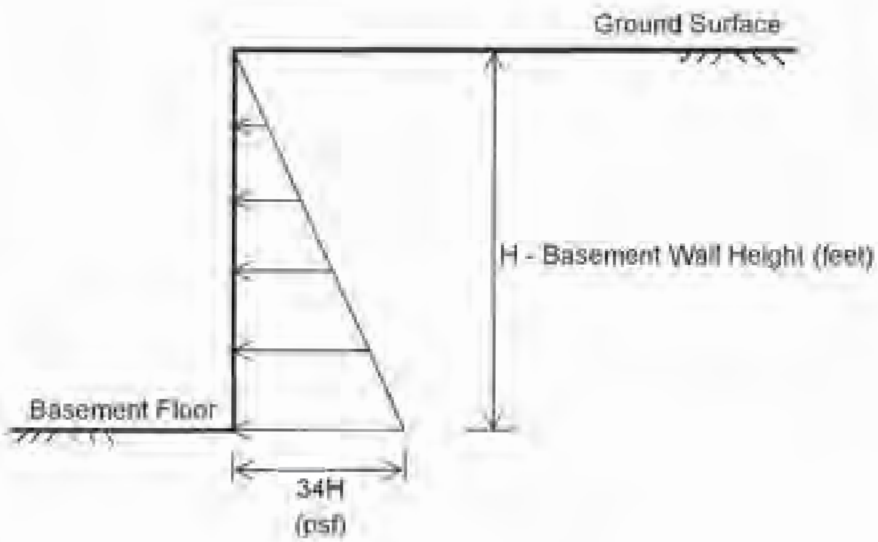
$EFP_{Wall} = 2P_a/H^2$ TRUE	=	41.1	pounds per cubic foot

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	**PROJECT No.**	1586-S	**PLATE**	5

LATERAL EARTH PRESSURE DIAGRAM
(Shoring Wall)



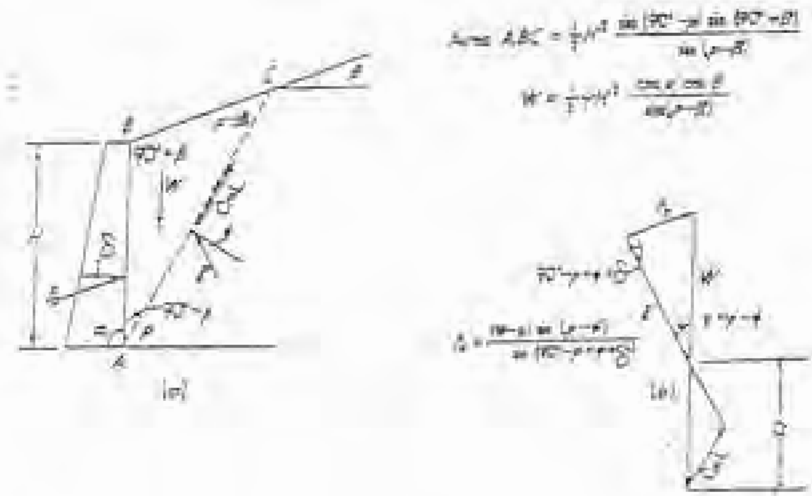
BRACED SHORING



CANTILEVERED SHORING

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	**PROJECT No.**	1586-S	**PLATE**	6

LATERAL EARTH PRESSURE ANALSIS FOR SHORING WALL



SOIL PARAMETERS

Cohesion, C	=	460.0	pounds per square foot
Angle of Friction, ϕ	=	23.0	degrees
Wet Density of Soil, γ	=	120.0	pounds per cubic foot

ANALYSES

Mobilized Cohesion, C_m	=	368.0	degrees	
Mobilized Angle of Friction, ϕ_m	=	18.4	pounds per square foot	
Angle of Wall Friction, $\delta=2\phi/3$	=	15.3	degrees	
Slope Angle, β	=	0.0	degrees	(Level Backslope)
Angle of Failure Plane, ρ	=	56.5	degrees	$(=45+{}^{\phi}/2)$
Length of Failure Plane, L	=	50.4	feet	
Wall Height, H	=	42.0	feet	
Weight of Failure Wedge, W	=	70.1	kips	
Surcharge Load, Q	=	3.0	kips	
Total Weight of Failure Wedge, W_t	=	73.1	kips	
Factor-of-Safety, FS	=	1.25		
$W = (0.5gH^2 \cos\rho \cos\beta) / \sin(\rho-\beta)$	=	70.1	kips	
$a = (C_m L) \sin(90+\phi_m) / \sin(\rho-\phi_m)$	=	28.5	kips	
$P_a = (W_t - a) \sin(\rho-\phi_m) / \sin(90-\rho+\phi_m+\delta)$	=	29.8	kips	
$EFP_{Wall} = 2P_a/H^2$	=	33.8	pounds per cubic foot	

APPENDIX

LOG OF TEST BORING

LABORATORY TEST

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well-graded sands or gravelly sands, little or no fines.
			SP	Poorly-graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

<u>BOUNDARY CLASSIFICATIONS:</u> Soils possessing characteristics of two groups are designated by combinations of group symbols.

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	**PROJECT No.**	1586-S	**PLATE**	A

LOG OF TEST BORING

BORING No. 1

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol		Description of Material	Color	Consistency	Moisture
							4" Asphalt Conc. over 6" Base Materials			
					SM	ALLUVIUM	SAND; fine to coarse, slightly clayey, silty	brown	dense	moist
5	R	39	11.7	111.5						
10	R	32	19.4	108.3	CL		CLAY; silty		stiff	
15	R	37	23.7	99.7						
20	R	36	16.5	108.9	ML		SILT; very fine-sandy	gray	firm	
25	R	42	22.1	104.5			SILT; slightly clayey, silty	grayish brown		
30	R	84	13.9	113.5			SILT; very fine-sandy	gray		
35	R	93	17.1	111.9						
40	R	80/6"	9.9	118.7		BEDROCK	SANDSTONE; fine- to medium-grained		hard	

(cont'd)

PROJECT LOCATION	3216 W. 8th St. Los Angeles, California	PROJECT No.	1586-S	PLATE	A-1-1

LOG OF TEST BORING

BORING No. 1 (cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs.

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						BEDROCK SANDSTONE; fine- to medium-grained, slightly silty to clean	gray to greenish grey	hard	moist
45	R	90/6"	10.2	120.1					
50	R	90/6"	10.9	119.4					

Total Depth: 50 feet

No Groundwater

PROJECT LOCATION	3216 W. 8th St. Los Angeles, California	PROJECT No.	1586-S	PLATE	A-1-2

LOG OF TEST BORING

BORING No. 2

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs
Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol		Description of Material	Color	Consistency	Moisture
							4" Asphalt Conc. over 6" Base Materials			
					SM	ALLUVIUM	SAND; fine to coarse, silty	brown	dense	moist
5	R	43	14.9	113.4						
10	R	39	9.1	104.2	SW		SAND; fine to coarse, clean			
15	R	47	8.4	108.3			SAND; fine to coarse, slightly silty to clean			
20	R	66	15.6	114.6	ML		SILT; very fine-sandy, slightly clayey		firm	
25	R	73	4.7	113.6	SW		SAND; fine to coarse, clean	light brown	dense	
30	R	41	21.1	102.4	ML		SILT; very fine-sandy	grayish brown	firm	
35	R	63	23.6	111.6	SM		SAND; fine to coarse, slightly clayey, silty	brown	dense	
40	R	90/4"	7.2	117.8		BEDROCK	SANDSTONE; fine- to medium-grained		hard	

(cont'd)

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-2-1

LOG OF TEST BORING

BORING No. 2 (cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 8/15/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						BEDROCK SANDSTONE: fine- to medium-grained, slightly silty to clean	gray to greenish gray	hard	moist
45	R	90/4"	8.7	119.3					
50	R	90/4"	9.4	120.4					

Total Depth: 50 feet

No Groundwater

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-2-2

LOG OF TEST BORING

BORING No. 3

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 8/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs/cu.ft.)	USCS Symbol		Description of Material	Color	Consistency	Moisture
							4" Asphalt Conc. over 5" Base Materials			
					SM	ALLUVIUM	SAND; fine to coarse, slightly clayey, silty	brown	dense	moist
5	R	49	12.2	114.7						
10	R	52	13.9	113.9						
15	R	58	14.8	114.1						
20	R	44	21.8	103.2	ML		SILT; very fine-sandy, slightly clayey		firm	
25	R	47	22.6	104.2						
30	R	53	23.2	108.8			SILT; very fine-sandy	grayish brown		
35	R	67	4.4	107.1	SW		SAND; fine to coarse, clean		dense	
40	R	90/6"	8.3	118.3		BEDROCK	SANDSTONE; fine- to medium-grained		hard	

(cont'd)

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-3-1

LOG OF TEST BORING

BORING No. 3
(cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						BEDROCK SANDSTONE: fine- to medium-grained, slightly silty to clean	gray to greenish gray	hard	moist
45	R	90/6"	10.3	120.4					
50	R	90/5"	9.7	119.6					

Total Depth: 50 feet

No Groundwater

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-3-2

LOG OF TEST BORING

BORING No. 4

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						4" Asphalt Conc. over 6" Base Materials			
					SM	**ALLUVIUM** SAND; fine to coarse, silty	brown	dense	moist
5	R	42	9.2	109.4					
10	R	46	10.3	110.8					
15	R	52	19.6	104.8	CL	CLAY; silty		stiff	
20	R	58	19.1	108.4					
25	R	61	21.5	108.6	ML	SILT; very fine-sandy	gray	firm	
30	R	76	7.9	111.7	SW	SAND; fine to coarse, clean	light brown	dense	
35	R	66	18.6	109.3	ML	SILT; very fine-sandy	gray	firm	
40	R	90/8"	10.1	117.4		**BEDROCK** SANDSTONE; fine- to medium-grained		hard	

(cont'd)

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-4-1

LOG OF TEST BORING

BORING No. 4
(cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 5/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						BEDROCK SANDSTONE: fine- to medium-grained, slightly silty to clean	gray to greenish gray	hard	moist
45	R	95/8"	8.8	118.4					
50	R	90/4"	10.2	121.2					

Total Depth: 50 feet

No Groundwater

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-4-2

LOG OF TEST BORING

BORING No. 5

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 6/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol		Description of Material	Color	Consistency	Moisture
							4" Asphalt Conc. over 6" Base Materials			
					SM	ALLUVIUM	SAND; fine, silty	brown	dense	moist
5	R	39	15.1	111.7						
10	R	50	8.3	105.6	SW		SAND; fine to coarse, clean			
15	R	67	6.7	107.4			SAND; fine to coarse, slightly silty to clean			
20	R	70	16.2	113.4	ML		SILT; very fine-sandy		firm	
25	R	88	5.6	114.8	SW		SAND; fine to coarse, clean	light brown	dense	
30	R	53	20.7	107.4	ML		SILT; very fine-sandy, slightly clayey	grayish brown	firm	
35	R	55	21.3	102.9	SM		SAND; fine to coarse, slightly clayey, silty	brown	dense	
40	R	90/9"	8.9	118.4		BEDROCK	SANDSTONE; fine- to medium-grained		hard	

(cont'd)

PROJECT LOCATION	3216 W. 8th St, Los Angeles, California	PROJECT No.	1586-S	PLATE	A-5-1

LOG OF TEST BORING

BORING No. 5
(cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 8/19/17
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

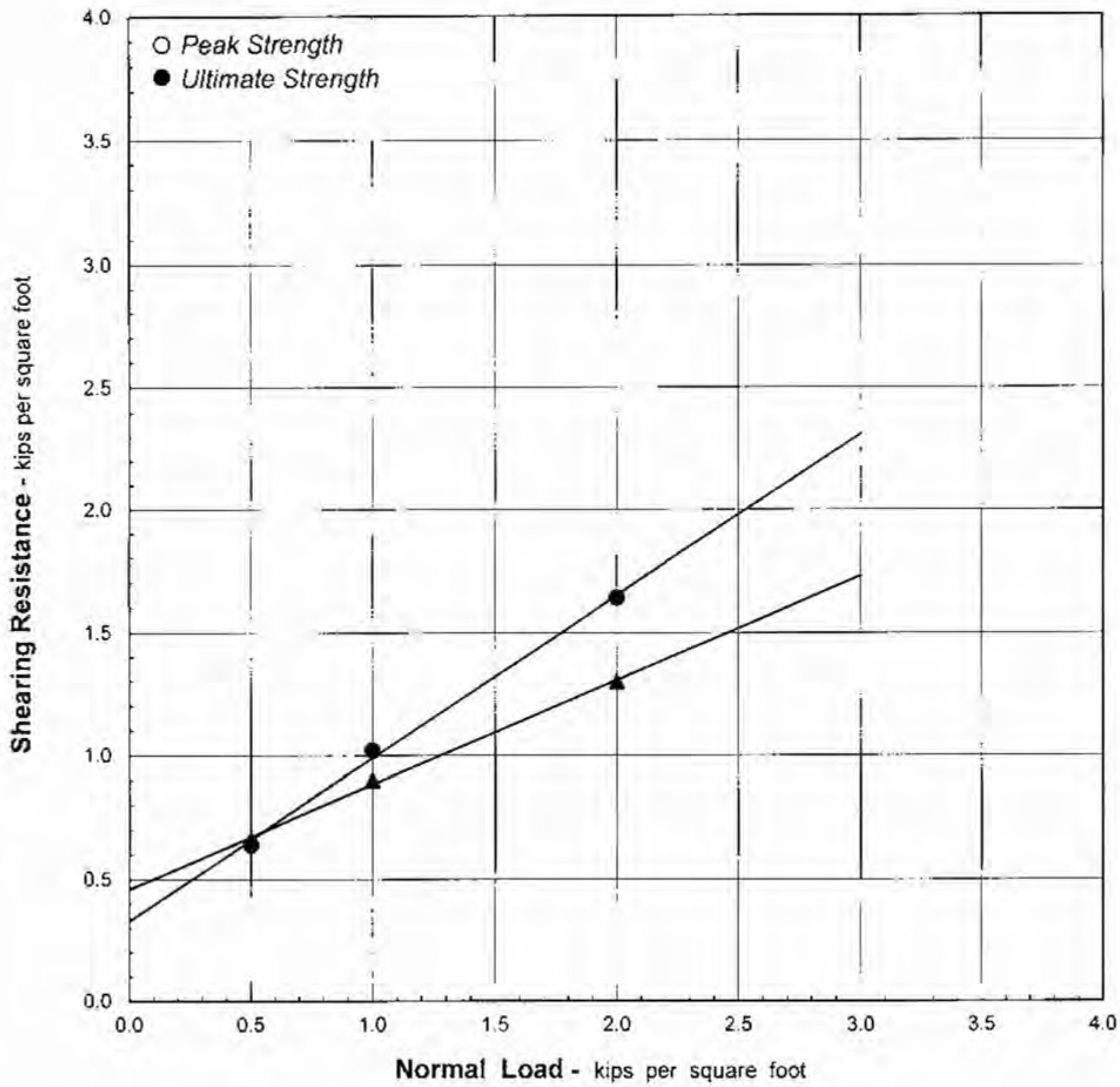
Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						BEDROCK SANDSTONE; fine- to medium-grained, slightly silty to clean	gray to greenish gray	hard	moist
45	R	90/6"	7.7	118.5					
50	R	90/8"	9.1	119.4					

Total Depth: 50 feet

No Groundwater

PROJECT LOCATION	3218 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-5-2

DIRECT SHEAR TEST

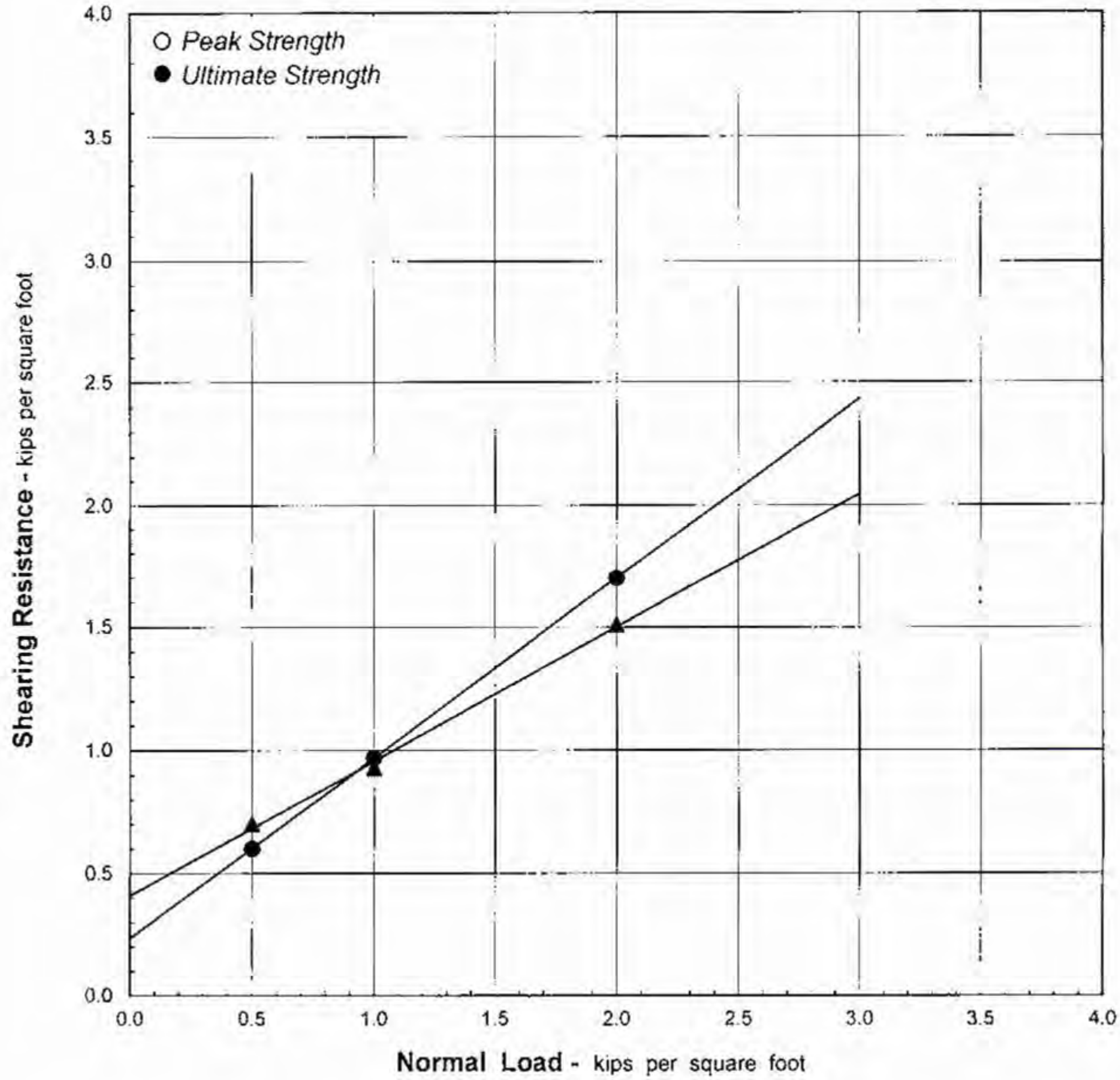


Symbol	Boring No.	Depth (feet)	USCS Symbol	Initial Moisture Content (% of dry wt.)	Saturated Moisture Content (% of dry wt.)	Dry Unit Weight (lbs./cu.ft.)	Cohesion (lbs./sq.ft.)	Angle of Friction (degree)
●	4	5	SM	9.2	19.6	109.4	330	33
▲	1	15	CL	23.7	26.4	99.7	460	23

Samples were tested under saturated and drained conditions.

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-6

DIRECT SHEAR TEST

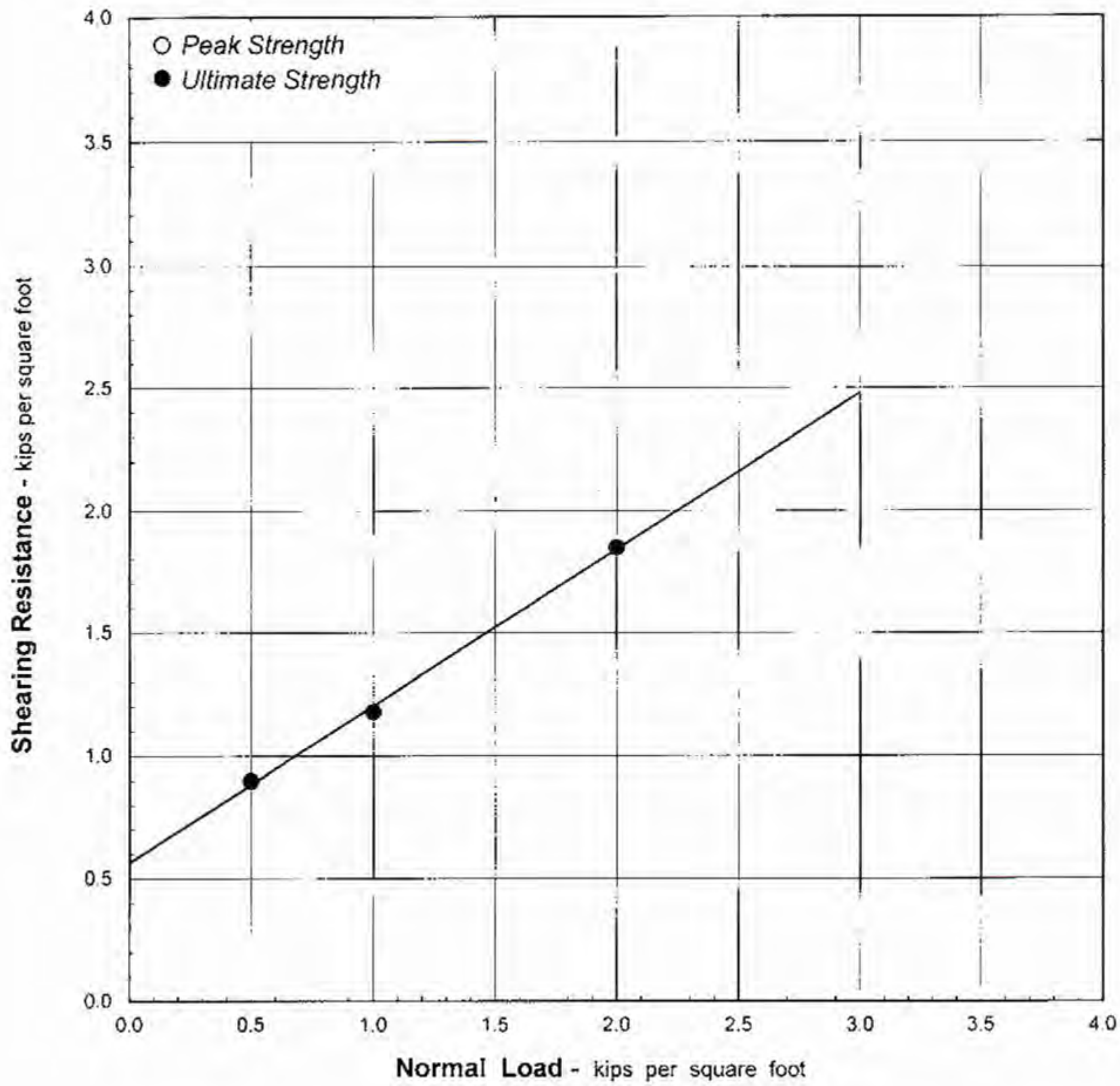


Symbol	Boring No.	Depth (feet)	USCS Symbol	Initial Moisture Content (% of dry wt.)	Saturated Moisture Content (% of dry wt.)	Dry Unit Weight (lbs./cu.ft.)	Cohesion (lbs./sq.ft.)	Angle of Friction (degree)
●	2	10	SW	9.1	22.3	104.2	240	36
▲	2	30	ML	21.1	24.2	102.4	410	29

Samples were tested under saturated and drained conditions.

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No.	1586-S	PLATE	A-7

DIRECT SHEAR TEST



Symbol	Boring No.	Depth (feet)	USCS Symbol	Initial Moisture Content (% of dry wt.)	Saturated Moisture Content (% of dry wt.)	Dry Unit Weight (lbs./cu.ft.)	Cohesion (lbs./sq.ft.)	Angle of Friction (degree)
●	4	40	Sndstn	10.1	15.6	117.4	570	33

Samples were tested under saturated and drained conditions.

PROJECT LOCATION	3216 W. 8th St Los Angeles, California	PROJECT No. 1586-S	PLATE A-8