Appendix E2

2018 Update of Geotechnical Engineering Investigation

Geotechnologies, Inc.
Consulting Geotechnical Engineers

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November 21, 2018
Revised December 5, 2018
File No. 21324

LIG-900, 910 & 926 E. 4th St.
405-411 S. Hewitt, LLC
6315 Bandini Boulevard
Commerce, California 90040

Attention: Dilip Bhavnani

Subject: Update of Geotechnical Engineering Investigation
Proposed Mixed-Use Structure
405-411 South Hewitt Street, and 900-926 East 4th Street, and 412 Colyton Street
Los Angeles, California

References: *Reports by Geotechnologies, Inc.:*
Geotechnical Engineering Investigation, dated December 29, 2016.

City of Los Angeles, Department of Building and Safety:
Soils Report Approval Letter, Log # 96372, dated January 30, 2017.

Dear Mr. Bhavnani:

INTRODUCTION

At your request, this letter has been prepared. The intention of this document is to provide an update of the referenced Geotechnical Engineering Investigation. It is the understanding of this firm that the scope of the proposed development has been revised since the referenced geotechnical investigation was issued. These recent changes are addressed herein.

PROPOSED PROJECT

The original scope of the proposed project, as addressed in our referenced geotechnical investigation, consisted of an eleven-story structure, to be underlain by three subterranean parking levels. It was anticipated that the lowest level of the subterranean garage would extend to a depth of 29 feet.

Under the currently proposed scope, the structure will now be fifteen stories in height. The depth of the proposed subterranean garage has not changed, and remains three levels in depth, with a finished floor elevation extending to a depth of 29 feet below the ground level.

The referenced geotechnical investigation recommended supporting the proposed structure on a conventional foundation system. However, due to the recent increase on height, as well as the higher load demand, the structural engineer has proposed to support the proposed structure on a mat foundation system. Recommendations to aid in the design of a mat foundation are provided herein.

Except as amended herein, all other recommendations provided in the referenced geotechnical investigation remain applicable for the proposed development.

SUPPLEMENTAL FOUNDATION RECOMMENDATIONS

Mat Foundations

The project structural engineer has proposed to support the structure on a mat foundations system. The use of a mat foundation is acceptable to this firm, provided that the recommendations presented herein are implemented. The mat foundation may bear in the competent native alluvial soils expected at the subgrade of the proposed subterranean garage.

Based on information provided by the project structural engineer, it is anticipated that the proposed tower will have an average bearing pressure of 7,000 pounds per square foot. Foundation bearing pressure will vary across the mat, with a maximum localized pressure of approximately 11,500 psf. These pressures reflect dead and live loads.

For design purposes, an allowable bearing pressure of up to 10,000 pounds per square foot, with locally higher pressures up to 12,000 pounds per square foot may be utilized in the mat foundation design. A factor of safety of 3 was utilized in the development of these bearing pressures.

The mat foundation may be designed utilizing a modulus of subgrade reaction of 300 pounds per cubic inch. This value is a unit value for use with a one-foot square footing. The modulus should be reduced in accordance with the following equation when used with larger foundations.

$$K = K_1 * [(B + 1) / (2 * B)]^2$$

where K = Reduced Subgrade Modulus
K_1 = Unit Subgrade Modulus
B = Foundation Width (feet)

The bearing values indicated above are for the total of dead and frequently applied live loads, and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces. Since the recommended bearing value is a net value, the weight of concrete in the foundations may be taken as 50 pounds per cubic foot and the weight of the soil backfill may be neglected when determining the downward load on the foundations.

Lateral Mat Foundation Design

Resistance to lateral loading may be provided by friction acting at the base of the mat and by passive earth pressure. An allowable coefficient of friction of 0.45 may be used with the dead load forces.

Passive geologic pressure for the sides of foundations poured against undisturbed soil may be computed as an equivalent fluid having a density of 300 pounds per cubic foot with a maximum earth pressure of 1,800 pounds per square foot. The passive and friction components may be combined for lateral resistance without reduction. A one-third increase in the passive value may be used for short duration loading such as wind or seismic forces.

Mat Foundation Settlement

Settlement of a mat foundation is expected to occur on application of loading. The maximum settlement is expected to occur below the central portion of the mat, and would be on the order of 2 inches. The settlement along the edges of the mat is expected to be on the order of ¾-inch. Therefore, the differential settlement anticipated across the mat is expected to be on the order of 1¼-inch.

SUPPLEMENTAL SHORING RECOMMENDATIONS

Temporary excavations up to a depth of 35 feet are anticipated for construction of the proposed subterranean parking garage and mat foundation. As a precautionary measure, recommendations for temporary shoring wall retaining a height of 38 feet of soils are provided below.

Lateral Pressures

A trapezoidal distribution of lateral earth pressure would be appropriate where shoring is to be restrained at the top by bracing or tie backs. Restrained shoring supporting a level backslope may be designed utilizing a trapezoidal distribution of pressure as indicated in the following table:

HEIGHT OF SHORING "H" (feet)	DESIGN SHORING FOR (Where H is the height of the wall)
Up to 12	18H
12 to 20	21H
20 to 35	24H
35 to 38	25H

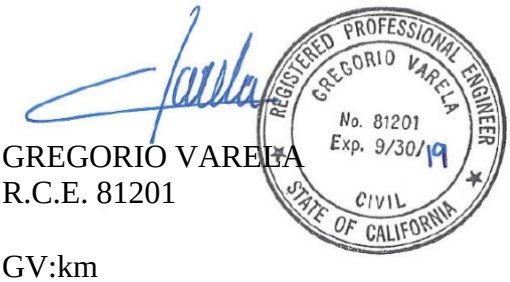
Where a combination of sloped embankment and shoring is utilized, the pressure will be greater and must be determined for each combination. Additional active pressure should be applied where the shoring will be surcharged by adjacent traffic or structures.

CLOSURE

As stated before, the purpose of this letter is to provide recommendations to supplement the referenced geotechnical engineering investigation. Except as amended herein, all other recommendations provided by this firm in the referenced geotechnical investigation remain applicable for the proposed project.

Should you have any questions please contact this office.

Respectfully submitted,
GEOTECHNOLOGIES, INC.



GREGORIO VARELA
R.C.E. 81201

GV:km

Enclosures: Plot Plan
Cross Sections A-A' and B-B' (2 sheets)
Calculation Sheets (1 page)

Distribution: (4) Addressee

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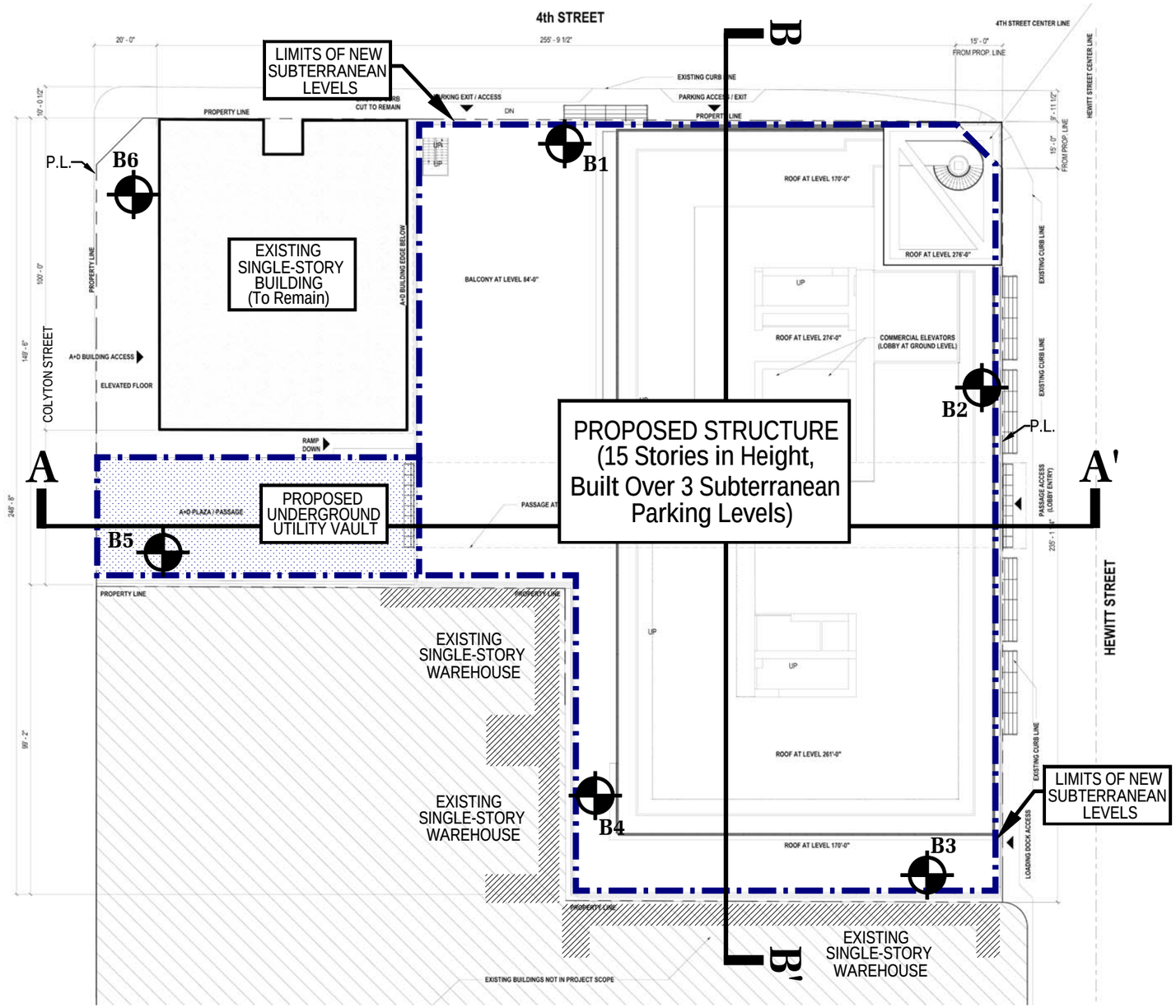
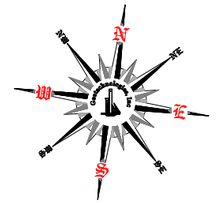




SCALE IN FEET

0 40 80

LEGEND

B6 — LOCATION & NUMBER OF BORING

B B' — CROSS SECTION B-B'

REFERENCE: SITE PLAN BY GENSLER
PRINT DATE 10/25/17

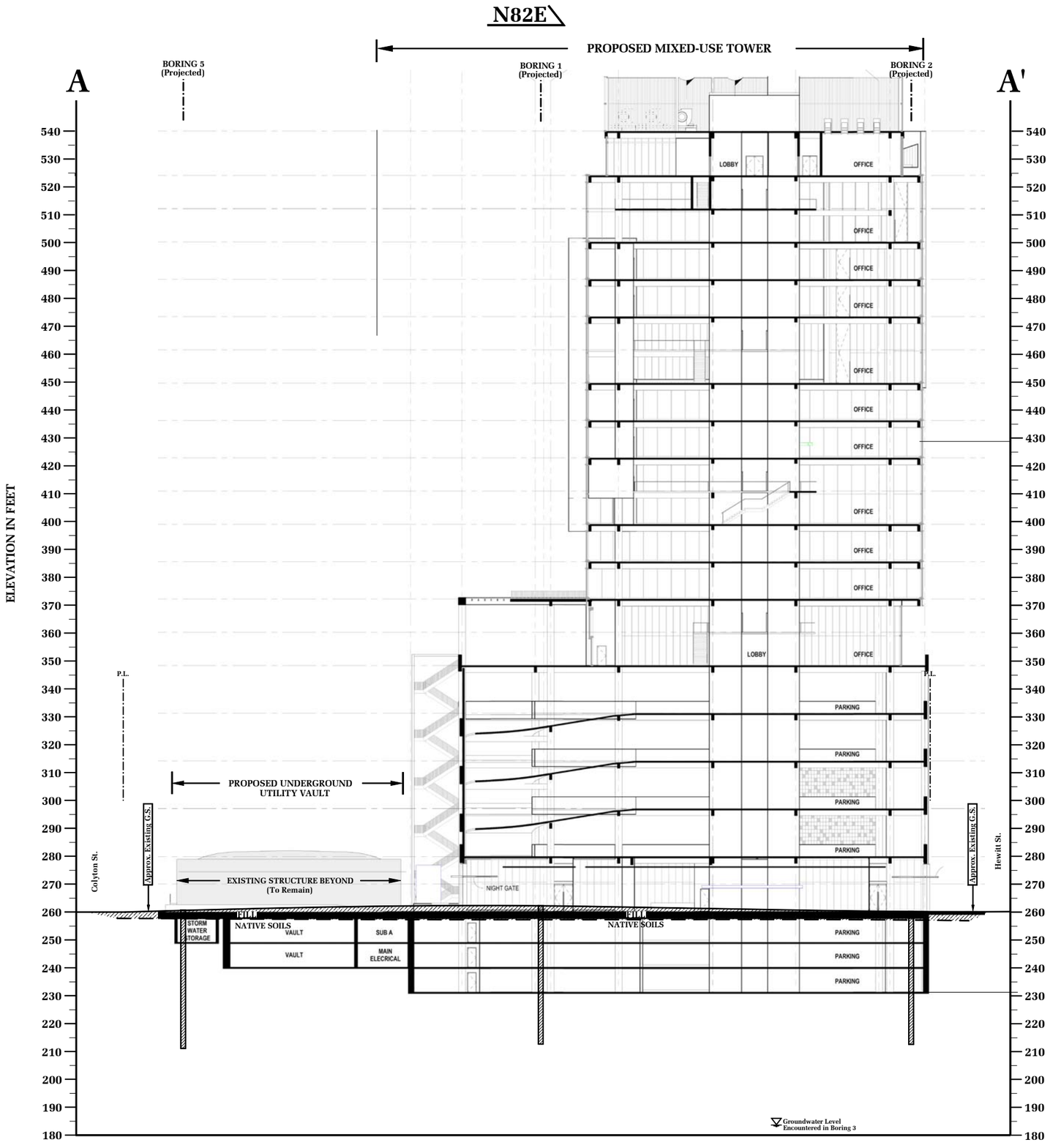
PLOT PLAN

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LIG-900, 910 & 925 E. 4TH ST., 405-411 S. HEWITT LLC

FILE No. 21324

November '18



SCALE IN FEET

0 40 80

REFERENCE: SECTION BY GENSLER
PRINT DATE 12/04/18

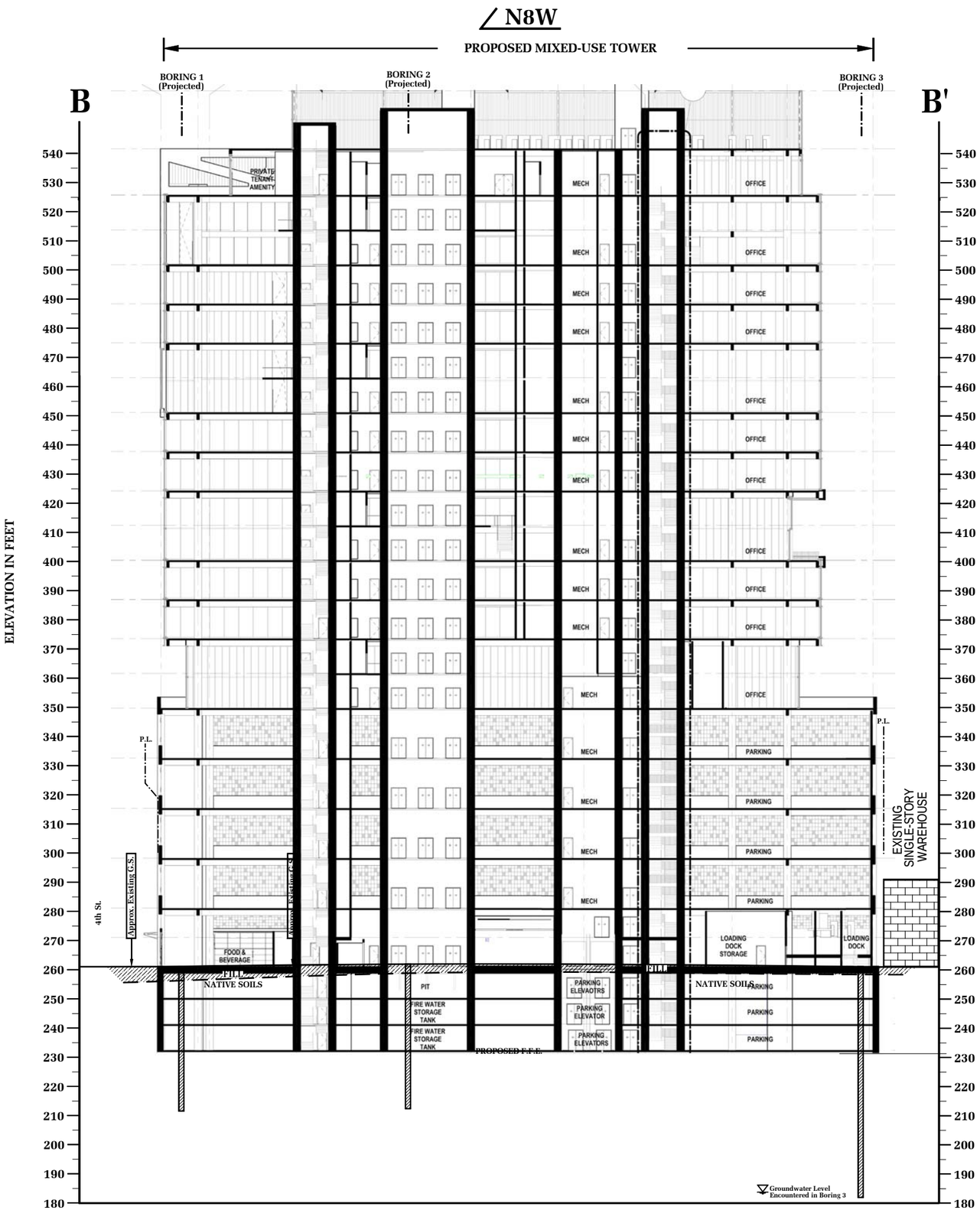
CROSS SECTION A-A'

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LIG-900, 910 & 925 E. 4TH ST., 405-411 S. HEWITT LLC

FILE No. 21324

December '18



SCALE IN FEET

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REFERENCE: SECTION BY GENSLER
PRINT DATE 12/04/18

CROSS SECTION B-B'

Geotechnologies, Inc.
Consulting Geotechnical Engineers

LIG-900, 910 & 925 E. 4TH ST., 405-411 S. HEWITT LLC

FILE No. 21324

December '18

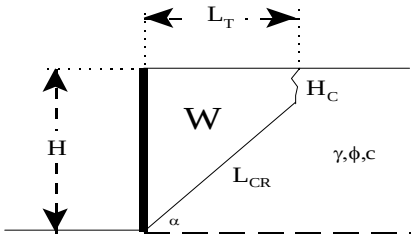
Geotechnologies, Inc.

Project: LIG 900, 910 & 925 E. 4th Street
File No.: 21324
Description: Temporary Shopring Walls (35 to 38 feet high)

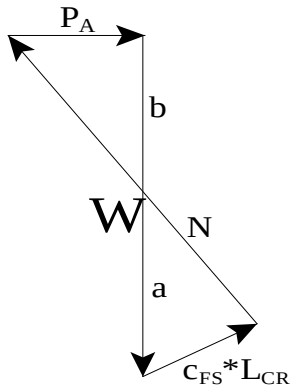
Shoring Design with Level Backfill (Vector Analysis)

Input:

Shoring Height	(H)	38.00	feet
Unit Weight of Retained Soils	(γ)	125.0	pcf
Friction Angle of Retained Soils	(ϕ)	34.0	degrees
Cohesion of Retained Soils	(c)	130.0	psf
Factor of Safety	(FS)	1.25	
Factored Parameters:	(ϕ_{FS})	28.4	degrees
	(c_{FS})	104.0	psf



Failure Angle (α)	Height of Tension Crack (H_C)	Area of Wedge (A)	Weight of Wedge (W)	Length of Failure Plane (L_{CR})	a	b	Active Pressure (P_A)
degrees	feet	$feet^2$	lbs/lineal foot	feet	lbs/lineal foot	lbs/lineal foot	lbs/lineal foot
40	4.7	847	105886.5	51.8	23459.9	82426.6	16992.3
41	4.4	819	102409.3	51.2	21387.5	81021.8	18182.4
42	4.2	792	99022.5	50.5	19607.2	79415.3	19283.6
43	4.0	766	95730.8	49.9	18064.9	77666.0	20300.5
44	3.8	740	92535.0	49.3	16718.4	75816.5	21237.4
45	3.6	715	89433.6	48.6	15535.0	73898.5	22098.1
46	3.5	691	86423.9	48.0	14488.6	71935.3	22886.1
47	3.4	668	83502.5	47.4	13558.1	69944.4	23604.7
48	3.3	645	80665.5	46.8	12726.5	67939.0	24256.7
49	3.2	623	77908.9	46.2	11980.0	65928.9	24844.6
50	3.1	602	75228.7	45.6	11306.9	63921.8	25370.9
51	3.0	581	72621.0	45.0	10697.8	61923.2	25837.5
52	3.0	561	70081.8	44.5	10144.6	59937.2	26246.2
53	2.9	541	67607.4	43.9	9640.5	57967.0	26598.6
54	2.9	522	65194.4	43.4	9179.7	56014.7	26895.9
55	2.8	503	62839.2	42.9	8757.3	54081.9	27139.3
56	2.8	484	60538.7	42.4	8369.2	52169.6	27329.7
57	2.8	466	58289.9	42.0	8011.5	50278.4	27467.8
58	2.8	449	56089.8	41.5	7681.1	48408.6	27554.0
59	2.8	431	53935.6	41.1	7375.4	46560.2	27588.8
60	2.8	415	51824.8	40.7	7091.7	44733.1	27572.1
61	2.8	398	49754.9	40.2	6828.0	42926.9	27504.0
62	2.8	382	47723.5	39.8	6582.4	41141.1	27384.2
63	2.8	366	45728.4	39.5	6353.1	39375.3	27212.3
64	2.9	350	43767.5	39.1	6138.8	37628.7	26987.6
65	2.9	335	41838.7	38.7	5938.0	35900.8	26709.4



Design Equations (Vector Analysis):

$a = c_{FS}*L_{CR}*\sin(90+\phi_{FS})/\sin(\alpha-\phi_{FS})$

$b = W-a$

$P_A = b*\tan(\alpha-\phi_{FS})$

$EFP = 2*P_A/H^2$

Maximum Active Pressure Resultant

$P_{A,\,max}$ 27588.8 lbs/lineal foot

Equivalent Fluid Pressure (per lineal foot of shoring)

$EFP = 2*P_A/H^2$

EFP 38.2 pcf

Design Shoring for an Equivalent Fluid Pressure: 39 pcf