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Geotechnical Report

Proposed Apartment Building

221 Congress Street, Portland, Maine

Client
Caleb Johnson Architects + Builders
265 Main St. #201
Biddeford, Maine 04005

Project #: 16231
Date: 6/22/17

SUMMIT
GEOENGINEERING SERVICES

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June 22, 2017
Summit #16231

Attn: Patrick Boothe, AIA, LEED AP BD+C
Caleb Johnson Architects + Builders
265 Main St. #201
Biddeford, Maine 04005

Reference: Geotechnical Engineering Report – Proposed Apartment Building
221 Congress Street, Portland, Maine

Dear Patrick;

Summit Geoengineering Services, Inc. (SGS) completed a geotechnical exploration at the above referenced site in 2009 and prepared a geotechnical report for the design and construction of previously proposed restaurant. The scope of services at that time included the drilling of 4 borings at various locations throughout the property, performing laboratory testing on collected soil samples, and preparing the geotechnical report. The restaurant which was referenced in that report was not built.

Recently, SGS was asked to provide geotechnical recommendations for newly proposed construction of an apartment building at the site. The recommendations provided within this geotechnical report are based upon the previous explorations performed by SGS at the site and are contingent upon a site visit during construction to observe the subgrade conditions.

1.0 Project and Site Description

We understand that the project consists of the construction of a new 5 story apartment building at the corner of Congress Street and Washington Street in Portland, Maine. Based on a preliminary plan set provided by you (dated 9/30/16), the proposed building will have a footprint of 5,514 square feet and will be constructed adjacent to the existing building called "The Snug" to the west and The Big Apple to the north. We understand that there will be a partial basement used for automatic car port parking, the first floor will be used for commercial space, and the 2nd through 5th floor will be residential living units.

The car port basement will be located along the western edge of the proposed building, adjacent to The Snug and The Big Apple. Based on discussions with you, we understand that a cut of approximately 17 feet will be required for the construction of the basement. At this time, we understand that the bracing method for this cut is unknown. Consideration is being given to

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bracing methods such as solider pile and lagging, cantilever sheeting, sheeting with soil anchors, sheeting with rakers, and others. We also understand that The Snug has a basement with a FFE approximately 8 feet below existing grade.

2.0 Subsurface Explorations and Laboratory Testing

2.1 Subsurface Explorations

SGS observed the subsurface conditions at the site with the drilling of 4 borings on January 2, 2009. All explorations were performed by Northern Test Boring, under direct supervision of SGS, using a Diedrich D-50 tracked drill rig. All of the borings (B-1 through B-4) were terminated in the native glacial till at a depth of 27 feet below ground surface. All borings were advanced using 2 ½" I.D. hollow stem augers. During the borings, split spoon sampling (*ASTM D1586*) was performed at 5 foot intervals.

The borings were located by SGS prior to drilling by taping/pacing from existing features. These locations can be seen in the SGS Exploration Plan in Appendix A. The boring logs can be found in Appendix B.

2.2 Laboratory Testing

Two Grain Size Analyses (*ASTM D422*) were performed on samples of glacial till soil collected in Boring B-3. The tested samples were collected at depths of 15' to 17' and 20' to 22'. A summary of the results are presented below. Detailed results can be found in Appendix C.

Table 1: Laboratory Test Results

GRAIN SIZE ANALYSIS RESULTS – FILL/REWORKED NATIVE						
Boring	**Sample**	**Depth (ft.)**	**Composition**			**USCS**
			Gravel	Sand	Silt/Clay	
B-3	S-6	15 to 17	1.2%	95.0%	3.8%	SP
B-3	S-7	20 to 22	0.0%	84.0%	16.0%	SM

USCS = Unified Soil Classification System, SP = Poorly Graded Sand, SM = Silty Sand

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3.0 Subsurface Conditions

3.1 Soil and Groundwater

In general, the soils encountered at the site consisted of ***fill*** overlying ***glacial till***. Pavement, approximately 2-1/2" thick, was encountered at B-1, B-2, and B-3.

Fill encountered at all boring locations ranged from 3 to 7.5 feet in thickness. The fill is described as brown to dark brown silty sand or sand with pieces of bricks and ashes. The fill was generally competent and no organic, trash, or other similar materials were encountered. SPT-N values in the fill ranged from 2 to 23 blows per foot and averaged 10 bpf. A very loose layer was encountered from 5 to 7 feet at B-3, underlying a thin wood layer encountered at 5 feet. The fill was dry and is classified as SM or SP in accordance with the USCS (Unified Soil Classification System).

The ***Glacial Till*** encountered at the site ranged from brown sand with a little gravel to gray fine sand with a little silt. Based on the results of the grain size the glacial till at B-3 from a depth of 15 to 20 feet, has 0% to 1.2% gravel, 84% to 95% sand, and 3.8% to 16% silt. These samples represent the finer range of the sediments observed in the samples. The SPT-N values for the glacial till range from 7 to 30 bpf and averaged 15 bpf. The glacial till classification ranges from SP to SM in accordance with the USCS.

Bedrock was not encountered in the borings, drilled to a depth of 27 feet.

The depth to Groundwater, based on observation of the samples obtained in the borings, ranged from 15 feet to 20 feet below the existing ground surface. Groundwater levels are expected to fluctuate seasonally and groundwater at this site may be higher during prolonged wet periods.

4.0 Geotechnical Evaluation

Based on our understanding of the proposed project, we believe that the new building and the associated development is feasible from a geotechnical standpoint. The building can be constructed using conventional spread footings on frost wall with a slab-on-grade. The proposed excavation support should be designed using the recommendation provided in this report. The geotechnical challenges associated with the proposed development include:

- A deep excavation for the construction of the new building foundation.
- Support of the existing basement foundation adjacent to the deep excavation.

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- Presence of groundwater within the building foundation excavation
- Presence of groundwater at and above the basement finish floor elevation (FFE).

A deep excavation will be required to construct the basement portion of the new building foundation. Based on discussions with you and an excavation contractor, we understand that the bracing scheme may involve sheeting or solider pile & lagging braced with soil tiebacks or rakers. Geotechnical design parameters for shoring designs have been provided in Section 6.0. If additional recommendations are needed based on updated or refined concepts, we should be notified in order to provide these. Also, final design computations for the shoring and retaining walls should be provided to us for review so we can verify that the assumed soil and water conditions match the recommendations provided in this report.

The deep excavation will be directly adjacent to the existing basement foundation of The Snug and The Big Apple. These foundations must be adequately supported during construction. The two options for supporting the foundations include:

1) Directly underpinning the existing foundation.
2) Designing a shoring system to rigidly support the existing foundation.

Underpinning will involve the installation of an independent load-bearing system of the existing foundation to carry the loads beneath the excavation depth. This will likely consist of a system such as micropiles, mass concrete underpinning, jet grouting, or others. If the foundation is not underpinned, the shoring system should be designed to support the load from the existing foundation and to minimize vertical and lateral movements of the soil beneath the foundation.

In both cases, we anticipate that structural monitoring of the adjacent buildings will be required before and during construction to verify that vibrations and excavation activities do not impact the existing foundations.

Groundwater was encountered at depths ranging from 15 to 20 feet below ground surface on the day of the explorations. These groundwater depths are anticipated to fluctuate over the life of the building. We anticipate that groundwater will be encountered within the building excavation and will require de-watering for construction. Groundwater will also have to be considered in the design of the basement floor slab and retaining walls.

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5.0 Geotechnical Recommendations – Proposed Building Foundation

5.1 Foundation Bearing Pressure

Based on the proposed grades, we anticipate that the native glacial till soil or existing fill will be exposed beneath footings for the building. Assuming that the recommendations below are followed, an allowable bearing pressure of 4,000 psf can be used to proportion the footings for the new building. If the recommendations provided below are followed, we anticipate that post construction total settlement will be less than 1 inch and differential settlement within the building will be less than a deflection of 1/300 (δ/L deflection divided by span length) between column footings. The following recommendations apply to the footings construction at both sites:

- All topsoil, pavement, and existing building elements are removed from within the proposed building footprint prior to excavation of the footing trenches.
- All footings exposed to freezing temperatures are constructed at the recommended frost protection depth of 4.0 feet below exterior finish grade. Interior footings in heated areas should be constructed at a minimum depth of 2.0 feet below FFE.
- The exposed soil at the bottom of footing trenches is proofrolled with a minimum of 4 passes with a large plate compactor or vibratory roller. Proofrolling should be performed on dry, unfrozen soils. The groundwater surface should be dewatered a minimum of 12” below the bottom of the new footings during proofrolling and construction of the footings.
- If soft/unsuitable soils or man-made materials are encountered at the bottom of the excavation, they should be removed and replaced with ¾” crushed stone prior to proofrolling. If a significant amount of soft/unsuitable soils are encountered, SGS should be notified.

5.2 Frost Protection

The design air freezing index for the Portland area is approximately 1,200 degree F days (10 year, 90% probability). Based on this, a total of 4.0 feet of frost protection should be provided for the exterior footings and interior footings exposed to freezing temperatures. Interior footings constructed in continuously heated areas can be constructed a depth of 2.0 feet below interior grade.

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We recommend that the exterior of all foundation elements exposed to freezing temperatures be backfilled with Foundation Backfill (FB). The portion of FB passing the 3" sieve size should meet the following gradation requirements:

Table 2: Foundation Backfill - Soil Gradation

FOUNDATION BACKFILL	
Sieve Size	**Percent Finer**
3 inch	100
¼ inch	25 to 100
No. 40	0 to 50
No. 200	0 to 6*

Reference: MDOT Specification 703.06, Type E (2014)
*Reduced from 7% to 6% from Type E Standard

Maximum particle size should be limited to 6 inches. Foundation backfill should be placed in 6 to 12 inch lifts and compacted to 95% of its optimum dry density determined in accordance with ASTM D1557. The compaction requirement can be reduced to 90% beneath landscaped areas.

5.3 Seismic Design

Based on the summary of field results we recommend Site Class D be used in accordance with the 2012 or 2015 International Building Code. The following seismic site coefficients should be used:

Table 3: Seismic Design Coefficients

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS - IBC	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.240
1 second spectral response (S_1)	0.078
Maximum short period spectral response (S_{MS})	0.385
Maximum 1 second spectral response (S_{M1})	0.187
Design short period spectral response (S_{DS})	0.256
Design 1 second spectral response (S_{D1})	0.125

Subgrade conditions are not considered susceptible to liquefaction during seismic events.

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5.4 Groundwater Control

Groundwater in the borings was encountered at or near the proposed basement floor elevation during the exploration. Groundwater is expected to rise but we do not expect it to rise significantly above the basement floor level. We recommend an underdrain be installed along the exterior foundation wall at the basement footing. Perimeter under-drains should consist of 6 inch rigid perforated PVC placed adjacent to the footing and surrounded by a minimum of 6 inches of crushed stone wrapped in filter fabric to prevent clogging from the migration of the fine soil particles in the foundation backfill soils. The under-drain pipe should be outlet to a location where it will be free flowing. Where exposed at the ground surface, the ends of pipes should be screened or otherwise protected from entry and nesting of wildlife, which could cause clogging. If the grades do not allow a gravity outlet, a sump and pump would be required. If a sump pump is used to permanently dewater the basement, we recommend that a redundant system be installed to accommodate any failures of the primary sump or during power outages. In this case the basement slab does not need to be designed to account for hydrostatic pressure.

Alternatively, the underdrain can be placed as low as possible to attain a gravity outlet. Portions of the basement walls below the underdrain should be waterproofed and designed to accommodate the pertinent lateral water pressure. The slab should be designed to support the excess hydrostatic pressure equal to the unit weight of water times the distance from the bottom of the basement slab to the underdrain. Joints between the slab and foundation walls should be sealed to preclude water seepage.

5.5 Slab-on-Grade and/or Pavement

This section provides recommendations for a concrete slab-on-grade or pavement surface in the event that both types of surface are used for the floor area. Additionally, this section will provide recommendations for both heated and unheated conditions. We anticipate that native glacial till will be exposed in the slab excavation for the basement and that existing fill will be exposed in the first floor slab excavation.

5.5.1 Concrete Slab-on-Grade

We recommend that the concrete slabs for the new building be constructed on a minimum of 12” of Structural Fill (SF, see table below) or ¾” crushed stone. The glacial till or existing fill soil exposed in the slab excavation should be proofrolled with a minimum of 4 passes with a vibratory roller. If the exposed soil becomes softened from exposure to water (i.e., rain water, surface runoff, seeping groundwater, etc.), all softened areas should be overexcavated and

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replaced with ¾" crushed stone. For exterior slabs or slabs in unheated areas, the slab subgrade thickness should be increased to 24" and the slab should be constructed on 2" of rigid insulation. Alternatively, the subgrade soil thickness could be increased to 48" (including the slab) if rigid insulation is not used to provide adequate frost heave protection.

The portion of SF passing the 3" sieve shall meet the following gradation requirements:

Table 4: Structural Fill - Soil Gradation

STRUCTURAL FILL (SF)	
Sieve Size	**Percent finer**
3 inch	100
½ inch	35 to 80
¼ inch	25 to 65
No. 40	0 to 30
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type D

The maximum SF particle size should be limited to 6 inches. Structural Fill should be placed in 6 to 12 inch lifts and should be compacted to a minimum of 95 percent of its maximum dry density, determined in accordance with ASTM D1557. If ¾" crushed stone is used, it should be placed in 12" lifts and be compacted with a minimum of 4 passes in each of two perpendicular directions with a vibratory roller. For the conditions described above, the slab can be designed using a subgrade modulus value of 175 pci.

5.5.2 Pavement

The mean annual freezing index for the Portland area is estimated at 900 degree days. Based on the subgrade and mean annual freezing index, the anticipated mean annual frost penetration depth is 36 inches.

We recommend a minimum total section thickness of 18 inches for pavement in unheated areas. We further recommend that the pavement section consist of the following materials:

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Table 5: Pavement Section Thicknesses

MATERIAL	THICKNESS (in)	SPECIFICATION
Asphalt Surface Course	1	MDOT 703.09 Type 9.5 mm or Type 12.5 mm
Asphalt Binder Course	2	MDOT 703.09 Type 19 mm
Base Soil	3	MDOT 703.06 Type A
Subbase Soil	12	MDOT 703.06 Type D

The Subbase soil thickness can be reduced to 6" if the area is continuously heated. For portions of the pavement subjected to light traffic loads of cars and light trucks we recommend MDOT Type 9.5mm surface course. The following specifications are for MDOT base and subbase gravel:

Table 6: Pavement Base and Subbase Gradations

SIEVE SIZE	Percent Passing a 3-inch Sieve	
	MDOT Type A (Base)	MDOT Type D (Subbase)
3 Inch	100	100
2 Inch	100	--
½ Inch	45 – 70	35 – 80
¼ Inch	30 – 55	25 – 65
No. 40	0 – 20	0 – 30
No. 200	0 – 6	0 – 7

Reference: MDOT Specification 703.06, Aggregate for Base and Subbase (2014)

The recommendations above can be used for exterior pavement areas.

6.0 Retaining Wall Design Recommendations

The following table presents soil parameters to be used in the structural design of the shoring systems and the foundation retaining walls:

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Table 7: Retaining Wall Design Parameters

GEOTECHNICAL PARAMETERS – RETAINING WALL DESIGN				
PARAMETER	**EXISTING FILL**	**GLACIAL TILL**	**[1]STRUCTURAL FILL**	**[1]FOUNDATION BACKFILL**
Elevation Top	*Ground Surf.*	*74.0 ft.*	*N/A*	*N/A*
Elevation Bottom	*74.0 ft.*	*54.0 ft.*	*N/A*	*N/A*
Total Unit Weight (γ_t)	125 pcf	130 pcf	135 pcf	130 pcf
Submerged Unit Weight (γ_B)	63 pcf	68 pcf	73 pcf	68 pcf
Effective Friction Angle (ϕ')	32°	36°	34°	32°
Cohesion (c)	0 psf	0 psf	0 psf	0 psf
Interface Friction Angle (δ), Precast Conc.	17°	22°	24°	22°
Interface Friction Angle (δ), C.I.P. Conc.	20°	26°	28°	26°
Interface Friction Angle (δ), Wood	19°	24°	25°	24°
Interface Friction Angle (δ), Steel	20°	22°	24°	20°
Adhesion (c_a)	0 psf	0 psf	0 psf	0 psf

[1]**Note:** Soil Parameters for Structural Fill and Foundation Backfill assume that the fill is placed in 12" maximum lifts and compacted to 95% of the dry density in accordance with ASTM D1557

Active and passive earth pressures can be calculated based on the above soil properties and the corresponding backslope/toeslope angles behind and in front of the walls. Earth pressures can be calculated using the Rankine or the Coulomb theories, whichever the designer feels is more appropriate. The Rankine theory will provide a more conservative coefficient that the Coulomb theory (wall batter and soil-wall interface friction are ignored using Rankine). Equivalent fluid pressure on the foundation walls can be computed by multiplying the applicable earth pressure coefficient by the soil unit weight.

Active earth pressure can be used for computing soil load on walls which are designed to anticipate a horizontal deflection of the following magnitude:

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Table 8: Required Deflections for Active Earth Pressure Design

RETAINED SOIL	REQUIRED DEFLECTION (% of Total Height)
Native Glacial Till	0.10% of total wall height
Structural Fill	0.20% of total wall height
Existing Fill	0.20% of total wall height
Foundation Backfill	0.20% of total wall height

If the proposed retaining wall is restricted against horizontal deflection or is not designed to accommodate the deflections in the table above, at-rest earth pressure should be used in the wall design. We anticipate that the shoring system design will use at-rest earth pressures (to limit soil movement) if the existing foundation is not underpinned.

7.0 Earthwork Considerations

The table below summarizes the OSHA general excavation guidelines for occupied excavations for the soils encountered in our geotechnical explorations.

Table 9: OSHA Permissible Slopes

OSHA Excavation Slopes		
Soil	**OSHA Classification**	**Permissible Slope**
Existing Fill & Glacial Till	Type C	1.5H:1V

Any excavations greater than 20 feet should be designed by a qualified Maine Licensed Professional Engineer.

It is possible that the native glacial till will meet the gradation requirements for Foundation Backfill (FB). If it is desired to reuse the glacial till as FB, representative samples of the excavated soil should be obtained and a grain size analyses should be performed to check its conformance to the FB specification provided in this report. We anticipate that the glacial till will not be able to be used as Structural Fill.

Surface water should be redirected from excavation areas. Where softened, we recommend the subgrade at the base of the excavation be over-excavated and replaced with a minimum of 12 inches of Crushed Stone. Crushed Stone should be should be tamped to lock the stone structure together. Crushed Stone should meet the following gradation specification:

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Table 10: 3/4" Crushed Stone Gradation

CRUSHED STONE ¾ INCH	
Sieve Size	**Percent finer**
1 inch	100
¾ inch	90 to 100
½ inch	20 to 55
⅜ inch	0 to 15
No. 4	0 to 5

Reference: MDOT Specification 703.13, Crushed Stone ¾-Inch (2014)

In general, we anticipate that groundwater will enter the deeper excavations. Dewatering may consist of shallow sumps at the base of the excavation. Diversion and control of surface water should be performed to prevent water flow from rain or snowmelt from entering the excavations. Consideration should be given to where sump pump outlets are located to prevent flooding of the site or adjacent site.

We recommend that a qualified geotechnical consultant be retained to monitor and test soil materials used during construction and confirm that soil conditions and construction methods are consistent with this report.

8.0 Closure

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions or the proposed development differ from those described in this report, SGS should be notified so that we can re-evaluate our recommendations.

We highly recommend that all retaining wall designs be made available to SGS for review in order to verify that the design conditions are consist with the recommendations provided in this report.

The recommendations provided within this geotechnical report are based upon the previous explorations performed by SGS at the site and are contingent upon a site visit during construction to observe the existing subgrade conditions prior to placing concrete formwork.

It is recommended that this report be made available in its entirety to contractors for informational purposes and be incorporated in the construction Contract Documents. We

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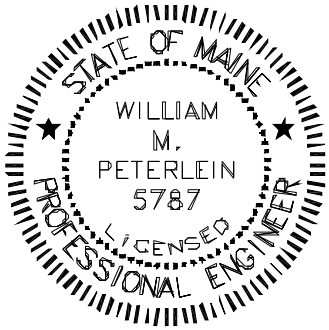
recommend that SGS be retained to review final construction documents relevant to the recommendations in this report.

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,

Mathew Hardison, EI
Geotechnical Engineer



William M. Peterlein, PE
President & Principal Engineer

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APPENDIX A

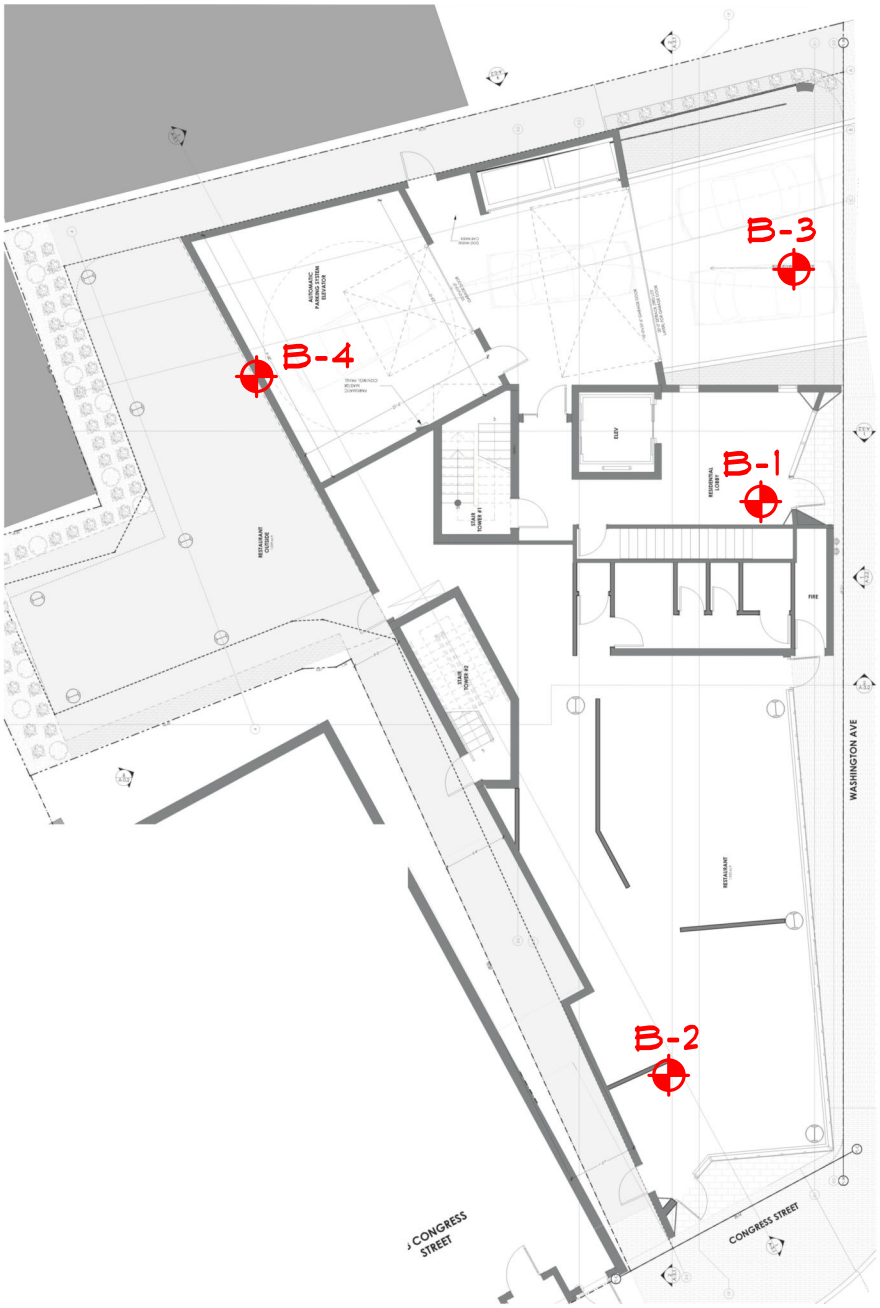
BORING LOCATION PLAN

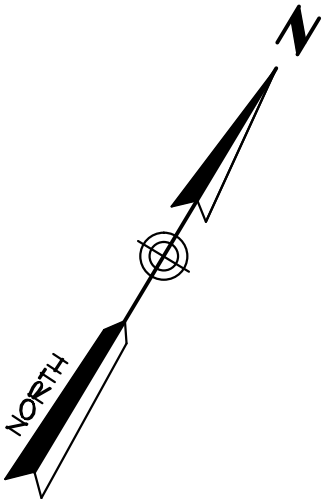
LEGEND

B-1 SUMMIT TEST BORING (JANUARY 2, 2009)

PLAN REFERENCE

"FIRST FLOOR PLAN, 221 CONGRESS STREET", DATED MARCH 28, 2017, PREPARED BY CALEB JOHNSON ARCHITECTS & BUILDERS.





TEST BORING LOCATION PLAN
PROPOSED APARTMENT BUILDING

221 CONGRESS STREET - PORTLAND, MAINE

PREPARED FOR

CALEB JOHNSON ARCHITECTS + BUILDERS

DATE: 6-22-2017	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 16231	SCALE: 1" = 20'	FILE: 16231 BOR

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APPENDIX B

BORING LOGS

SUMMIT GEOENGINEERING SERVICES 640 Main Street Lewiston, Maine 04240	SOIL BORING LOG Project: Bingas Wingas Restaurant 6 Washington Avenue Portland, Maine	Boring #: B-1 Project #: 17443 Sheet: 1 of 1 Prep by: WMP

Drilling Co:	Northern Test Borings	Ground Elevation:	81 ft +/-
Foreman:	M. Nadeau	Reference:	Site Plan prepared by Associated Design Partners
Summit:	B. Peterlein, P.E.	Date started: 1/2/2009	Date Comp: 1/2/2009

DRILLING METHOD		SAMPLER	
Vehicle:	Trailer	Type:	24" SS
Model:	Deidrich D50	Hammer:	140 lb
Method:	2-1/2" H.S.A.	Fall:	30"

GROUND WATER DEPTH			
Date	Depth	Elevation	Comments
1/2/2009	15 ft	66 ft +/-	Wet sample

Depth (ft.)	SAMPLE DATA No.	Pen/Rec (in.)	Depth (ft)	Blows	ENGINEERING DESCRIPTION	GEOLOGIC DESCRIPTION
	S-1	24/18	0 to 2	17	2-1/2' Pavement	
1				7	Dark brown Silty SAND mixed with brick,	FILL
				9	ashes, compact, moist, SM	
2				9		
	S-2	24/20	2 to 4	4		
3				3		
				5		
4				12	Brown SAND, little Gravel, compact,	GLACIAL TILL
					moist to damp, SP	
5						
	S-3	24/20	5 to 7	9	Brown SAND, trace to little Gravel,	
6				15	compact, moist to damp, SP	
				15		
7				19		
8						
9						
10						
	S-4	24/24	10 to 12	4	Same as S-3	
11				4		
				5		
12				8		
13						
14						
15						
	S-5	24/24	15 to 17	5	Same as S-3, wet	
16				5		
				9		
17				11		
18						
19						
20						
	S-6	24/24	20 to 22	7	Brown fine SAND, trace to little Silt,	
21				7	compact, wet, SP or SM	
				7		
22				10		
23						
24						
25						
	S-7	24/24	25 to 27	6	Same as S-6	
26				5		
				4		
27				6		
					End of Boring at 27 ft	

SUMMIT GEOENGINEERING SERVICES 640 Main Street Lewiston, Maine 04240	SOIL BORING LOG Project: Bingas Wingas Restaurant 6 Washington Avenue Portland, Maine	Boring #: B-2 Project #: 17443 Sheet: 1 of 1 Prep by: WMP

Drilling Co:	Northern Test Borings	Ground Elevation:	81 ft +/-
Foreman:	M. Nadeau	Reference:	Site Plan prepared by Associated Design Partners
Summit:	B. Peterlein, P.E.	Date started: 1/2/2009	Date Comp: 1/2/2009

DRILLING METHOD		SAMPLER	
Vehicle:	Trailer	Type:	24" SS
Model:	Deidrich D50	Hammer:	140 lb
Method:	2-1/2" H.S.A.	Fall:	30"

GROUND WATER DEPTH			
Date	Depth	Elevation	Comments
1/2/2009	20 ft	61 ft +/-	Wet sample

Depth (ft.)	SAMPLE DATA No.	Pen/Rec (in.)	Depth (ft)	Blows	ENGINEERING DESCRIPTION	GEOLOGIC DESCRIPTION
	S-1	24/24	0 to 2	34	2-1/2' Pavement	
1				14	Brown SAND, little Gravel, compact,	FILL
				9	dry, SP	
2				6		
	S-2	24/20	2 to 4	3	Brown to dark brown SAND, little Silt,	
3				3	trace Gravel, trace brick pieces, ashes,	
				4	moist, SM	
4				4		
5						
	S-3	24/18	5 to 7	3	Same as S-2	
6				3		
				3		
7				3		
					Tannish-brown SAND, trace to little Silt	GLACIAL TILL
8					loose, moist, SP	
9						
10						
	S-4	24/18	10 to 12	3	Brown SAND, trace to little Gravel,	
11				4	clean, loose, dry, SP	
				4		
12				6		
13						
14						
15						
	S-5	24/24	15 to 17	9	Same as S-4	
16				9		
				10		
17				12		
18						
19						
20						
	S-6	24/20	20 to 22	5	Brown medium to fine SAND, trace Silt,	
21				5	loose, wet, SP	
				4		
22				8		
23						
24						
25						
	S-7	24/24	25 to 27	4	Same as S-6	
26				5		
				3		
27				2		
					End of Boring at 27 ft	

SUMMIT GEOENGINEERING SERVICES 640 Main Street Lewiston, Maine 04240	SOIL BORING LOG Project: Bingas Wingas Restaurant 6 Washington Avenue Portland, Maine	Boring #: B-3 Project #: 17443 Sheet: 1 of 1 Prep by: WMP

Drilling Co:	Northern Test Borings	Ground Elevation:	81 ft +/-
Foreman:	M. Nadeau	Reference:	Site Plan prepared by Associated Design Partners
Summit:	B. Peterlein, P.E.	Date started: 1/2/2009	Date Comp: 1/2/2009

DRILLING METHOD		SAMPLER	
Vehicle:	Trailer	Type:	24" SS
Model:	Deidrich D50	Hammer:	140 lb
Method:	2-1/2" H.S.A.	Fall:	30"

GROUND WATER DEPTH			
Date	Depth	Elevation	Comments
1/2/2009	15 ft	66 ft +/-	Wet sample

Depth (ft.)	SAMPLE DATA No.	Pen/Rec (in.)	Depth (ft)	Blows	ENGINEERING DESCRIPTION	GEOLOGIC DESCRIPTION
	S-1	24/6	0 to 2	14	2-1/4" Pavement	
1				9	Dark brown Silty SAND, chunks of brick,	FILL
				3	ashes, loose, dry, SM	
2				3		
	S-2	24/6	2 to 4	1		
3				1		
				1		
4				1		
5						
	S-3	24/18	5 to 7	2	wood layer	
6				1		
				1/2	loose soil?	
7				1/2		
	S-4	24/16	7 to 9	1		
8				5		
				6	Brown fine to medium SAND, trace Silt,	GLACIAL TILL
9				7	moist, compact, SP	
10						
	S-5	24/16	10 to 12	7	Brown SAND, clean, compact, moist,	
11				8	SP	
				8		
12				8		
13						
14						
15						
	S-6	24/18	15 to 17	5	Same as S-5, wet	Gravel = 1.2%
16				5		Sand = 95.0%
				6		Silt = 3.8%
17				7		
18						
19						
20						
	S-7	24/24	20 to 22	7	Brown medium to fine SAND, trace to	Gravel = 0.0%
21				9	little Silt, compact, wet, SP	Sand = 84.0%
				11		Silt = 16.0%
22				13		
23						
24						
25						
	S-8	24/24	25 to 27	8	Same as S-7	
26				9		
				11		
27				12		
					End of Boring at 27 ft	

SUMMIT GEOENGINEERING SERVICES 640 Main Street Lewiston, Maine 04240	SOIL BORING LOG Project: Bingas Wingas Restaurant 6 Washington Avenue Portland, Maine	Boring #: B-4 Project #: 17443 Sheet: 1 of 1 Prep by: WMP

Drilling Co:	Northern Test Borings	Ground Elevation:	81 ft +/-
Foreman:	M. Nadeau	Reference:	Site Plan prepared by Associated Design Partners
Summit:	B. Peterlein, P.E.	Date started: 1/2/2009	Date Comp: 1/2/2009

DRILLING METHOD		SAMPLER	
Vehicle:	Trailer	Type:	24" SS
Model:	Deidrich D50	Hammer:	140 lb
Method:	2-1/2" H.S.A.	Fall:	30"

GROUND WATER DEPTH			
Date	Depth	Elevation	Comments
1/2/2009	16.5 ft	64.5 ft +/-	Wet sample

Depth (ft.)	SAMPLE DATA No.	Pen/Rec (in.)	Depth (ft)	Blows	ENGINEERING DESCRIPTION	GEOLOGIC DESCRIPTION
	S-1	24/12	0 to 2	5	Gray to black fine SAND mixed with ashes,	
1				5	brick, glass, compact, SM	FILL
				6		
2				8		
	S-2	24/12	2 to 4	4		
3				4		
				4		
4				2	Brown SAND, trace Silt, loose, dry, SP	
5						
	S-3	24/12	5 to 7	1		
6				1	Reddish brown SAND, trace to little	
				11	Gravel, trace Silt, moist, SM	
7				16		
	S-4	24/12	7 to 9	11		
8				13	Brown SAND, clean, compact, moist, SP	GLACIAL TILL
				17		
9				17		
10						
	S-5	24/20	10 to 12	10	Same as S-4	
11				10		
				13		
12				14		
13						
14						
15						
	S-6	24/24	15 to 17	5	Same as S-4	
16				7		
				9		
17				11		
					Gray fine SAND, trace Silt, non-plastic,	
18					compact, wet, SM	
19						
20						
	S-7	24/18	20 to 22	1	Same as S-6	
21				4		
				3		
22				5		
23						
24						
25						
	S-8	24/24	25 to 27	4	Same as S-6	
26				5		
				6		
27				7		
					End of Boring at 27 ft	

APPENDIX C

LABORATORY TEST RESULTS

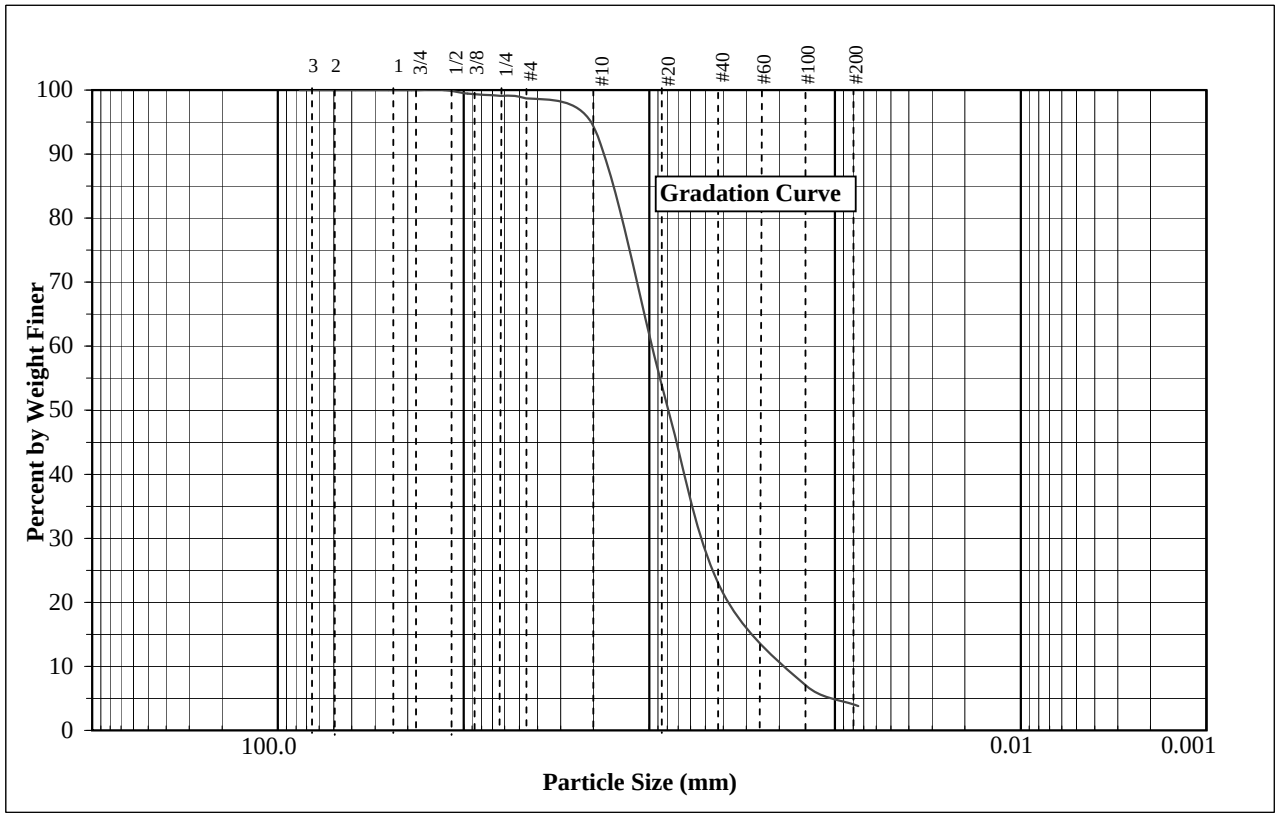
SUMMIT GEOENGINEERING SERVICES
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Bingas Wingas, Washington Street, Portland	PROJ #:	17449
CLIENT:	Bingas Wingas	SAMPLE:	S1
SOIL DESCRIP:		DATE:	1/6/09
INTENDED USE:	Investigation	SOURCE:	Boring B-3, 15'-17'
SPECIFICATION:		TECH:	F. Clark

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	99.5
6.35	(1/4 in)	99.1
4.75	(No. 4)	98.8
2.00	(No. 10)	94.4
0.85	(No. 20)	53.5
0.43	(No. 40)	22.9
0.15	(No. 100)	7.5
0.08	(No. 200)	3.8



REMARKS:

Reviewed: Darrell A. Gilman, CMT Manager
Sent: 1/6/08

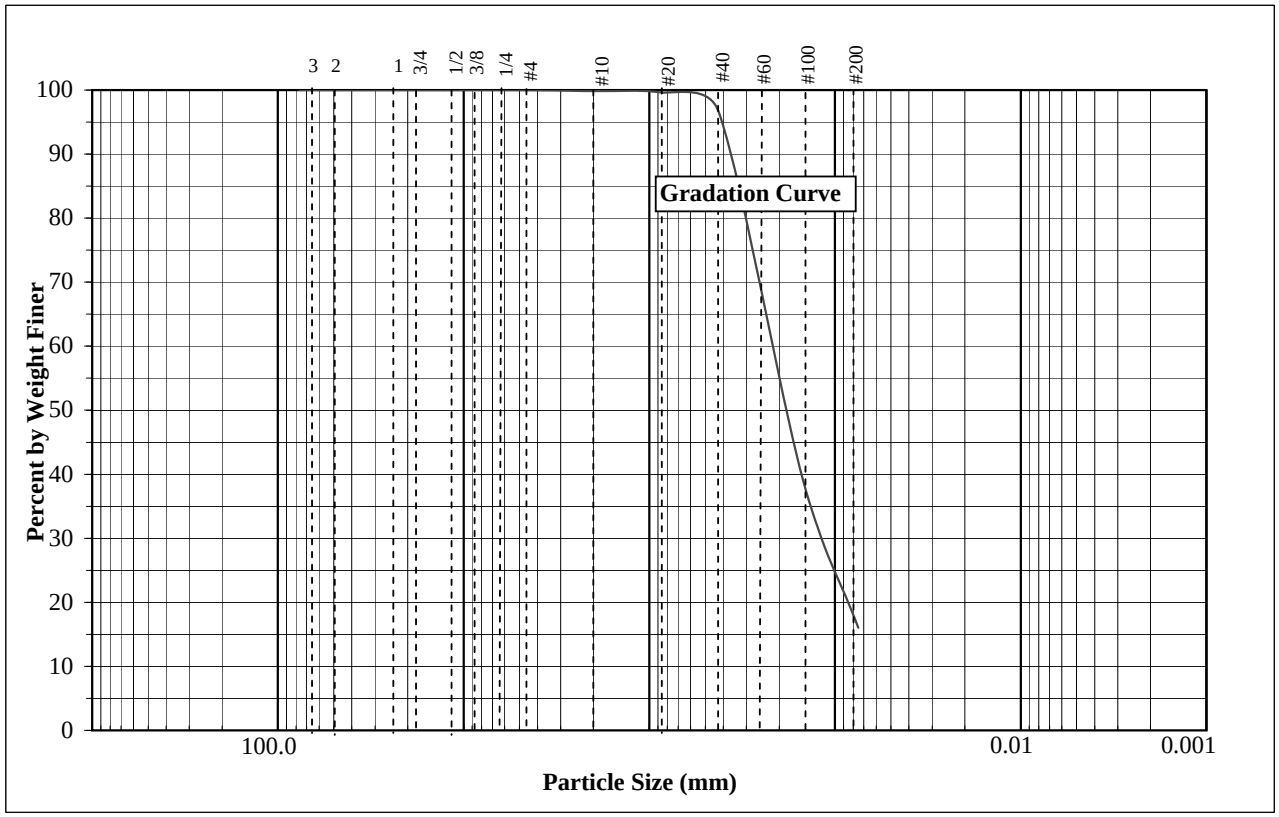
SUMMIT GEOENGINEERING SERVICES
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Bingas Wingas, Washington St. Portland	PROJ #:	17449
CLIENT:	Bingas Wingas	SAMPLE:	S2
SOIL DESCRIP:		DATE:	1/6/09
INTENDED USE:	Investigation	SOURCE:	Boring B-3, 20'-22'
SPECIFICATION:		TECH:	F. Clark

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	99.9
0.85	(No. 20)	99.6
0.43	(No. 40)	96.7
0.15	(No. 100)	39.5
0.08	(No. 200)	16.0



REMARKS:

Reviewed: Darrell A. Gilman, CMT Manager
Sent: 1/7/08