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Geotechnical Report

Proposed Wex Building

Corner of Hancock & Thames Street, Portland, Maine

Client
Archetype, PA
Union Wharf
Portland, Maine 04101

SUMMIT
GEOENGINEERING SERVICES

Project #: 17181
Date: 7/20/17

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July 20, 2017
Summit #17181

Attn: Bill Hopkins
Archetype, PA
Union Wharf
Portland, Maine 04101

Reference: Geotechnical Engineering Services – Proposed Wex Building
Corner of Hancock & Thames Street, Portland, Maine

Dear Bill;

Summit Geoengineering Services, Inc. (SGS) has completed a geotechnical investigation for the proposed construction at the site referenced above. Our scope of services included the drilling of 2 test borings and 2 cone penetration tests (CPT), laboratory testing of collected samples, and preparing this geotechnical report summarizing our findings and providing geotechnical recommendations.

Our scope of services for this project did not include an environmental site assessment or further investigation for the presence or absence of hazardous or toxic material on, below, or around the site. Any statements in this report, or on the soil boring logs, regarding odors or unusual and suspicious conditions observed are for informational purposes and are not intended to constitute an environmental assessment.

1.0 Project and Site Description

We understand that the project consists of the construction of a new building at the corner of Hancock and Thames Street in Portland, Maine. We further understand that the building will be a three story structure with an approximate footprint of 30,000 square feet. There will be a fourth story constructed on the portion of the building adjacent to Hancock Street totaling approximately 10,000 square feet of the 30,000 total. There will be a roof deck on the 3-story portion of the building.

The site of the proposed development is located at the corner of Hancock Street and Thames Street in Portland, Maine. The site is northeast of the AC Hotel currently being constructed and southwest of the Hamilton Marine building. The site is currently used as a parking lot. Existing grades are relatively flat throughout the proposed development area, ranging from

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approximately elevation 14 feet to 15 feet, based on the City of Portland GIS contours. At the time of preparing this report, a proposed grading plan was not available.

Anticipated structural loads were provided to us by Veitas & Veitas Engineers, Inc. (V&V) for the proposed building. Based on these loads and a preliminary foundation plan prepared by V&V, we understand that isolated column loads are anticipated to range from 125 kips to 405 kips. Dead load accounts for approximately 50% to 60% of the total load. At the time of preparing this report, uplift and lateral loads were not available to SGS.

2.0 Subsurface Exploration and Laboratory Testing

2.1 Subsurface Explorations

Summit Geoengineering Services (SGS) observed the subsurface conditions with the drilling of 2 borings (B-1 and B-2) and 2 cone penetration tests (CPT-1 and CPT-2) on June 8, 2017 using a rubber track mounted Power Probe 9500 VTR. Both borings and CPT-2 were advanced to refusal (probable bedrock), ranging in depth from 59.0 feet to 65.5 feet. CPT-1 was advanced to a depth of 5.5 feet, where refusal was encountered on rubble/debris. CPT-1 was offset and multiple probes were advanced in this location, all of which encountered refusal on rubble/debris at depths ranging from 4.0 feet to 7.5 feet.

Borings were advanced using 3-inch direct push steel casing. Soils were visually classified (*ASTM D2488*) using SPT split spoon sampling (*ASTM D1586*) and thin wall tube sampling (*ASTM D1587*). Field vane shear tests (*ASTM D2573*) were attempted in Boring B-2, but the vane was unable to be advanced due to likely sand seams.

Two cone penetration tests (ASTM D5778) were performed using a 5-ton digital cone anchored using a dual driven anchor system. Parameters obtained include cone resistance (q_c), sleeve friction (f_s), and piezocone pore pressure (u). Shear wave velocity (ASTM D7400) was performed in CPT-2. CPT-1 encountered refusal on rubble/debris at a depth of 5.5 feet.

The boring and CPT explorations were approximately located by SGS by taping and pacing from existing site features. The exploration locations are shown on the Exploration Location Plan in Appendix A. Logs of the explorations are provided in Appendix B.

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2.2 Laboratory Testing

Laboratory testing was performed on specimens of clay obtained from a thin wall tube sample (UT-1) of the marine clay from Boring B-2 at a depth of 25 to 27.5 feet below ground surface. Testing consisted of Atterberg Limits (*ASTM D4318*), one-dimensional consolidation test (*ASTM D2435)*, and moisture contents (*ASTM D2216*). The results from the testing of tube UT-1 is summarized below:

Glacial Marine Clay (Boring B-2, UT-1: 25-27.5 ft)
Liquid Limit: 29, Plasticity Index: 8
Moisture Content: 27.9% to 36.1%
Laboratory Torvane (S_u): 360 psf

Results of these tests and the consolidation curve can be found in Appendix C.

3.0 Subsurface Conditions

3.1 Soil

The following subsurface layers and thicknesses were encountered in our geotechnical investigation, starting from the ground surface:

- ***Pavement,*** 10 inches (B-1 only)
- ***Fill,*** 18.2 feet to 20.0 feet
- ***Glacial Marine (Sand),*** 5.0 feet to 7.0 feet
- ***Glacial Marine (Clay),*** 31 feet to 39 feet
- ***Glacial Till,*** 1.0 to 3.0 feet, (absent in B-1)
- ***Bedrock (refusal depth),*** 59.6 feet depth to 65.5 feet depth

The ***Pavement*** was only encountered in Boring B-1 and is 10 inches thick and in poor condition. The ground surface at the site is either gravel or pavement.

The ***Fill*** was encountered in all of the explorations, starting either beneath the pavement or at the ground surface and ranges in thickness from 18.2 to 20.0 feet. The fill recovered from Borings B-1 and B-2 is fine to coarse sand with little to some gravel and trace to little silt with occasional asphalt pieces near the surface of B-1. The fill observed in the southern corner of the site includes frequent brick pieces and buried rubble. The explorations in this corner of the site could not penetrate through the rubble fill.

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Standard Penetration Number (SPT-N) of the fill ranges from 1 to 19 with an average of 12 blows per foot (bpf). We anticipate that the SPT-N value of 1 was due to groundwater pressure loosening the fill soil once the casing plug was removed at that dept. In general, the fill is loose to compact, dry to wet (increasing moisture with depth) and classifies as SP or SP-SM in accordance with the Unified Soil Classification System. Based on our review of historic Sanborn maps made available to us, it appears that the site previously included a trainyard, passenger station, lumber yard, and a store. It is possible that the foundation of the passenger station was encountered in the southern corner of the site which caused the shallow refusal.

The ***Glacial Marine (Sand)*** deposit begins at a depth ranging from 19 feet to 20 feet below ground surface and extends to depths ranging from 24 to 26 feet. The glacial marine sand is described as gray silty fine sand or silt with trace clay and sand. It is loose/soft, wet, and contains trace shell fragments and wood pieces at the B-2 location. SPT-N ranges from 4 to 7 and averages 5 blows per foot (bpf). Pocket Penetrometer measurements (an estimate of unconfined compressive strength) range from 1,000 psf to 5,500 psf. The glacial marine sand visually classifies as SM or ML in general accordance with USCS.

The ***Glacial Marine (Clay)*** deposit begins at a depth ranging from 24 feet to 26 feet below ground surface and extends to depths ranging from 56 to 65.5 feet, terminating on glacial till or bedrock. This soil is described as wet, very soft gray silty clay. Occasional sand and silt seams are present throught the deposit, and increase in frequency within the lower 5 to 10 feet of the deposit. Moisture contents ranged from 27.9% to 36.1% and averages 31.9%. Atterberg Limit testing resulted in a Liquid Limit of 29 and a Plasticity Index of 8. The glacial marine (clay) deposit classifies as CL in accordance with the USCS.

Interpretation of the consolidation test on sample UT-1 from Boring B-2 and the CPT results indicates that the clay is nearly normally consolidated. We anticipate that applied stresses exceeding 300 to 400 psf will exceed the preconsolidation pressure of the clay. This was calculated with an approximate OCR value of 1.2 at this depth.

The ***Glacial Till*** was encountered in B-2 and CPT-2 starting at depths ranging from 56 to 58 feet and extends to bedrock. Samples of the glacial till were not collected, however Soil Behavior Type (SBT) classification using the tip resistance and sleeve friction meausrements in the CPT tests indicate the glacial till consists of a medium dense clean to silty sand.

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3.2 Groundwater

On the day of the explorations, groundwater was encountered at depths ranging from 8.4 feet to 10.0 feet below ground surface. In general, groundwater appears to fluctuate within the fill layer. Table 1 presents the depth and approximate elevation of the groundwater measured on the days of the explorations.

Table 1: Groundwater Depths and Approx. Elevations

GROUNDWATER DEPTHS and ELEVATIONS		
Exploration	**Depth (ft.)**	**Approximate Elevation (ft.)**
B-1	10.0’	5.0’ +/-
B-2	8.4’	6.1’ +/-
CPT-1	NE	NE
CPT-2	8.0’	6.0’ +/-

Note: 1) All elevations are approximate and were interpolated from the City of Portland GIS
2) NE = none encountered

3.3 Bedrock

Bedrock was encountered at the depths and approximate elevations shown in Table 2. According to the Maine Geological Survey, bedrock at the site is of the Precambrian Z Spring Point Formation consisting of green schist and amphibolites facies ranging from and mafic to felsic volcanic rock.

Table 2: Bedrock Depths and Approx. Elevations

BEDROCK DEPTHS and ELEVATIONS		
Exploration	**Depth (ft.)**	**Approximate Elevation (ft.)**
B-1	65.5’	-50.5’ +/-
B-2	59.0’	-44.5’ +/-
CPT-2	59.6’	-45.6’ +/-

Note: 1) All elevations are approximate and were interpolated from the City of Portland GIS

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4.0 Geotechnical Evaluation

We have identified the following geotechnical considerations in regard to the construction of the proposed foundation:

- Potential for excessive total and differential settlements of footings constructed on loose, existing fill.
- Potential for excessive total and differential settlements of footings which apply load to the underlying clay deposit.
- Presence of rubble and debris within the existing fill.

Based on discussions with the design team, we understand that the desired settlement limitations for the proposed structure are 1.0" of total settlement and 0.5" of differential settlement between two adjacent columns. Given these settlement magnitude limitations and the structural loads from V&V, the feasibility of various foundation types were evaluated for construction of the new building. This included shallow foundations, intermediate foundations/ground improvement, and deep foundations. We did not investigate the option of preloading the site due to the time restraint of the project schedule and the existing use of the lot as a parking area.

Our analysis assumes that fill placed within the building footprint does not exceed 2 to 3 feet. SGS should be notified if the proposed FFE is any more than 3 feet above existing grade.

4.1 Shallow Foundations

4.1.1 Frost Wall and Continuous Strip Footings with Isolated Column Footings.

A settlement analysis of the existing fill was performed using assumed allowable bearing pressures and column loads to compute the footing dimensions. The results of this analysis suggest that long-term settlement due to footing loads will be on the order of 1.3" to 1.9". Based on discussions with the design team, we understand that this magnitude of settlement is unacceptable for the new building construction.

4.1.2 Structural Mat

Assuming a design bearing pressure of 800 psf to 1,000 psf for the structural mat, settlement magnitudes were estimated to be on the order of 1.5" to 3.0" for the total settlement of the existing fill and clay soil. We believe that this settlement magnitude is unacceptable for the new building construction. We also understand that the cost of a structural mat is likely greater than alternative options.

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4.2 Intermediate Foundations/Ground Improvement:

4.2.1 Stone Columns

The use of Stone Columns (SC) is a form of ground improvement which involves the installation of crushed stone columns into the existing fill to stiffen the soil matrix beneath foundation elements and reduce settlement magnitudes. SC elements can also increase the allowable bearing capacity of existing soils. SCs are installed using replacement or displacement methods and involve the installation of controlled, compacted lifts of stone to force the stone laterally into the surrounding soils. Building foundations constructed on SC improved soils can typically be built as conventional foundations without any load transfer platforms, grade beams, or other load transfer mechanisms.

We anticipate that SC will be a feasible option for the proposed foundation. Based on our preliminary computations, settlements can be limited to 1.0" within the fill soil using engineering properties of soil improved with SCs. SC should be constructed as "floating columns" above the clay deposit and should be designed to limit or prevent foundation loads from reaching the clay deposit.

4.2.2 Grouted Stone Columns or Rigid Inclusions

Grouted Stone Columns (GSC) or Rigid Inclusion Piles (RIP) is a ground improvement technique which involves the installation of rigid pier elements extending to hard bearing strata. In this method, the rigid elements are designed to support the entire building load (bypass the existing fill and clay) and generally require a load transfer platform to transfer the load from the foundation to the rigid elements. We anticipate that GSC or RIP elements would need to extend to the glacial till/bedrock layer at a depth of approximately 55 to 65 feet below existing grade. Additionally, we anticipate a load transfer platform would also be required for the installation of this type of ground improvement. While this is an option for the proposed building, we anticipate it will be more expensive than stone columns.

4.3 Deep Foundations:

4.3.1 Timber Piles

Typically, timber piles are only feasible for sites where the refusal depth or pile termination depth is less than 50 feet. We anticipate that timber piles are not feasible at this site.

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4.3.2 Steel H-Piles or Pipe Piles

Utilizing steel H-piles or pipe piles for construction of the new foundation will eliminate the settlement of the fill and clay by transferring the foundation loads directly to bedrock. However, we anticipate that the cost of steel piles driven to refusal will exceed that of intermediate foundation/ground improvement.

5.0 Geotechnical Recommendations

5.1 Ground Improvement

Given the evaluations stated above we recommend that ground improvement, consisting of stone columns, be used to improve the site soils and provide adequate bearing for the proposed building foundation footings. We recommend that stone columns be designed to terminate in the upper fill or glacial marine (sand) deposit above the clay. Stone columns should be designed to limit all foundation loads to the underlying clay deposit in order to minimize foundation settlements.

As discussed in Section 5.2 below, the stone column system should be designed to meet the following criteria:

- Maximum Allowable Bearing Pressure: 5,000 psf
- Maximum Total Long-Term Settlement: 1.0 inches
- Maximum Differential Long-Term Settlement: 0.5 inches between adjacent columns

Based on preliminary stone column calculations, we estimate that an area replacement ratio of 25% or higher may be required to obtain the allowable bearing pressure of 5,000 psf. The working pad from which the stone columns are installed should be the elevation of the bottom of the 12” slab subgrade (1.0 feet below bottom of slab). Imported fill within the project area should be minimal. All fill placed within the proposed building footprint should consist of Structural Fill (SF, see Section 5.6). Fill outside of the building footprint can consist of SF or Gravel Borrow (GB). The portion of GB passing the 3” sieve size should meet the following gradation requirements:

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Table 3: Gravel Borrow Gradation

GRAVEL BORROW (GB)	
Sieve Size	**Percent finer**
¼ inch	0 to 70
No. 200	0 to 10.0

Reference: MDOT Specification 703.19, Gravel Borrow

The maximum GB particle size should be limited to 6 inches. GB 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.

Assuming that the subgrade preparation recommendations contained herein are followed, the proposed slab can be constructed as a slab-on-grade on the existing proofrolled fill without the need for stone columns.

Pre-augering for stone column installation may be necessary in some parts of the proposed footprint, particularly in the southern corner where rubble/debris was encountered in the explorations. The stone column design should be performed and stamped by a qualified Maine Licensed Professional Engineer. Soil property assumptions are the responsibility of the stone column designer. Summit Geoengineering Services (SGS) should be provided an opportunity to review the Stone Column design submittal package.

If an alternative foundation type besides stone columns is selected for this site, SGS should be notified so that we can evaluate the alternatives.

5.2 Foundation Bearing Pressure

Assuming that the recommendations below are followed, we recommend an allowable bearing pressure of 5,000 psf be used to proportion the footings for the new building constructed on the improved existing fill. The stone column system should be designed to limit the total footing settlement to 1.0” and differential settlement between adjacent footings to 0.5”.

- Prior to footing excavations, the entire building footprint should be proofrolled with a minimum of 12 passes (6 north/south and 6 east/west) with a 10 ton minimum operating weight vibratory roller.
- All footings exposed to freezing temperatures are constructed at the recommended frost protection depth of 4.0 feet below exterior finish grade. Interior footings

should be constructed at a minimum depth of 2.0 feet below finish floor elevation (FFE).

- If soft or unsuitable fill is encountered during proofrolling, it should be removed and replaced with ¾" crushed stone or compacted Structural Fill. If a significant amount of soft/unsuitable soils are encountered, SGS should be notified.
- All placed fill within the building footprint consists of Structural Fill (SF, see Section 5.6 for gradation and compaction requirement) or ¾" crushed stone.

Any subgrade improvements required beneath footings (proofrolling, over-excavation and replacement, etc.) should be provided by the Stone Column designer and reviewed by Summit Geoengineering Services.

5.3 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 at a depth of 2.0 feet below interior grade.

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 4: 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.

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5.4 Seismic Design

Based on the summary of field results we recommend Site Class D be used in accordance with the 2006 or 2009 International Building Code. The following seismic site coefficients should be used:

Table 5: Seismic Design Parameters

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS – 2006/2009 IBC	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.311
1 second spectral response (S_1)	0.077
Maximum short period spectral response (S_{MS})	0.485
Maximum 1 second spectral response (S_{M1})	0.184
Design short period spectral response (S_{DS})	0.324
Design 1 second spectral response (S_{D1})	0.123

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

5.5 Groundwater Control

Based on observed groundwater levels, groundwater is anticipated below exterior foundation depths. However, seasonal perched water may be present during wet periods or from runoff and snowmelt. Based on this we recommend perimeter underdrains be installed along the exterior foundation walls. In addition, we recommend exterior grades slope away from the building footprint to reduce runoff water from infiltrating the foundation backfill soils.

Perimeter underdrains should consist of 4 inch rigid perforated PVC placed adjacent to the exterior footings 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 underdrain pipe should be outlet to a location where it will be free flowing. If the grades do not allow a gravity outlet, a sump and pump would be required.

5.6 Slab-on-Grade

Existing fill or imported fill will be exposed in the slab excavation. We recommend that the slab for the building be constructed on a minimum of 12" of Structural Fill (SF) or ¾" Crushed Stone. As discussed in Section 5.2, the entire building footprint should be proofrolled with a minimum of 12 passes (6 north/south and 6 east/west) with a 10 ton minimum operating weight vibratory roller prior to excavating for the footings once the ground improvement elements are

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installed. Any soft, wet, or otherwise unsuitable soils exposed in the slab excavation or identified during proofrolling should be removed and replaced with compacted SF or ¾" Crushed Stone.

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

Table 6: Structural Fill 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 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.

For the conditions described above, the slab can be designed using a coefficient of subgrade reaction of 150 pci.

6.0 Pavement Recommendations

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 paved areas. We further recommend that the pavement section consist of the following materials:

Table 7: 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

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 8: 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)

7.0 Earthwork Considerations

The existing fill is classified as OSHA Type C soil. Based on this, general occupied excavations less than a depth of 20 feet are limited to a maximum side slope of 1.5 horizontal to 1 vertical in the existing fill and native sand soil. Excavations within the clay are not anticipated.

Rubble and debris was encountered in the southern corner of the proposed site, at the corner of Hancock and Thames Street. The extent of this rubble/debris is unknown, but it appears to consist of brick and possible concrete foundation elements. The site contractor and stone column installer should coordinate and be prepared to either pre-auger through this rubble/debris or have it removed prior to installing the columns. Any voids created upon removal of the rubble/debris should be backfill with Structural Fill compacted to a minimum of 95% of ASTM D1557.

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If a displacement-type of stone columns is used for ground improvement, some vibrations are anticipated during construction. The contractor should take the necessary precautions for monitoring vibrations and/or adjacent structures, if necessary based on the anticipated vibrations.

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

Table 9: 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 do not anticipate groundwater within footing excavations. If localized perched groundwater is encountered, 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.

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

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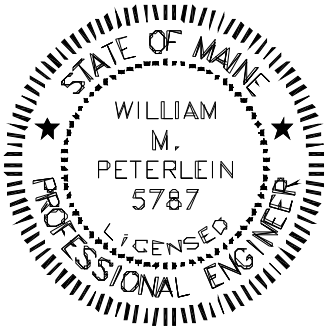
so that we can re-evaluate our recommendations. SGS should be provided an opportunity to review the Stone Column submittal package.

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 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

EXPLORATION LOCATION PLAN

LEGEND

- B-1 — SUMMIT TEST BORING (JUNE 8, 2017)
- CPT-2 — SUMMIT CONE PENETRATION TEST (JUNE 8, 2017)
- P-1 — SUMMIT TEST PROBE (JUNE 8, 2017)

PLAN REFERENCE

AERIAL IMAGE (2012) OBTAINED FROM MAINE OFFICE OF G.I.S.

EXPLORATION LOCATION PLAN
WEX BUILDING

HANCOCK & THAMES STREETS - PORTLAND, ME

PREPARED FOR

ARCHETYPE, PA

DATE: 7-5-2017	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 17181	SCALE: 1" = 60'	FILE: 17181 BOR

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APPENDIX B

EXPLORATION LOGS

EXPLORATION COVER SHEET

The exploration logs are prepared by the geotechnical engineer from both field and laboratory data. Soil descriptions are based upon the Unified Soil Classification System (USCS) per ASTM D2487 and/or ASTM D2488 as applicable. Supplemental descriptive terms for estimated particle percentage, color, density, moisture condition, and bedrock may also be included to further describe conditions.

Drilling and Sampling Symbols:

SS = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Shear Vane
PP = Pocket Penetrometer
RC = Rock Core Sample
FV = Field Vane Shear Test
PS = Concrete Punch Sample
Hyd = Hydraulic Advancement of Drilling Rods
Push = Direct Push of Drilling Rods
WOH = Weight of Hammer
WOR = Weight of Rod
PI = Plasticity Index
LL = Liquid Limit
W = Natural Water Content
USCS = Unified Soil Classification System
Su = Undrained Shear Strength
Su(r) = Remolded Shear Strength

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. Groundwater monitoring wells may be required to record accurate depths and fluctuation.

Gradation Description and Terminology:

Boulders:	Over 12 inches	Trace:	Less than 5%
Cobbles:	12 inches to 3 inches	Little:	5% to 15%
Gravel:	3 inches to No.4 sieve	Some:	15% to 30%
Sand:	No.4 to No. 200 sieve	Silty, Sandy, etc.:	Greater than 30%
Silt:	No. 200 sieve to 0.005 mm		
Clay:	less than 0.005 mm		

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		DENSITY OF GRANULAR SOILS	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 4	Very Loose
2 to 4	Soft	5 to 10	Loose
5 to 8	Firm	11 to 30	Compact
9 to 15	Stiff	31 to 50	Dense
16 to 30	Very Stiff	>50	Very Dense
>30	Hard		

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-1**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	1 of 2
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	15.0 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
6/8/2017	10.0 ft.	5.0 ft. +/-	Observed on soil samples

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
					14.2'	10" Pavement		PAVEMENT
1								
	S-1	24/12	1 to 3	5		Brown/Black SAND, little Gravel, little Asphalt, compact,		
2				7		humid, SP		FILL
				6				
3				5				
4								
5								
	S-2	24/18	5 to 7	2		Brown fine-medium SAND, little Gravel, trace Silt,		
6				5		compact, SP		
				*10		*Bottom 1' high blow counts likely due to driving through		
7				*19		cobble		
8								
9								
10								
	S-3	24/1	10 to 12	WH		Brown Gravelly SAND, trace Silt, very loose,	▽ Groundwater	
11				1		moist, SP		
				WH				
12				1				
13								
14								
15								
						Could not sample at 15', running sands		
16								
17								
18								
19					-4.0'			
20								
	S-4	24/20	20 to 22	7		Top 1.5' gray Silty fine SAND, loose, wet, SM		GLACIAL MARINE
21				4				(SAND)
				3				
22				5		Bottom 0.5' gray Silty CLAY, stiff, CL	PP = 5,500 psf	
							to 5,000 psf	

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-1**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	2 of 2
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	15.0 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
6/8/2017	10.0 ft.	5.0 ft. +/-	Observed on soil samples

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
23								GLACIAL MARINE (SAND)
24								
25								
	S-5	2 2/5	25 to 27	3		Top 1' Silty SAND, trace Clay, SM, similar to above	PP = 1,500 psf to 2,000 psf	
26				4	-11.0			
				2		Bottom 1' gray CLAY, little Silt, CL, similar to above		GLACIAL MARINE (CLAY)
27				3				
				PROBE		Probed to refusal		
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
63								
64								
65								
					-50.5	REFUSAL at 65.5', probable bedrock		
66								PROBABLE BEDROCK
67								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-2**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	1 of 2
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	14.5 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
6/8/2017	8.4'	6.1 ft. +/-	10' Casing in hole

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/20	0 to 2	7		Black Gravelly medium to coarse SAND, little Silt,		
1				5		compact, humid, SP-SM		
				7				FILL
2				6				
3								
4								
5								
	S-2	24/18	5 to 7	8		Brown Gravelly fine to coarse SAND, trace Silt, compact,		
6				9		humid, SP		
				10				
7				9				
8								
							▽	
9							Groundwater	
10								
	S-3	24/6	10 to 12	6		Brown Gravelly medium to coarse SAND, trace Silt		
11				6		compact, saturated, SP		
				6				
12				5				
13								
14								
15								
	S-3	24/6	15 to 17	3		Same as above		
16				5				
				7				
17				5				
18								
19					-4.5			
						Drilling becomes softer at 19' depth		
20								
	S-4	24/	20 to 22	3		Grayish Blue SILT, trace Sand and Clay, trace shell	PP = 1,500 psf	GLACIAL MARINE
21				2		fragments and wood (natural) pieces, soft, ML	to 1,000 psf	(SAND)
				2				
22				3				

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-2**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	2 of 2
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	14.5 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
6/8/2017	8.4'	6.1 ft. +/-	10' Casing in hole

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
23								GLACIAL MARINE (SAND)
24					-9.5			
25								
	UT-1	30"	25'-27.5'	Push		Undisturbed Shelby Tube Collected	MC = 30.2%	GLACIAL MARINE
26						Gray Silty CLAY, occasional fine Sand seams, soft, wet,	LL = 29	(CLAY)
27						CL	PI = 8	
28				PROBE				
29								
30						Attempted field vane, encountered sand/silt seams, encountered Sand or Silt seam at 30' depth, unable to advance field vane		
31						Speartip probe advanced with vibratory method		
32								
33								
34						Various dense layers (probable seams) encountered throughout probe depth		
50								
51								
52								
53								
54								
55								
56								
57								
58								
59						Becomes denser at 58'		GLACIAL TILL
						REFUSAL at 59', probable bedrock		PROBABLE BEDROCK

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL PROBE LOG

Boring #: **P-1**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	1 of 1
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	15.0 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
				PROBE				
1						Speartip probe advanced from ground surface. Refusal on likely rubble (brick framgents recovered from speartip)		
2								
3								
4								
5								
6								
7								
8						End of probe at 7.5', likely rubble		RUBBLE
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

SOIL PROBE LOG

Boring #: **P-2**

Project:	Proposed Wex Building	Project #:	17181
Location:	Corner of Hancock and Thames St.	Sheet:	1 of 1
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	15.0 ft. +/-
Driller:	C. Coolidge, P.E.	Reference:	City of Portland GIS
Summit Staff:	M. Hardison, E.I.; T. Jones, E.I.	Date started: 6/8/2017	Date Completed: 6/8/2017

DRILLING METHOD		SAMPLER	
Vehicle:	Tracked	Length:	24" SS
Model:	AMS Power Probe	Diameter:	2"OD/1.5"ID
Method:	3" Casing	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
				PROBE				
1						Speartip probe advanced from ground surface. Refusal on likely rubble (brick framgents recovered from speartip)		
2								
3								
4								
5				▼				
						End of probe at 5.0', likely rubble		RUBBLE
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

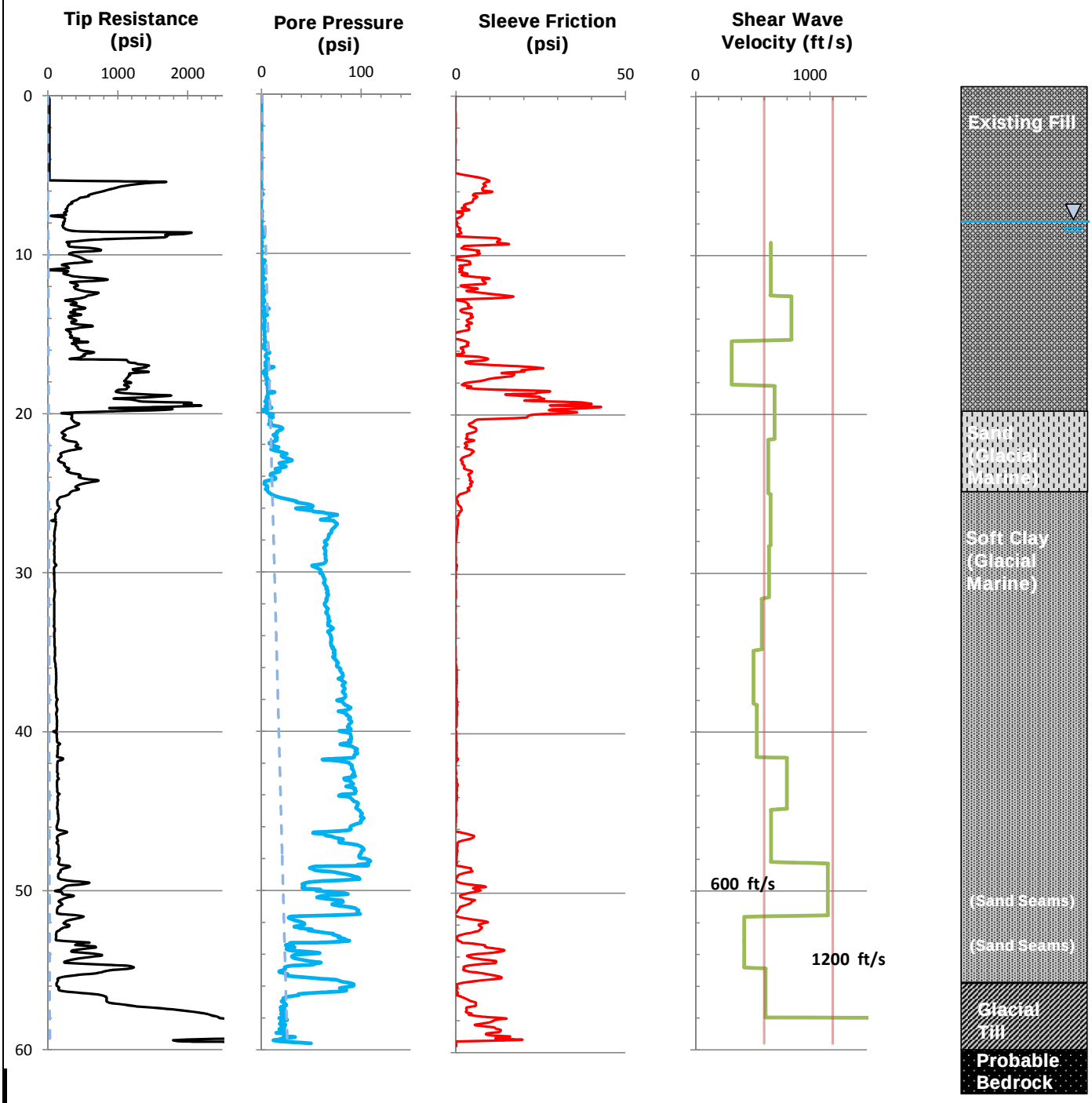
Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT GEOENGINEERING SERVICES

PIEZOCONE PENETRATION LOG

Test Number:	CPT-2		
Sheet:	1 of 1		
Project:	Proposed Wex Building	Project Number:	17181
Location:	Corner of Hancock and Thames	Method:	ASTM D5778
City, State	Portland, Maine	Weather:	30° Sunny

Cone ID:	Vertek #4544.101	Test Elevation:	14.0 ft. +/-
Cone Type:	VTK 5 Ton Digital Cone	Reference:	City of Portland GIS
Piezocone:	Silicone Single Filter	Date started: 6/9/2017	Date Completed: 6/9/2017
Push Rig:	AMS Power Probe 9500 VTR	ESTIMATED GROUND WATER DEPTH	
Anchor Style:	Dual Driven Anchors	Date / Depth / Elevation / Reference	
Performed By:	Craig Coolidge, P.E.	6/9/2017 / 8.0 ft. / 6.0 ft. +/- / Interpreted from pore pressure	



NOTES:

Soil Profile based on interpretation of CPT measurements and nearby borings

Shear Wave Velocity test (V_s) performed at 3.3 feet (1-meter) increments

Abrupt push refusal encountered at depth of 59.6

APPENDIX C

LABORATORY TESTING RESULTS

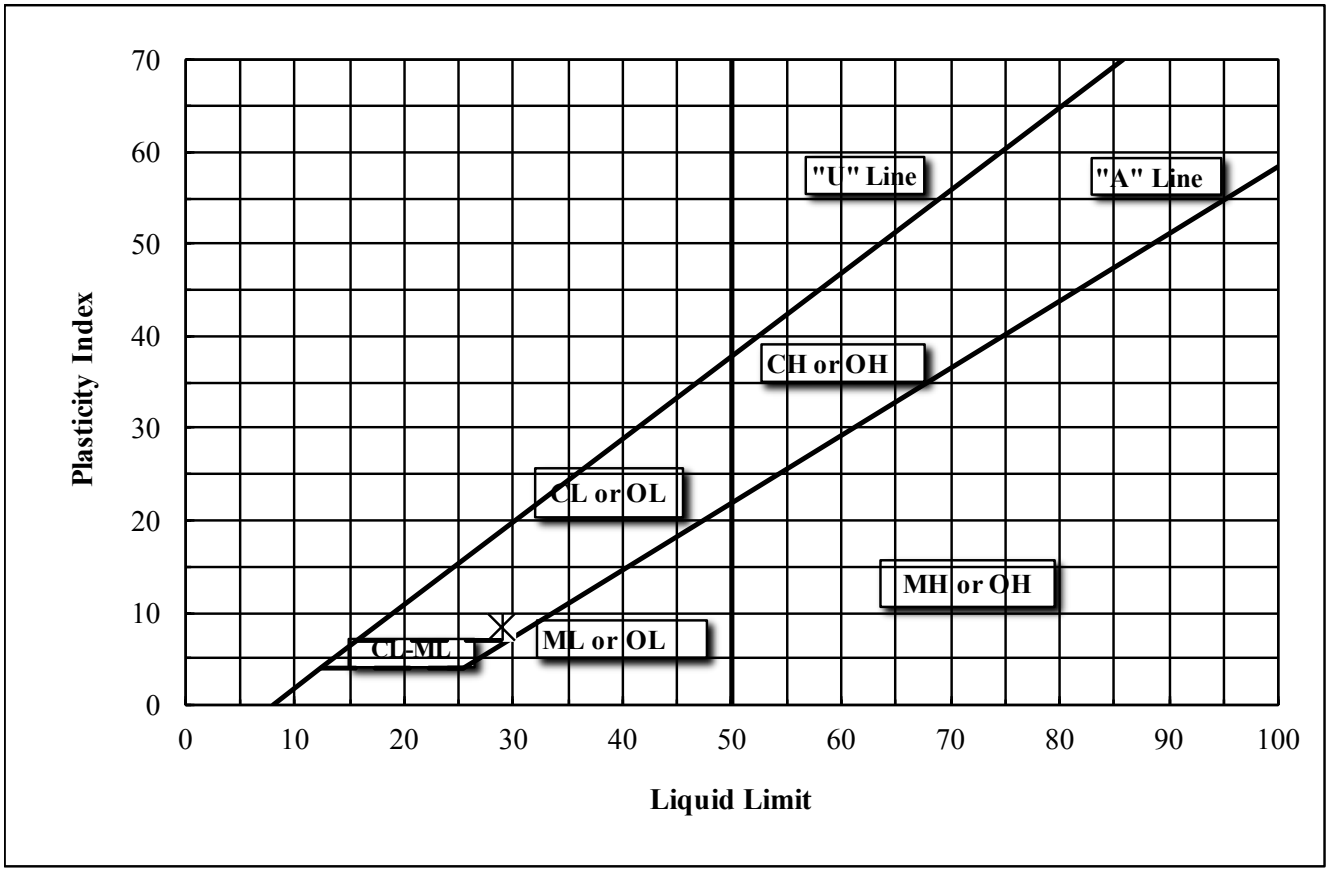
ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	Proposed Building	PROJECT NUMBER:	17181
CLIENT:	Archetype, PA	SAMPLE NUMBER:	UT-1
SOURCE:	Boring B-2	DEPTH:	25' to 27.5'
TEST DATE:	6/13/17	TECHNICIAN:	Preston Spicer

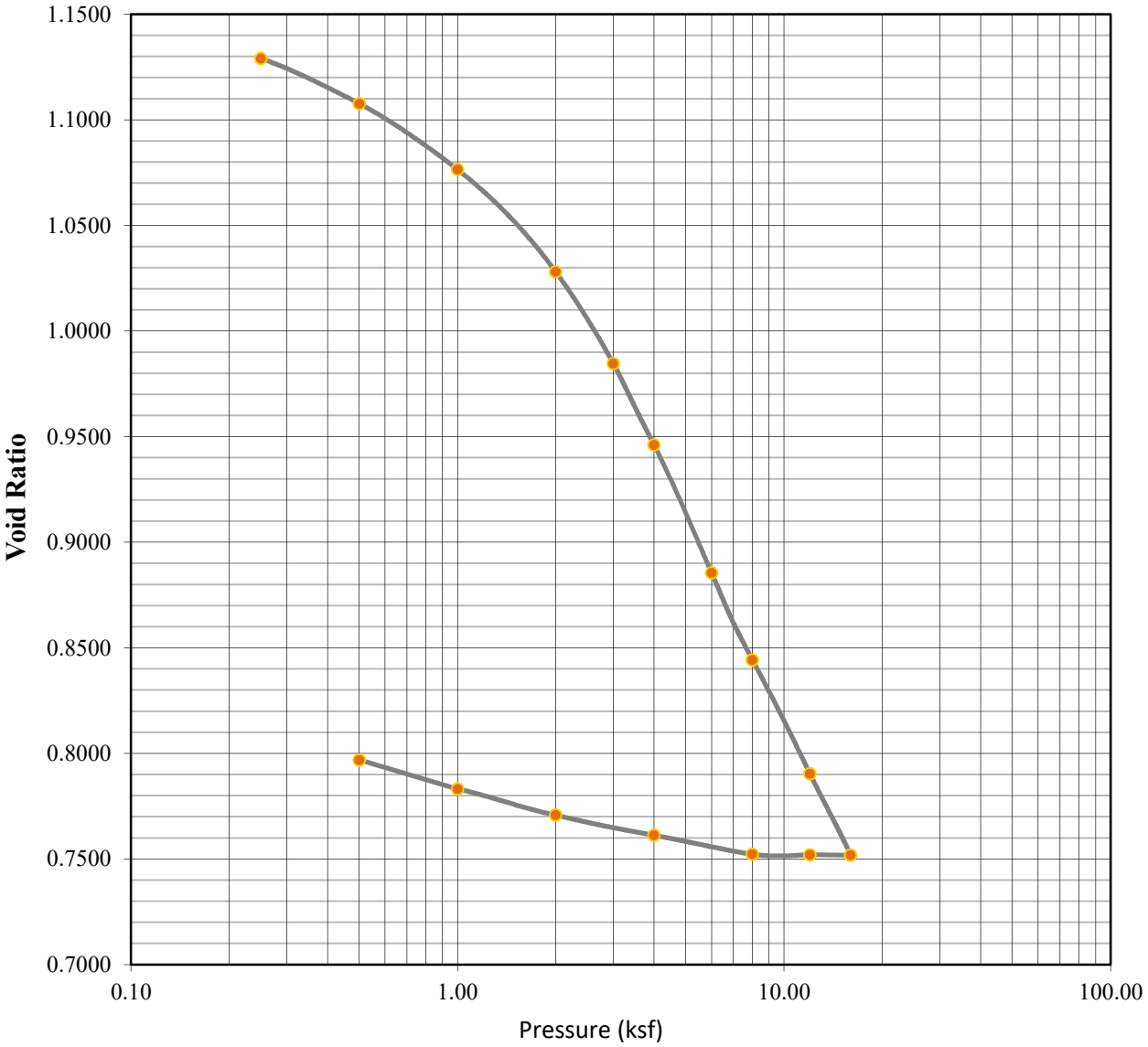
DATA

Source	Depth	LL	PL	PI	Classification
B-2	25' to 27.5'	29	21	8	Gray CLAY, occasional fine Sand seams, CL



Notes: Moisture Content = 30.2%

Consolidation Test
Test Results



	Before	After				
Moisture (%):	37.97	27.80	**Liquid Limits:**	29	**Test Date:**	7/11/17
Dry Density (pcf):	80.61	96.68	**Plastic Limits:**	21	**Performed By:**	PS
Saturation (%):	91.55	97.21	**Plasticity Index (%):**	8	**Reviewed By:**	ELS
Void Ratio:	1.1489	0.7966	**Specific Gravity:**	2.780	Assumed	

Soil Description:	Gray CLAY, occasional fine Sand seams, soft, wet, C		
Project Number:	17181	**Depth:**	25' to 27.5'
Sample Number:	UT-1	**Boring Number:**	B-2
Project:	Proposed Building		
Client:	Archetype, PA		
Location:	Hancock and Thames St., Portland, ME		

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145 Lisbon Street (PO Box 7216), Lewiston, Maine 04243, (207) 576-3313
173 Pleasant Street, Rockland, Maine 04841, (207) 318-7761

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THIN WALLED TUBE SAMPLING - ASTM D1587

PROJECT NAME: Proposed Building
PROJECT LOCATION: Hancock and Thames Streets, Portland, ME
COLLECTION DATE: 6/8/17
TEST DATE: 6/13/17

PROJECT #: 17181
CLIENT: Archetype, PA
SAMPLE #: UT-1
TECHNICIAN: Preston Spicer

Test Boring Information

Boring Number: B-2
Drilling Method: Direct push
Drilling Tooling: 3-inch casing
Sampling Method: Direct push

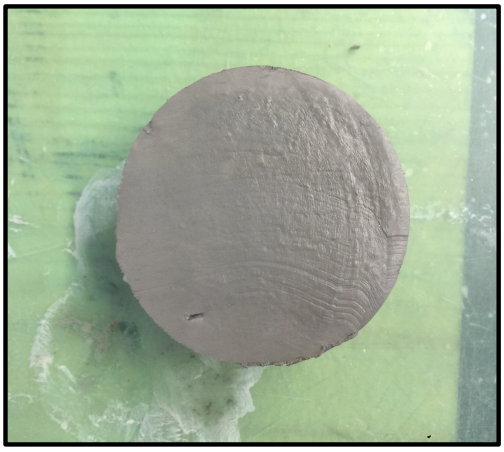
Sample Information

Tube Length: 30"
Recovery: 28"
Tube Diameter: 2.5"
Depth: 25' to 27.5'

Trial / Specimen Number	Moisture Content	Unit Weight	Torvane
1	36.1%	118 pcf	300 psf
2	27.9%	110 pcf	400 psf
3	31.6%	121 pcf	360 psf
Average	31.9%	116 pcf	360 psf

Visual Description (ASTM D2488):

Gray CLAY, occasional fine Sand seams, soft, wet, CL



Photograph of cross sectional sample view.

Photograph of longitudinal sample view.

REMARKS: