SUMMIT
GEOENGINEERING SERVICES

GEOTECHNICAL REPORT

New Retail and Office Building
16 Middle St.
Portland, Maine

Prepared for:

Bateman Partners, LLC
470 Fore St.
Portland, Maine 04101

Prepared by:

Summit Geoengineering Services
145 Lisbon St.
Lewiston, Maine

Project #14147
December 2015

SUMMIT
GEOENGINEERING SERVICES

December 17, 2015
SGS #14147

Nathan Bateman
Bateman Partners, LLC
470 Fore St.
Portland, Maine 04101

Reference: Geotechnical Investigation, Proposed Building
16 Middle Street, Portland, Maine

Dear Nathan;

Summit Geoengineering Services, Inc. (SGS) has completed the geotechnical investigation for construction of a proposed multi-story building located at 16 Middle Street in Portland, Maine. Our scope of services includes the drilling of three conventional test borings and one cone penetration test to refusal, laboratory testing of collected soil samples, and preparing this geotechnical report summarizing our findings and geotechnical recommendations for construction at the site.

Haley and Aldrich performed subsurface explorations at this site in 2004 and 2005 for the construction of the parking garage and furnished a report titled "Report on Subsurface Explorations and Foundation Design Recommendations, Eastern Waterfront Development, Proposed Parking Garage and Office Building" dated November 8, 2005. We have included some data (primarily refusal depth and strata change depths) into our analysis. Based on their explorations within and around the proposed building footprint, refusal depth is expected to range from 32 feet at the west end of the building to 52 feet at the east end.

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.

SECTION 1 – PROJECT AND SITE DESCRIPTION

This project consists of the construction of a 12,116 square foot, 5-story steel framed building at the corner of Middle Street and Hancock Street in Portland, Maine. The building will contain retail space on the first floor and office space on the top four floors. The western portion of the building will not have a first floor, but the top four floors will be constructed over an access easement to the parking garage directly to the south.

Existing grades at the site range from approximately 23 feet at the southeast corner to approximately 27 feet at the northwest corner. The lot is currently an open grassy area with a gravel walkway, granite benches, and some small trees. Proposed finish floor elevations range from 23.7 feet at the southeast corner of the building to 27.3 feet at the southwest corner of the building. Fill required to raise the grade will be minimal.

Based on approximate structural loads, we understand that the maximum column loads are anticipated to be the following:

Maximum Dead Load: **252 kips**
Maximum Live Load: **180 kips**

Based on the proposed building type, we established our permissible total and differential settlement values aS 1.0" and L/360, respectively.

SECTION 2 – EXPLORATION AND LABORATORY TESTING

2.1 Exploration

Summit Geoengineering Services (SGS) observed the subsurface conditions at the site with the drilling of three borings on August 5 and 6, 2014 and one cone penetration test (CPT) on August 6, 2014. Borings SGS14-B1, SGS14-B2, and SGS14-B3 were advanced to 35.5', 27', and 22' below ground surface, respectively. Refusal was encountered in SGS14-B1. Borings were driven using 3" casing. Split spoon samples were collected at 5 foot intervals during each boring as shown on the boring logs in Appendix B. A Shelby Tube sample was collected at depth 19 feet to 21.5 feet during boring SGS14-B1 to obtain a high quality clay sample for laboratory testing.

Boring SGS-B2A encountered casing refusal due to obstruction at 9.5' below ground surface. The boring was re-located three times until penetration through the fill layer using hollow stem augers was achieved at location SGS14-B2D. The location of these borings can be seen in Appendix B.

A Cone Pentration Test (CPT) was conducted near the southeast corner of the building to determine engineering properties of the clay and the extent of the deposit. SGS14-CPT1 was advanced to a depth of 38.2 feet below ground surface where refusal was encountered. The CPT was performed using a rubber track mounted PowerProbe 9500 VTR with a single point hollow stem anchor set to a depth of 5 feet. CPT was performed using a Vertek 5 ton digital cone pushed at a constant rate (2 cm/s). Parameters obtained include cone resistance (q_c), sleeve friction (f_s), and piezocone pore pressure (u), and shear wave velocity (V_s). A copy of the CPT data is included in Appendix B.

The locations of the borings and CPT were marked by SGS prior to the days of drilling by measuring from the existing parking garage and granite benches. These locations can be seen in the SGS Boring Plan in Appendix A.

2.2 Laboratory Testing

Moisture content (*ASTM D4634*), Atterberg Limit (*ASTM D4318*), and one-dimensional consolidation (*ASTM D2435*) tests were performed on selected clay samples from Borings SGS14-B1 and SGS14-B2D, and SGS14-B3. The results of the moisture contents tests and the Atterberg Limit tests are summarized in the following table.

LABORATORY TEST SUMMARY						
Boring	**Sample**	**Depth (ft)**	**Moisture**	**LL**	**PI**	**USCS**
SGS14-B1	S-3	10 to 12	23.6%	-	-	CL
	S-4	15 to 17	26.2%	-	-	SP
	UT1	19 to 21.5	48.6%	43	20	CL
	S-5	24 to 26	41.5%	-	-	CL
	S-6	30 to 33.5	36.7%	-	-	CL
SGS14-B2D	S-4	14 to 16	36.0%	-	-	CL
SGS14-B3	S-2A	5 to 6	35.0%	-	-	ML
	S-2B	6 to 7	45.9%	-	-	CL
	S-3	10 to 12	36.6%	36	18	CL
	S-4	15 to 17	32.9%	-	-	SP

Moisture = Existing water content
LL = Liquid Limit
PI = Plasticity Index
USCS = Unified Soil Classification System

A one-dimensional consolidation test was performed on the sample collected at a depth of 19 to 21.5 feet at the SGS14-B1 location. The test indicated the following consolidation properties.

Preconsolidation Pressure (P_c) = **1,400 psf**
Recompression Index (C_r) = **0.12**
Virgin Compression Index = (C_c) = **0.36**

Detailed results of the laboratory tests are included in Appendix C.

SECTION 3 – SUBSURFACE CONDITIONS

3.1 Soil

The soil at the site generally consists of ***fill*** overlying ***stiff clay*** overlying ***soft clay*** overlying ***sand*** overlying ***glacial till*** overlying ***bedrock***.

3.1.1 Fill. The ***fill*** at the site was encountered in all three borings and ranges in thickness from 5.5 feet at the location of Boring SGS14-B3 to 13 feet at the location of boring SGS14-B2D. The fill at the site varies in composition, but consists mostly of gravelly silt or sand with trace clay.

The fill is humid and loose to compact. There is likely rubble in the fill at the northwest portion of the site which resulted in difficult casing advance in Borings SGS14-B2A through B2D. Standard Penetration Test Blow Counts (SPT-N) values ranged from 18 to 28. The fill classifies as ML to SP in accordance with the Unified Soil Classification System (USCS).

3.1.2 Stiff Clay. The ***stiff clay*** at the site ranges in thickness from approximately 1 feet at Boring SGS14-B3 to 6 feet at the location of SGS14-B1. The stiff clay consists of soft to stiff olive to olive gray silty clay but also may be considered a clayey silt at some depths. SPT-N values ranged from 3 to 5 blows per foot (bpf) and averaged 4 bpf. Pocket penetrometer tests, a rough measure of the unconfined compressive strength, ranged from 3,500 psf to 4,000 psf. The water content of the stiff clay ranges from 23.6% to 35.0% and averages 29.3%. The stiff clay classifies as ML or CL in accordance with the Unified Soil Classification System (USCS).

3.1.3 Soft Clay. The ***soft clay*** layer at the site is described as gray, wet, very soft silty clay. In general, the soft clay was encountered from 10 to 13 feet below ground surface. The thickness of the soft clay ranges from 20.5 feet at the southeastern end of the site to 7.5 feet at the western end of the site. Silt and sand seams are frequent throughout the soft clay layer deposit and were observed in both borings and the CPT. The CPT data indicates silt seams at the spikes in the tip resistance with corresponding decreases in pore pressure shown on the CPT l graph in Appendix B. Black streaking observed on the collected samples indicate that decayed remains of marine organic matter are present in the clay. The existing moisture content of the soft silty clay soil ranges from 36.0% to 48.6% and averages 40.9%. The Atterberg limit tests of the soft clay indicate a liquid limit of 43 and a plasticity index of 20. The soft marine clay classifies as CL in accordance with the Unified Soil Classification System (USCS).

3.1.4 Sand. The sand deposit which underlies the soft marine clay is described as loose gray, silty fine sand with trace to no clay and varies in thickness from 1 to 6.5 feet. The sand is wet, loose, and classifies as SP-SM in accordance with the Unified Soil Classification System (USCS).

3.1.5 Glacial Till. The glacial till deposit at the site was encountered at a depth of 34.5 feet at the SGS14-B1 location and is described as gray silty medium to coarse sand with little gravel and trace clay. The SPT-N value at the top of the till layer was 11, but it is expected that value would increase greatly with depth based on the tip resistance and sleeve friction measured in SGS14-CPT1. The glacial till is wet and dense and classifies as SW in accordance with the Unified Soil Classification System.

3.2 Groundwater

On the day of the explorations, groundwater at the site was measured to be at or near the elevation of the top of the soft clay layer ranging from depths of 11.7 to 28.2 feet below the existing ground surface (elevation 13.8 feet to 2.3 feet sloping downwards toward the southern end of the site).

3.3 Bedrock

Presumed bedrock was encountered at the SGS14-CPT1 location at a depth of 38.2 feet. 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.

SECTION 4 – GEOTECHNICAL EVALUATION

Based on the magnitude of the proposed building loads and presence of relatively thick, soft marine clay at the site, we do not believe that the newly constructed building will be adequately supported on shallow spread footings. Predicted settlements of column footings supported by a shallow foundation are estimated to be upwards of 6 inches. We believe these magnitudes of settlement are unacceptable for this construction. Alternative foundations considered for the new building included a structural mat, helical piles (intermediate foundation), preload, and piles (deep foundation).

Taking into consideration the cost, feasibility, site constraints, and risk associated with these options, we believe that a pile-supported foundation is the most economical and reliable foundation type to support the anticipated exterior and interior column and wall loads. The ground floor slab can be constructed as a “floating” slab supported on the existing soil. We recommend that the columns and load bearing elements of the new building be supported by steel H-piles or pipe piles end bearing on bedrock.

Based on the provided structural loads for the new building, we recommend all interior and exterior continuous and isolated footings be supported on steel H-piles or pipe piles bearing on bedrock or dense glacial till soil. Based on explorations within and around the proposed building footprint, refusal depth is expected to range from 32 feet at the west end of the building to 52 feet at the east end.

SECTION 5 – FOUNDATION RECOMMENDATIONS

5.1 Pile Foundation Recommendations

We recommend that steel piles be designed and installed in accordance with the International Building Code 2015 (IBC 2015), Section 1810. The designed piles should be verified with a WEAP analysis to ensure that compressive driving stresses do not exceed the allowable capacity of the piles. To ensure that the pipe piles can be properly driven through potential obstructions in the fill, such as the rubble encountered at the northwest corner of the site, we recommend that all piles be capped with a steel conical tip (if pipe piles are used) or a steel driving shoe (if H-piles are used) welded to the end of the pile. The piles can be designed using the soil parameters from the Table below:

TABLE 1 - PILE DESIGN PARAMETERS			
Parameter	**Existing Fill**	**Glacial Marine Clay**	**Glacial Till**
Saturated Unit Weight	125 pcf	105 pcf	130 pcf
Undrained Shear Strength (i.e. cohesion)	0 psf	550 psf	0 psf
Effective friction angle	32^0	0^0	36^0
Earth Pressure Coefficient (compression)	0.80	0.80	1.10
Earth Pressure Coefficient (tension)	0.50	0.50	0.70
Lateral Modulus	300 kcf	150 kcf	600 kcf
Friction Factor (steel and soil)	0.25	0.20	0.35

The following depth/elevations can be assumed for the pile design:

Existing Fill: Elevation 26 feet (or ground surface) to Elevation 13 feet
Glacial Marine Clay: Elevation 13 feet to Elevation -5 feet
Glacial Till: Elevation -5 feet to refusal

Due to the minimal thickness of stiff clay, we recommend that it be ignored in the pile design. Since there is very minimal fill required for the new building construction, we anticipate that pile downdrag will be negligible.

5.1.1 Lateral Support: Once the pile type and diameter have been determined, the allowable lateral load should be established. We recommend that the allowable lateral capacity (per pile) of the installed piles be taken as a maximum of 1 ton per pile. However, if the pile diameter is larger than 10", the lateral capacity may be increased to 2 tons per pile. To ensure that the soil around the pile develops adequate passive resistance, prior to construction of the pile cap all soil within a 3 foot width beyond the edge of the pile in all directions should be proofrolled with a minimum of 4 passes in each of two perpendicular directions with a 5-ton (operating weight) vibratory roller.

We recommend that piles within a pile group be spaced at a minimum of 4 times the diameter of the pile center to center. We further recommend that piles within a pile group which are spaced parallel to the direction of horizontal loading should be spaced at a minimum of 6 times the diameter of the pile center to center. Piles spaced closer than this will result in overlapping stress distributions in the soil and cause lateral capacity to be reduced.

Lateral capacity can also be developed by the soil resistance against the pile caps and grade beams. If the lateral deflection of the pile cap or grade beam is greater than 0.005 feet per foot of grade beam/pile cap depth, the passive resistance of the soil will be mobilized. We recommend that the allowable lateral capacity of the soil against pile caps and grade beams be taken as 375 psf per foot of depth perpendicular to the lateral force applied (passive equivalent fluid pressure) for this condition. If lateral deflections are less than 0.005 feet per foot of depth, we recommend

an allowable lateral capacity of 70 psf per foot of depth (at-rest equivalent fluid pressure) for this condition. These soil resistances assume that Foundation Backfill (FB, Section 5.3) placeD around the pile caps is compacted to 95 percent of its maximum dry density, determined in accordance with ASTM D1557, and that the design moist unit weight of the soil is a minimum of 130 pounds per cubic foot (pcf).

Pile Cap and Grade Beam Lateral Resistance	
Lateral Deflection	**Lateral Soil Resistance**
< 0.005 ft/ft of depth	70 psf/ft of depth
> 0.005 ft/ft of depth	375 psf/ft of depth

5.1.2 Corrosion Protection: We recommend that corrosion resistance measures be taken to protect the long-term integrity of the piles. In the order of preference, these measures include:

- If pipe piles are used, filling the piles with concrete
- Increasing the size of the steel pile to account for area loss over time
- Coating the pipe pile with a corrosion inhibitor

To increase the corrosion protection, more than one of the above mentioned methods can be used. The corrosion rate of an uncoated steel pile is estimated to be in the order of 0.001 in/year.

5.1.3 Uplift Resistance: We recommend that the ultimate uplift capacity of the H-piles or pipe piles be taken as the dead weight of the pile, pile cap, soil above the pile cap, friction of the mobilized soil, and soil friction resistance along the length of the pile. We recommend that factor of safety of 1.0 be used for the dead weight calculations, and a factor of safety of 2.5 be used for the mobilized soil and soil friction resistance along the pile. The ultimate soil friction resistance along the pile can be calculated using the coefficients provided in Table 1. If needed, a viable way to increase the uplift capacity is by increasing the size of the pile cap and the volume of soil above the pile cap.

5.1.4 Pile Splices: We anticipate that pile splices will be required for some of the installed piles. The design of all pile splices should be in accordance with IBC 2015 Section 1810.3.6.

5.2 Slab-on-Grade

5.2.1 Interior Slabs: We recommend that the slab-on-grade for the new building be constructed on a minimum of 12” of Structural Fill (SF, see the table below for gradation requirements). All topsoil should be removed from within the building footprint to expose the existing fill. If any soft, unsuitable, or rubble material is exposed in the existing fill, it 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.

STRUCTURAL FILL (SF)	
Sieve Size	**Percent finer**
3 inch	100
½ inch	38 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 subgrade modulus of 175 pci.

5.2.1 Exterior Slabs: We recommend that slabs on grade in unheated areas outside the building footprint be placed on a minimum of 30 inches of SF in order to provide frost heave protection. We further recommend that concrete slabs at entrances be constructed on a frost wall foundation. This construction method will exclude potential slab movements from interfering with doors.

5.3 Frost Protection and Foundation Backfill

Based on a 10-year design air freezing index of 1,200 degree F days for the Portland, Maine region, the bottom of all pile caps, grade beams, and foundation walls exposed to freezing temperatures should be constructed at a minimum depth of 4 feet below finish exterior grade. We recommend that these elements be backfilled with Foundation Backfill (FB). The portion of FB passing the 3" sieve size should meet the following gradation requirements:

FOUNDATION BACKFILL (FB)	
Sieve Size	**Percent finer**
3 inch	100
¼ inch	25 to 100
No. 40	0 to 50
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type E

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 bottom of pile caps, grade beams, and footings in heated areas should be constructed at a minimum of 2 feet below finish floor elevation.

5.4 Non-Bearing Foundation Walls

We recommend that all load bearing foundation walls and columns for the new building be supported by deep foundations. However, non-bearing foundation walls can be constructed directly on the existing soil. Assuming the subgrade preparation recommendations outlined in Section 5.2 are followed, non-bearing foundation walls can be proportioned using an allowable bearing capacity of 750 psf.

Exterior walls exposed to freezing temperatures should be constructed at a minimum depth of 4 feet below finish grade. We recommend that all exposed native soils beneath constructed walls be proofrolled with a minimum of 4 passes with a walk behind plate compactor. Soft, wet, or unsuitable soils should be removed and replaced with compacted SF or ¾" crushed stone. Walls should be backfilled using FB placed in accordance with the methods outlined in Section 4.3.

5.5 Seismic Site Class and Design Criteria

Based on shear wave velocity measurements collected during the CPT at the site and laboratory testing on collected samples, the site classifies as Site Class E "soft clay soil" in accordance with the 2012 International Building Code. The following seismic site coefficients should be used:

SEISMIC DESIGN COEFFICIENTS	
Seismic Coefficient	**Site Class E**
Short period spectral response (S_S)	0.240
1 second spectral response (S_1)	0.078
Maximum factored spectral response (S_{MS})	0.600
1 second factored spectral response (S_{M1})	0.273
Design short period spectral response (S_{DS})	0.400
Design 1 second spectral response (S_{D1})	0.182

5.6 Groundwater Considerations

Based on an approximate finish floor elevation ranging from 23 to 27 feet, and a 4 foot frost protection depth, we do not anticipate that groundwater will rise up to the bottom of pile cap elevation. However, it is generally good practice to include a perimeter underdrain for the construction of new foundation. With that in mind, and to account for the potential changes in local hydrology, we recommend that perimeter underdrains be constructed around all of the foundation walls and grade beams. Underdrains should consist of 6-inch diameter, perforated PVC pipe surrounded by a minimum of 6 inches of crushed stone wrapped in filter fabric. The underdrains should be placed at the base of the foundation and outlet to a free draining location or pumped if necessary.

SECTION 6 – TESTING AND FIELD MONITORING RECOMMENDATIONS

All piles should be installed to an ultimate capacity equal to the allowable axial capacity multiplied by a factor of safety of 2.25. To ensure that this capacity is developed, and to avoid over-stressing of the installed piles, we recommend dynamic pile testing (PDA) be performed on select piles in accordance with ASTM D4945. If desired, the piles can be designed with a maximum allowable capacity of 40 tons to preclude the need for PDA testing.

We recommend that a detailed pile-driving log for each pile be performed and reviewed to evaluate pile installation and consistency. The contractor or a qualified technician can record the pile-driving logs. If the contractor is selected to record the pile driving logs, we recommend that SGS review the logs and verify that the piles are being installed within the design recommendations.

We recommend that the skin friction values generated by the dynamic pile testing (ASTM D4945) be evaluated to verify the field uplift capacity, if used in the foundation design. Field testing for lateral pile capacity is not required.

SECTION 7– CONSTRUCTION CONSIDERATIONS

Rubble and/or cobbles were encountered around 8 foot depth during Boring SGS14-B2A through B2C (near the proposed garage access easement), causing refusal of these explorations. Since this rubble was not encountered in the other explorations, we anticipate that it is localized to this area. The Contractor should be aware of this rubble, in the event that piles are driven in this area, it should not be mistaken for shallow bedrock.

Based on the groundwater levels observed from our explorations, we do not anticipate that groundwater will be encountered in excavations at the site. We believe that dewatering will not be necessary.

All exposed native soil which will be load bearing (under slabs, pile caps, and grade beams) should be proofrolled with a minimum of 4 passes in each of two perpendicular directions with a 5-ton (operating weight) vibratory roller.

General excavations within the silty clay soil, if encountered, will be susceptible to softening when wet. If subgrade softening does occur, we recommend over excavation and replacement with a minimum of 6 inches of ¾” crushed stone. The placed crushed stone should be compacted with a minimum of 4 passes with a walk-behind plate compactor.

Although unanticipated, excavations deeper than 4 feet should be sloped no greater than 1.5H to 1V. These slopes are based on the current OSHA Excavation Guidelines.

SECTION 8 - CLOSURE

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering. Some changes in subsurface conditions from those presented in this

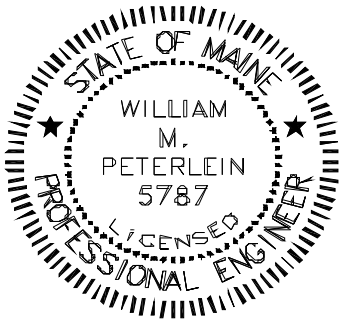
report may occur. Should these conditions differ materially from those described in this report, SGS should be notified so that we can re-evaluate our recommendations. Furthermore, SGS should be notified should pile material change, expected fill height increase, or pile refusal is encountered outside of the anticipated depth of 32 feet to 52 feet. The final foundation plan should be made available to SGS for review to confirm accordance with the recommendations in this report.

Building foundation loads were not available for this report. Once the foundation (and slab) loads have been determined, SGS should be notified so we can confirm the recommendations in this report are valid.

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,
Summit Geoengineering Services, Inc.

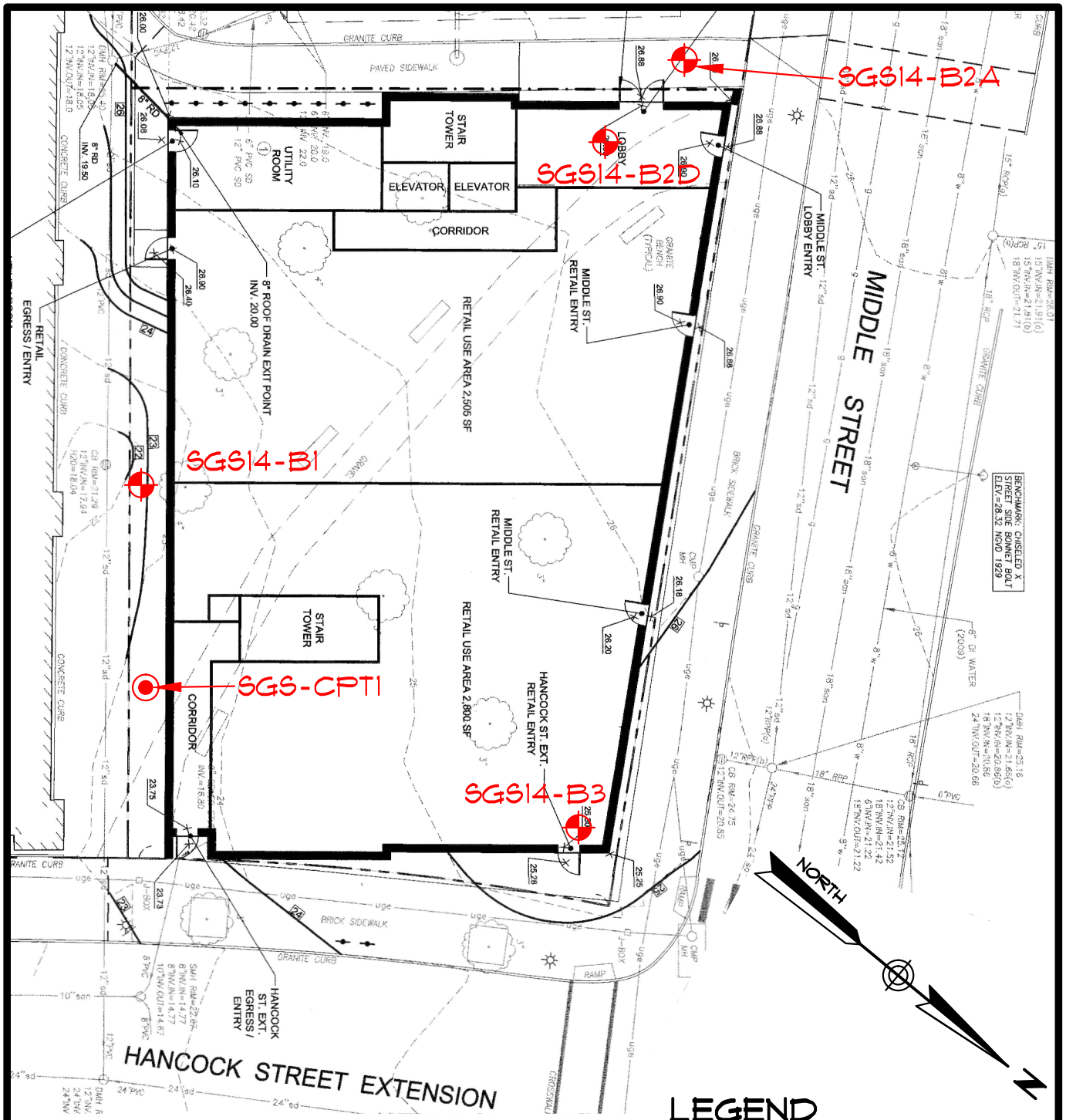
Mathew Hardison, EI
Geotechnical Engineer



William M. Peterlein, PE
Principal Geotechnical Engineer

APPENDIX A

BORING LOCATION PLAN



PLAN REFERENCE

"16 MIDDLE STREET - GRADING & DRAINAGE PLAN", DATED MAY 2014, PREPARED BY FAY, SPOFFORD & THORNDIKE.

LEGEND

SGS	SUMMIT TEST BORING (AUGUST 5, 2014)
CPT-1	SUMMIT CONE PENETRATION TEST (AUGUST 6, 2014)

TEST BORING LOCATION PLAN
NEW BUILDING

16 MIDDLE STREET - PORTLAND, MAINE

PREPARED FOR

BATEMAN PARTNERS, LCC

DATE: AUG. 11, 2014	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 14147	SCALE: 1" = 20'	FILE: 14147 BOR

145 LISBON ST. - SUITE 601
LEWISTON, ME 04240
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APPENDIX B

BORING LOGS

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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
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

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		

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SOIL BORING LOG

Project:	Proposed Building	Boring #:	SGS14-B1
Location:	16 Middle Street	Project #:	14147
City, State:	Portland, Maine	Sheet:	1 of 2
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	22.5 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/5/2014

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
8/5/2014	20.2 ft	2.3 ft +/-	After casing removal

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Dark brown fine sandy SILT, trace organics, rootlets,		TOPSOIL
1				5		damp, loose, ML		
				10		Light brown to brown gravelly SILT, little fine to medium		
2				18		sand, humid, compact, cobble piece in tip of spoon, ML		
3								
4								FILL
5								
	S-2	24/4	5 to 7	10		Dark brown gravelly medium to coarse SAND, little silt,		
6				11		humid, compact, SW		
				8		NOTE: most of sample was not recovered in split spoon,		
7				9		expected cobble fragments		
8								
9								
10								
	S-3	24/24	10 to 12	2				
11				2		Olive gray clayey SILT, mottled, silt seams, sand seam at	PP = 2.0 tsf	
				3		11.6', damp, firm, ML	MC = 23.6%	
12				3				
13								
14								
15								
	S-4	30/0	15 to 17.5	Hyd.				GLACIAL MARINE
16				Push		Failed tube sample from 15' to 17.5'. No Recovery. Split		
				Push		spoon was driven through disturbed sample		
17				Push		Gray soft SILT, little clay and fine sand, wet, very soft,	MC = 26.2%	
				Push		ML		
18								
19								
	UT1	30/26	19 to 21.5	UT1			LL=43, PI=23	
20				Hyd.			MC = 48.6%	
				Push		Gray silty CLAY, wet, very soft, CL	Pc = 1.4 ksf	
21				Push			Cc=0.36, Cr=0.21	
				Push				
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

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

SOIL BORING LOG

Boring #: **SGS14-B1**

Project:	Proposed Building	Project #:	14147
Location:	16 Middle Street	Sheet:	2 of 2
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	22.5 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/5/2014

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
8/5/2014	20.2 ft	2.3 ft +/-	After casing removal

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
21						Gray silty CLAY, wet, very soft, CL		
22								
23								
24								
	S-5	24/24	24 to 26	WH				
25				WH		Same as above, slight black organic staining	MC = 41.5%	
				WH				
26				1				
27								
28								GLACIAL MARINE
29								
30								
				WH				
31				WH				
				WH				
32				WH				
	S-6			WH		Same as above	MC = 36.7%	
33				WH				
				WH				
34				1		Gray silty fine SAND, trace clay, wet, loose, SP		
				2				
35				3		Gray silty medium to coarse SAND, little gravel, trace clay, wet, loose, SW		GLACIAL TILL
				8				
36						End of Boring at 35.5'		
37								
38								
39								
40								
41								
42								

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

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

SOIL BORING LOG

Boring #: **SGS14-B2A**

Project:	Proposed Building	Project #:	14147
Location:	16 Middle Street	Sheet:	1 of 3
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	27 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/6/2014

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
8/6/2014	15.9 ft	11.1 ft +/-	Measured with casing in ground

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/12	0 to 2	7		Dark brown fine sandy SILT, trace organics, rootlets, damp, loose, ML		TOPSOIL
1				7				
				12		Light brown to brown medium to coarse sandy SILT, little gravel, cobble fragments in sample, humid, compact		
2				14				
3								
						Casing advance very difficult, likely rubble		
4								
5								
	S-2	24/8	5 to 7	6				FILL
6				13		Brown to dark brown medium to coarse sandy SILT, little to trace clay, cobble in sample and spoon tip, humid, compact, ML		
				9				
7				11				
8								
9						Casing advance very difficult, likely rubble		
10						End of Boring at 9.5'. Casing encountered refusal, likely rubble in fill layer. The boring was re-located 3 times (ranging from 4 to 10 feet from boring B-2A location) to auger below rubble. See boring B-2D		
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

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

SOIL BORING LOG

Boring #: **SGS14-B2D**

Project:	Proposed Building	Project #:	14147
Location:	16 Middle Street	Sheet:	2 of 3
City, State:	Portland, Maine	Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	27 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/6/2014

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
8/6/2014	15.9 ft	11.1 ft +/-	Measured with casing in ground

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
1						See B-2A		
2								
3						Augered with solid stem auger to 10'. Rubble encountered during auger advance from 4.5 to 10'.		
4								
5								
6								
7								FILL
8								
9								
10								
	S-3	24/8	10 to 12	7				
11				12		Dark brown to black coarse sandy GRAVEL, little silt, cobble in sample, humid, compact, GP		
				6				
12				9				
13								
						Casing advanced through much softer material starting at 13', likely start of glacial marine deposit		
14								
	S-4	24/24	14 to 16	WH				
15				WH		Gray silty CLAY, silt seam at 14.8', wet, very soft, CL	MC = 36.0%	
				WH				
16				WH				
17								
18								GLACIAL MARINE
19								
20						Increased resistance to casing advance		
	S-5	24/6	20 to 22	WH				
21				4				
				11		Gray silty fine SAND, wet, compact, SP		
22				7				

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

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%

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GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	Proposed Building	Boring #:	SGS14-B2D
Location:	16 Middle Street	Project #:	14147
City, State:	Portland, Maine	Sheet:	3 of 3
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	27 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/6/2014

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
8/6/2014	15.9 ft	11.1 ft +/-	Measured with casing in ground

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
21						Gray silty fine SAND, wet, compact, SP		GLACIAL MARINE
22								
23								
24								
25								
	S-6	24/24	25 to 27	WH				
26				1		Same as above		
				WH				
27				WH				
						End of Boring at 27', no refusal		
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								

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

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%

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SOIL BORING LOG

Project:	Proposed Building	Boring #:	SGS14-B3
Location:	16 Middle Street	Project #:	14147
City, State:	Portland, Maine	Sheet:	1 of 1
		Chkd by:	

Drilling Co:	Summit Geoengineering Services	Boring Elevation:	25.5 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Grading & Drainage Plan - Fay, Spoffard & Thorndike (5/2014)
Summit Staff:	M. Hardison, E.I.	Date started: 8/5/2014	Date Completed: 8/5/2014

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
8/5/2014	11.7 ft	13.8 ft +/-	After casing removal

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/14	0 to 2	2		Dark brown fine sandy SILT, trace organice, rootlets,		
1				6		damp, loose, ML		TOPSOIL
				11		Mostly bits of cobble, little fine sand, pieces of pavement		
2				13		in tip of spoon		
3								
								FILL
4								
5								
	S-2	24/24	5 to 7	1		Dark brown fine to coarse silty SAND, humid, loose, SP		
6				2		Olive clayey SILT, mottled and blocky, humid, soft, ML or	PP = 1.25 tsf	
				1		CL	MC = 35.0%	
7				WH		Olive gray silty CLAY, slightly mottled, soft, wet, CL		
							MC = 45.9%	
8								
9								
10								
	S-3	24/24	10 to 12	WH				
11				WH		Gray silty CLAY, slightly mottled, silt seams at 10.8' and		
				WH		11.3', wet, soft, CL		
12				WH			MC = 36.6%	
13								
								GLACIAL MARINE
14								
15								
	S-4	24/24	15 to 17	WH				
16				WH		Gray clayey SILT, little fine sand, wet, soft, ML		
				WH			MC = 32.9%	
17				WH				
18								
19								
20								
	S-5	24/12	20 to 22	3		Gray silty fine SAND, trace clay, wet, loose, SP		
21				6				
				7		Gray to light brown fine to medium sandy SILT, little clay		
22				5		and gravel, wet, compact, ML		GLACIAL TILL
						End of Boring at 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

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

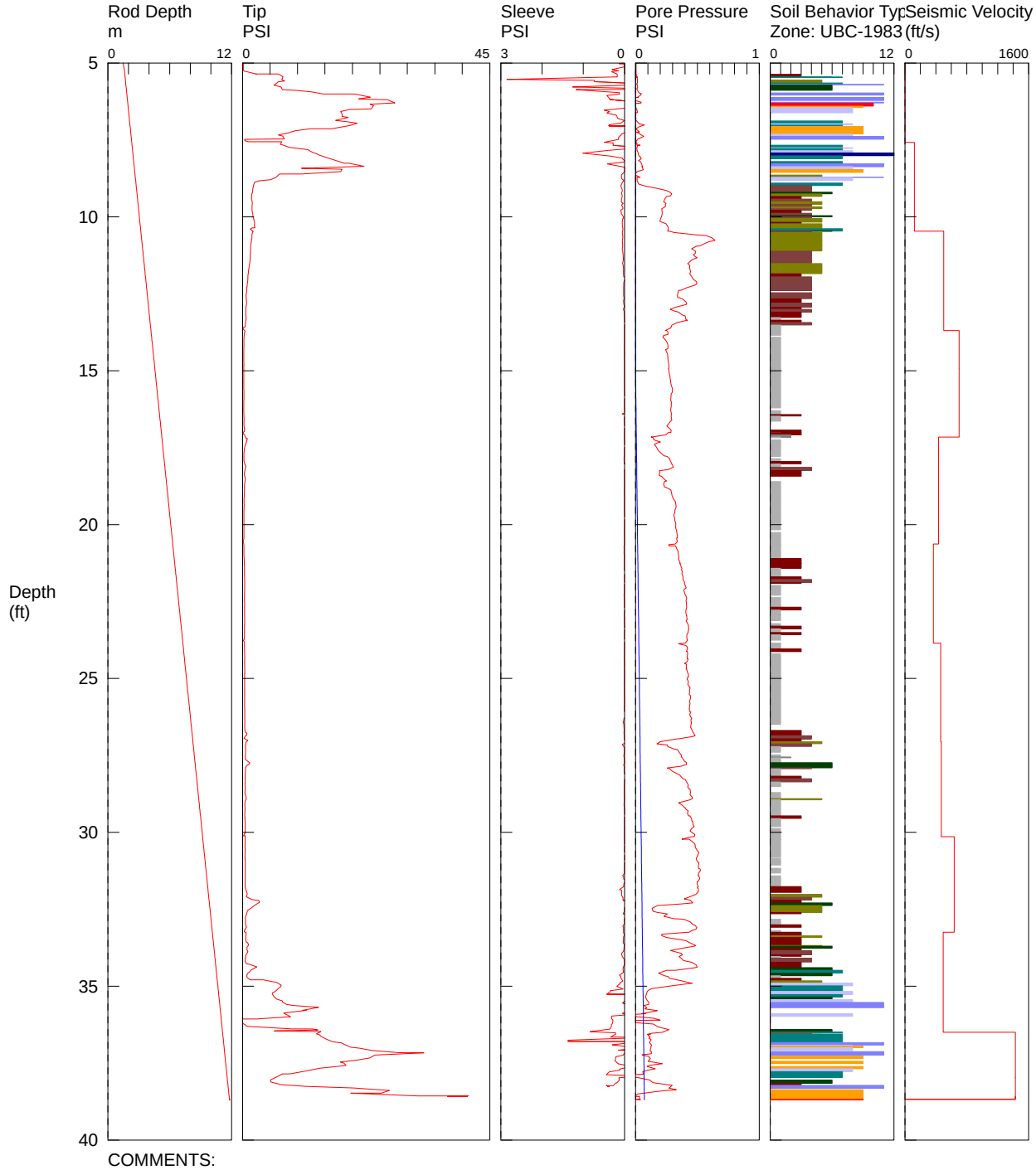
Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

Proposed Building - Middle Street

COMPANY: Summit Geoengineering Services
FILENAME:
TEST ID: cpt1
PROJECT: 14147
SITE: Proposed Building - Middle Street

LOCATION: cpt1
OPERATOR: C. Coolidge, P.E.
CREW: M. Hardison, E.I.
CLIENT: Bateman Partners, LLC
CLIENT REP:

TEST DATE: Wed 06/Aug/2014
START TIME: 11:57:38
GPS: 0, 0, 0, 0, 0
WEATHER: CLEAR



COMMENTS:

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

APPENDIX C

LABORATORY TEST RESULTS

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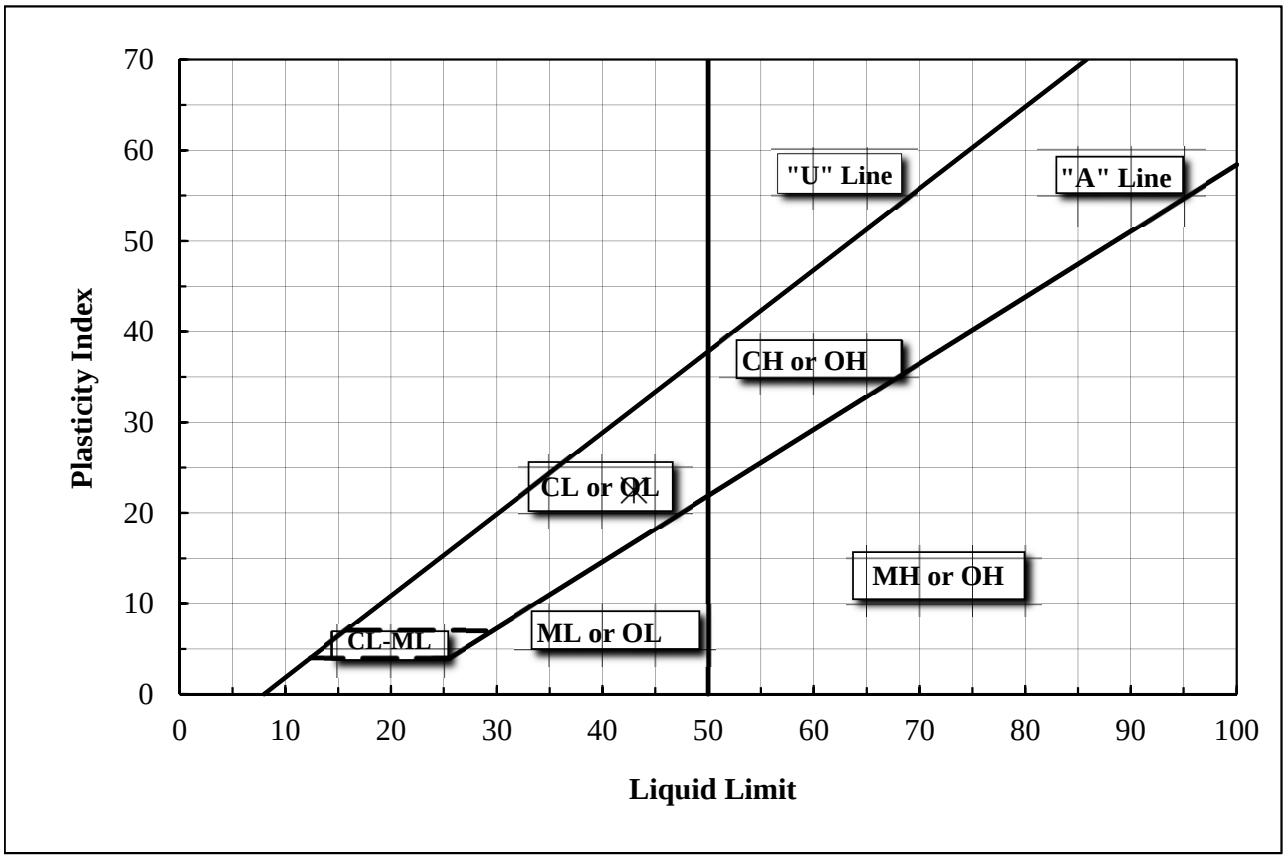
ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	New Building 16 Middle Street, Portland	PROJECT NUMBER:	14147
CLIENT:	Bateman Partners, LLC	SAMPLE NUMBER:	UT-1
SOURCE:	B-1	DEPTH:	19' - 21'
DATE:	8/12/2014	TECHNICIAN:	Erika Hawksley, E.I.

DATA

Source	Depth	LL	PL	PI	Classification
B-1	19' - 21'	43	20	23	Gray Silty CLAY, CL



Notes:

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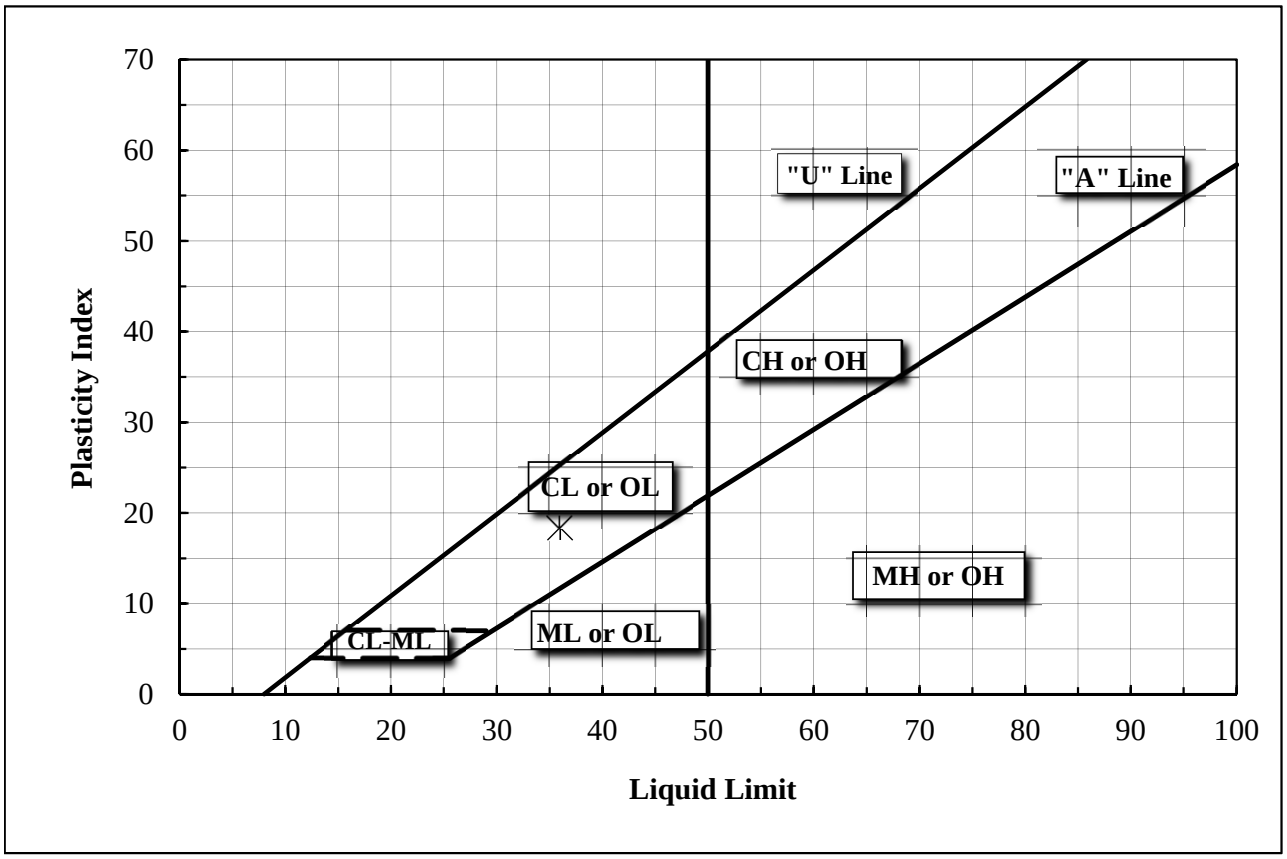
ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	New Building 16 Middle Street, Portland	PROJECT NUMBER:	14147
CLIENT:	Bateman Partners, LLC	SAMPLE NUMBER:	S-3
SOURCE:	B-3	DEPTH:	10' - 12'
DATE:	8/12/2014	TECHNICIAN:	Erika Hawksley, E.I.

DATA

Source	Depth	LL	PL	PI	Classification
B-3	10' - 12'	36	18	18	Gray Silty CLAY, CL



Notes:

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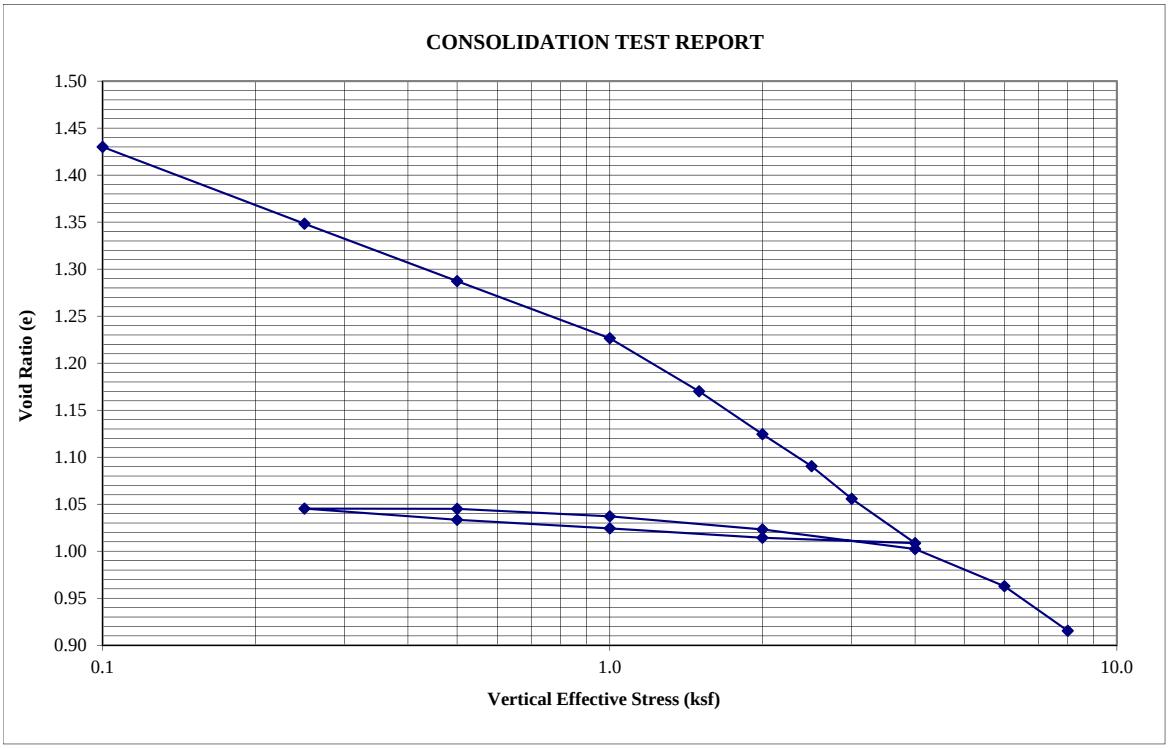
ONE DIMENSIONAL CONSOLIDATION - ASTM D2435

PROJECT NAME:	New Building 16 Middle Street, Portland	PROJECT #	14147
CLIENT:	Bateman Partners, LLC	SAMPLE #:	UT-1
SOIL DESCRIPTION:	Gray Silty Clay, CL	DATE:	3/28/2014
INTENDED USE:	Soil Investigation	SOURCE:	Boring B-1, 19' - 21'
		TECH:	Erika Hawksley, E.I.

CONSOLIDATION TEST RESULTS



Load (ksf)	Void Ratio (e)	Cv (ft^2/day)
0.25	1.35	0.03
0.50	1.29	0.03
1.00	1.23	0.04
1.50	1.17	0.05
2.00	1.12	0.03
2.50	1.09	0.03
3.00	1.06	0.00
4.00	1.01	0.00
2.00	1.01	0.99
1.00	1.02	0.40
0.50	1.03	0.27
0.25	1.05	0.08
0.50	1.05	0.49
1.00	1.04	0.53
2.00	1.02	0.48
4.00	1.00	0.14
6.00	0.96	0.05
8.00	0.92	0.06

Preconsolidation Pressure (P'c):	1.4	ksf
Compression Index (Cc):	0.36	
Recompression Index (Cr):	0.12	
Initial Void Ratio:	1.46	
Specific Gravity:	2.77	
Natural Moisture Content:	48.6	%
Natural Degree of Saturation:	97.3	%
Dry Unit Weight:	70.2	pcf
Torvane Shear Strength:	150	psf
Liquid Limit (LL):	43	
Plastic Index (PI):	23	

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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Laboratory Determination of Water (Moisture) Content of Soil ASTM D2216 / D4643

PROJECT NAME:	New Building - 16 Middle St, Portland, M	PROJECT #:	14147
CLIENT:	Bateman Partners, LLC	DRYING METHOD	Oven Dried
SOURCE:	SGS14-B1, SGS14-B2D, & SGS14-B3	DESCRIPTION:	Various Clay Samples
DATE:	8/7/2014	TECHNICIAN:	Erika Hawksley, E.I.

Location	Sample No.	Depth	Moisture Conten	Remarks
SGS14-B1	S-3	10' - 12'	23.6%	
SGS14-B1	S-4	15' - 17'	26.2%	(Sandy)
SGS14-B1	S-5	24' - 26'	41.5%	
SGS14-B1	S-6	30' - 33.5'	36.7%	
SGS14-B2D	S-4	14' - 16'	36.0%	
SGS14-B3	S-2	5' - 6'	35.0%	
SGS14-B3	S-2	6' - 7'	45.9%	
SGS14-B3	S-3	10' - 12'	36.6%	
SGS14-B3	S-4	15' - 17'	32.9%	(Sandy)

REMARKS: