REPORT

October 24, 2012
08-0494 S

Geotechnical Engineering Services

Proposed Courtyard by Marriott
321 Commercial Street
Portland, Maine

PREPARED FOR:
J.B. Brown & Sons, Inc.
Attention: Vin Veroneau
36 Danforth Street
Portland, Maine 04101

PREPARED BY:
S.W.COLE ENGINEERING, INC.
286 Portland Road
Gray, Maine 04039
207-657-2866

S.W.COLE ENGINEERING, INC.

- *Geotechnical Engineering*
- *Construction Materials Testing*
- *GeoEnvironmental Services*
- *Ecological Services*

www.swcole.com

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08-0494 S

October 24, 2012

J.B. Brown & Sons, Inc.
Attention: Vin Veroneau
36 Danforth Street
Portland, Maine 04101

Subject: Geotechnical Engineering Services
Proposed Courtyard by Marriott
321 Commercial Street
Portland, Maine

Dear Vin:

In accordance with our Proposal dated September 5, 2012, we have performed subsurface explorations for the Proposed Courtyard by Marriott at 321 Commercial Street in Portland, Maine. This report presents our findings and geotechnical recommendations and its contents are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our work was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations and earthwork associated with the proposed construction. Our scope of work included a review of previous exploration information, the making of two test boring and sixteen test pit explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Proposed Construction

Based on information provided by Opechee Construction Corporation (project design-builder), we understand proposed construction consists of a new Courtyard by Marriott hotel building with associated at-grade paved parking and landscape areas. We

understand the proposed building will be a six-story, steel-framed structure with concrete decks and a masonry veneer. The building will have a finish floor elevation of about 14.5 feet (project datum) which will require tapered fills approaching 2.5 feet and tapered cuts approaching one foot. Structural loading information was not available at the time of our report. Proposed and existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Two test borings (B-101 and B-102) and sixteen test pits (TP-1 through TP-17, excluding TP-13) made at the site on September 26, 2012. Test pit TP-13 was not performed due to conflict with existing utilities. The test borings were made by Great Works Test Boring, Inc. of Rollinsford, New Hampshire and the test pits by Eastern Excavation, Inc. of Westbrook, Maine, both working under subcontract to S.W.COLE ENGINEERING, INC. The exploration locations were selected by S.W.COLE ENGINEERING, INC. in conjunction with Opechee Construction Corporation and established in the field by S.W.COLE ENGINEERING, INC. utilizing taped measurements from existing site features. The approximate exploration locations are shown on the "Exploration Location Plan" attached as Sheet 1.

Logs of the test borings are attached as Sheets 2 through 3. Rock core logs are attached as Sheet 4. Test pit logs are attached as Sheets 5 through 13 The ground surface elevations shown on the logs were estimated based on topographic information shown on Sheet 1. A key to the notes and symbols used on the logs is attached as Sheet 14.

2.1.1 Previous Explorations

Fourteen test borings (B1 through B12, including B11A and B11B) were previously made at the site by Sebago Technics, Inc in 2010. Logs for these explorations and a sketch plan showing the approximate locations were provided by J.B. Brown & Sons, Inc. Borings B-1 through B-7 were within the proposed Courtyard project site. These boring logs are attached as Appendix A and the approximate locations are shown on the "Exploration Location Plan", attached as Sheet 1.

2.2 Testing

The test borings were made using a combination of solid stem auger and cased, wash-boring drilling techniques. The soils were sampled at 2 to 5-foot intervals using a split spoon sampler and Standard Penetration Test (SPT) methods. SPT blow counts are shown on the logs.

Soil samples obtained from the test borings were returned to our laboratory for classification and testing. Laboratory testing includes grain size analyses, organic content testing, and moisture content testing. Results of the grain size analyses are attached as are attached as Sheets 15 through 17. Results of the organic content and moisture content testing are shown on the logs.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The site is located at 321 Commercial Street in Portland, Maine. Based on anecdotal information and historic right-of-way plans provided, we understand the site has had several industrial and commercial past site uses with associated buildings, utilities, railroad tracks, and roadways. We understand the rail lines previously crossed over portions of the site. The site structures have subsequently been razed and the site now consists of a gravel-surfaced parking lot with lightly vegetated areas along the periphery.

The site is generally bound by Commercial Street to the east, Maple Street to the south, a paved, upper tier parking lot the west, and a driveway/walkway to the north previously known as Foundary Lane. The site is relatively flat with existing topography varying from about elevation 12 feet (project datum) along Commercial Street, gently rising to about elevation 17 feet towards the western side. Existing site conditions and approximate topography around the site boundary are shown on the "Exploration Location Plan" attached as Sheet 1.

3.2 Subsurface Conditions

Beneath a surficial layer of gravel, the explorations generally encountered a soils profile consisting of uncontrolled fill overlying bay mud with organics (harbor bottom deposits), overlying glacial outwash and glacial till soils, overlying bedrock. The principle soil strata

encountered are described below; not all the strata where encountered in each of the explorations. Refer to the attached logs for more detailed descriptions of the subsurface findings at the exploration locations.

Uncontrolled Fill: The explorations encountered a layer of uncontrolled fill material varying in thickness from about 8 to 16 feet, where penetrated. The fill generally consisted of loose to dense brown silty sand with varying portions of gravel and cobbles and miscellaneous debris (brick, concrete, asphalt, glass, organics, wood, coal clinker, ash, metal, paper, and plastic). Much of the fill observed at the test pits had a significant portion of brick. A petroleum odor was noted in the fill material at test pit TP-3. Relic foundation walls from prior structures were observed in test pits TP-1, TP-2, TP-11, TP-16.

Bay Mud: Underlying the uncontrolled fill, the borings encountered bay mud deposits (labeled harbor bottom deposits on the previous exploration logs) consisting of loose dark brown, gray, and black silty sand with varying portions of gravel, organics and wood fragments. Brick fragments were observed within the bay mud deposits at boring B-101 and at several previous borings. The bay mud extended to depths varying from about 16 to 26 feet below the ground surface.

Glacial Outwash: Underlying the uncontrolled fill, boring B-2 encountered glacial outwash soils consisting of loose to medium dense sand with varying portions of silt and gravel. The glacial outwash extended to a depth of about 26 feet below the ground surface.

Glacial Till: Underlying the bay mud and glacial outwash deposits, the borings encountered glacial till consisting of medium dense to dense gray and brown silty sand with varying portions of gravel. The glacial till was not encountered at borings B-5, B-6, and B-7. Where encountered, the glacial till extended to depths varying from about 22 to 31 feet below the ground surface.

Bedrock: Bedrock was encountered in the borings at depths varying from about 16 to 31 feet. The bedrock appears to be relatively weathered at the surface as indicated by penetration of the drilling equipment up to several feet in depth. Bedrock cores obtained at borings B-101 and B-102 consist of poor to good quality Schist with Rock Quality Designations (RQD) varying from 30 to 88 percent.

3.3 Groundwater Conditions

Saturated soils were encountered at borings B-101 and B-102 at a depth of about 7 feet. Groundwater seepage was observed at test pit TP-10 at a depth of about 7 feet. Groundwater levels will fluctuate tidally, seasonally and following periods of precipitation and snowmelt.

3.4 Seismic and Frost Considerations

The 25-year Air Freezing Index for the Portland, Maine area is about 1,250-Fahrenheit degree-days, which corresponds to a frost penetration depth on the order of 4.5 feet. Based on the subsurface findings at the test borings, we interpret the site soils to correspond to Seismic Soil Site Class D in accordance with 2009 IBC N-value and vane shear methods.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. We offer the following geotechnical considerations:

- The uncontrolled fills and loose bay mud with organics (harbor bottom deposits) are unsuitable for support of the proposed building. We recommend ground improvement by grouted rammed aggregate piers (RAP) be utilized across the building footprint to support spread footing foundations and on-grade floor slabs. Alternatively, we recommend the building and floor slab derive support from steel H-piles driven to end bearing on bedrock. In both cases, the foundation contractor will need to be prepared to pre-auger to overcome buried obstructions.

- Perimeter foundation underdrains should be provided for the proposed building.

- The uncontrolled fills are unsuitable for backfill in the building area and for foundation backfill. Imported Structural Fill and Crushed Stone will be needed for construction.

- Subgrades for proposed paved areas are anticipated to consist of existing uncontrolled fill. Uncontrolled fill pavement subgrades should be thoroughly proof-

rolled and densified. Areas that become soft or yielding during proofrolling must be removed and replaced with compacted subbase gravel prior to constructing the new pavement section.

4.2 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. The soils that will be exposed will be subject to erosion.

In general, foundation subgrades will consist of loose to medium dense uncontrolled fill containing miscellaneous debris. Groundwater may be encountered, particularly in deeper excavations for foundations and utilities. We recommend that foundation subgrades be overexcavated by 6-inches and backfilled with compacted Crushed Stone. The Crushed Stone will help provide a stable working mat and a drainage media for dewatering.

Relic structures, slabs, and foundations will likely be encountered during construction. Relic structures and foundations should be demolished at least 4.5 below proposed finish grade. Voids left from existing foundations should be backfilled with compacted Granular Borrow or Structural Fill

Subgrades for proposed paved areas are anticipated to consist of existing uncontrolled fill. Uncontrolled fill pavement subgrades should be thoroughly proof-rolled and densified with 3 to 5 passes of a vibratory roller having a static weight of at least 10 tons. Areas that become soft or continue to yield during densification and areas which contain a significant amount of wood or organics should be overexcavated and replaced with compacted Structural Fill. Areas of exposed subgrade which are significantly voided should be choked/filled with compacted Crushed Stone prior to placing pavement gravels.

4.3 Excavation and Dewatering

Excavation work will generally encounter uncontrolled fills. Miscellaneous debris including relic structures, slabs, foundations, and pavements will be encountered in the fills. Handling and disposal of excavation spoils must follow local, state and federal regulations. The uncontrolled fills may have premium disposal costs due to uncharacterized contaminants.

Groundwater in the existing fills may be encountered in excavations. Ditching with sump and pump dewatering methods should be adequate to control groundwater in shallow excavations. The layer of Crushed Stone provided below foundations will provide a drainage media from which to sump and pump. Controlling groundwater to a depth of at least one foot below subgrade will help to stabilize subgrades. Tidal influence of groundwater should be anticipated.

Excavations must be properly shored and/or sloped according to OSHA Regulations to prevent sloughing and caving of the sidewalls during construction.

4.4 Foundations

We recommend the proposed building and floor slabs derive support from driven steel H-piles or from spread footing foundations bearing on ground improved by grouted rammed aggregate piers (RAPs). The design of ground improvement by grouted RAPs should be performed as an engineered design-build submittal by a qualified geotechnical contractor. The uncontrolled fill present at the site contains a significant amount of debris which will likely require pre-augering to clear obstructions for RAP and H-Pile installation.

4.4.1 Grouted Rammed Aggregate Piers

RAPs consist of aggregate columns that densify the soil column through the uncontrolled fill, bay mud and glacial outwash deposits to the top of the dense glacial till soils or bedrock. We recommend the RAP's be grouted through the zone of uncontrolled fill and bay mud soils due to the presence of voids in the fill and organics in the bay mud deposit. We offer the following geotechnical parameters for spread footings bearing on grouted RAP improved ground:

- Design Frost Depth = 4.5 feet
- Net Allowable Soil Bearing Pressure = 4 ksf or less
- Base Friction Factor = 0.40 (Concrete to Crushed Stone)
- Passive Lateral Earth Pressure Coefficient = 3.0
- At-Rest Lateral Earth Pressure Coefficient = 0.5
- Total Unit Weight of Backfill = 130 pcf (Compacted Structural Fill)
- Internal Friction Angle of Backfill = 30 degrees
- Seismic Soil Site Class = D (2009 IBC, N-value and Vane Shear methods)

We recommend at least 6-inches of compacted Crushed Stone be provided below the spread footings after ground improvement is performed. The crushed stone will help to provide a stable working mat for foundation construction and a media from which to dewater.

4.4.2 Driven Piles

Working pile capacities must consider the strength of the materials with adequate factors of safety against yielding, corrosion, and damage during driving.

Steel H-Piles: Based on the subsurface findings, steel H-piles driven to end bearing on bedrock may be used to support the building foundations and a structural floor slab. We recommend the following H-pile sizes and allowable axial compressive capacities:

RECOMMENDED STEEL H-PILE CAPACITIES	
50 ksi Steel H-Pile Section	Allowable Axial Compressive Capacity (kips)
HP 10X42	80
HP 10X57	160
HP 12X74	220
Notes: 1. Piles driven to practical refusal on hard, sound bedrock with cast driving tips and (1/8-inch) corrosion allowance 2. Capacities greater than 80 kips require pile load test	

Pile Spacing: Piles should be spaced a minimum center-to-center distance of at least 3 pile diameters, but no less than 30 inches. Piles in groups should be driven from the interior outward to help preclude excessively hard driving conditions of the interior piles due to soil densification.

Lateral Resistance: We recommend that lateral loads be resisted by passive earth pressures acting on the grade beams and pile caps. Passive lateral resistance acting on grade beams and pile caps backfilled with compacted Structural Fill should consider a total unit weight of granular backfill of 130 pcf, an angle of internal friction of 30 degrees with an ultimate passive lateral earth pressure coefficient of 3.0. Additional resistance to lateral loads can be mobilized along the pile shafts, if needed. S.W.COLE

ENGINEERING, INC. can assist with lateral pile capacities, as deemed necessary by the structural engineer.

Pile Load Testing: For piles with a capacity over 40 tons (80 kips), we recommend the contractor coordinate a test pile program including monitoring of several piles with a Pile Driving Analyzer (PDA) to determine pile and driving equipment compatibility as well as to define the "set" criteria and allowable pile capacity. The test pile program should include PDA monitoring of the test piles during re-strikes in order to assess pile capacity and driving resistance after pore water pressures have relaxes. The pile driving contractor should submit a WEAP analysis and information relative to pile driving equipment prior to beginning driving. S.W.COLE ENGINEERING, INC. should be retained to observe pile driving.

4.5 Foundation Drainage

We recommend an underdrain system be installed near footing grade around the perimeter footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe enveloped in 12-inches of Crushed Stone, fully wrapped in non-woven geotextile filter fabric. The underdrain pipe must be connected to a positive gravity outlet protected from freezing, clogging and backflow.

Exterior foundation backfill should be sealed with a surficial layer of clayey or loamy soil in areas that are not paved or occupied by entrance slabs. This is to reduce direct surface water infiltration into the backfill. Surface grades should be sloped away from the building for positive surface water drainage. General underdrain details are shown on Sheet 18.

4.6 Slab-On-Grade Floors

We recommend on-grade concrete floors be supported on a minimum of 24 inches of compacted Structural Fill overlying RAP improved subgrades. On-grade floor slabs founded on properly prepared subgrades may be designed considering a modulus of subgrade reaction of 150 pci. If a pile supported structural floor slab option is selected, we recommend at least 12 inches of compacted Structural Fill be provided below the slab. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function.

We recommend a sub-slab vapor retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering that may be sensitive to moisture vapors. The vapor retarder must have a permeance that is less than the floor cover or surface treatment that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material shall be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed surface treatments, flooring and adhesive materials.

4.7 Entrance Slabs and Sidewalks

Entrance slabs and sidewalks adjacent to buildings must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that clean, non-frost susceptible sand and gravel meeting the requirements of Structural Fill be provided to a depth of at least 4.5 feet below the top of entrance slabs. This thickness of Structural Fill should extend the full width of the entrance slabs and outward at least 4.5 feet, thereafter transitioning up to the bottom of the adjacent sidewalk or pavement subbase gravel at a 3H:1V or flatter slope. General details of this frost transition zone are attached as Sheet 18.

4.8 Backfill and Compaction

Based on the subsurface findings, the existing fill soils and native soils are unsuitable for reuse in building construction. We recommend the following imported fill and backfill materials.

Structural Fill: Fill to raise building grades, backfill for foundations, and base gravel below floor slabs should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below.

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
#40	0 to 30
#200	0 to 5

Crushed Stone: Crushed Stone, used beneath foundations and for underdrain aggregate, should meet the gradation requirements of MDOT Standard Specifications 703.22 "Underdrain Backfill Type C".

MDOT 703.22 Underdrain Backfill Type C – Crushed Stone	
Sieve Size	**Percent Finer by Weight**
1 inch	100
¾ inch	90-100
⅜ inch	0-75
#4	0-25
#10	0-5

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should not exceed 12 inches. We recommend that fill and backfill in building areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted in loose lifts not exceeding 12 inches.

4.9 Site Retaining Walls

Based on our understanding of the proposed site grading concepts, we anticipate that a mechanically stabilized earth retaining wall (MSE Wall) will be needed to provide grade separation along the western site boundary. We anticipate this MSE Wall will support a parking lot above it and will range in height from about 2 to 5 feet. Based on the subsurface findings, it appears this MSE Wall would be founded on uncontrolled fills. Since MSE Walls are tolerant of settlement, it is our opinion the MSE Wall can be supported on the uncontrolled fills, provided the fills are prepared properly. Specifically,

we recommend overexcavating the uncontrolled fills beneath this MSE wall to a depth of at least 1 foot, densifying the exposed uncontrolled fills and backfilling the overexcavated area with compacted Crushed Stone.

For MSE Walls bearing on properly prepared subgrades, we offer the following geotechnical parameters for design consideration:

- Reinforced Soil Unit Weight = 125 pcf
- Reinforced Soil Friction Angle = 30 degrees
- Retained Soil Unit Weight = 125 pcf
- Retained Soil Friction Angle = 28 degrees
- Foundation Soil Allowable Bearing Pressure = 1.5 ksf
- Foundation Soil Friction Angle = 28 degrees
- Foundation Soil Friction Factor = 0.4

4.10 Weather Considerations

Earthwork and foundation construction activities should be limited during wet and freezing weather. The contractor should anticipate the need to moisture condition fills in order to facilitate compaction. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.11 Design Review and Construction Testing

S.W.COLE ENGINEERING, INC. should be retained to review the final design and specifications to determine that our earthwork and foundation recommendations have been properly interpreted and implemented.

A soils and concrete testing program should also be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE ENGINEERING, INC. is available to observe RAP and driven pile installations for foundations as well as testing services for soils, concrete, asphalt, steel and spray-applied fireproofing construction materials.

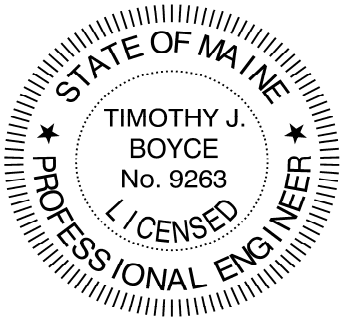
5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during construction.

Sincerely,

S.W.COLE ENGINEERING, INC.

Evan M. Walker, P.E.
Geotechnical Engineer



Timothy J. Boyce, P.E.
Senior Geotechnical Engineer

EMW:tjb

Attachment A
Limitations

This report has been prepared for the exclusive use of J.B. Brown & Sons, Inc. for specific application to the Proposed Courtyard by Marriott located at 321 Commercial Street in Portland, Maine. S.W.COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

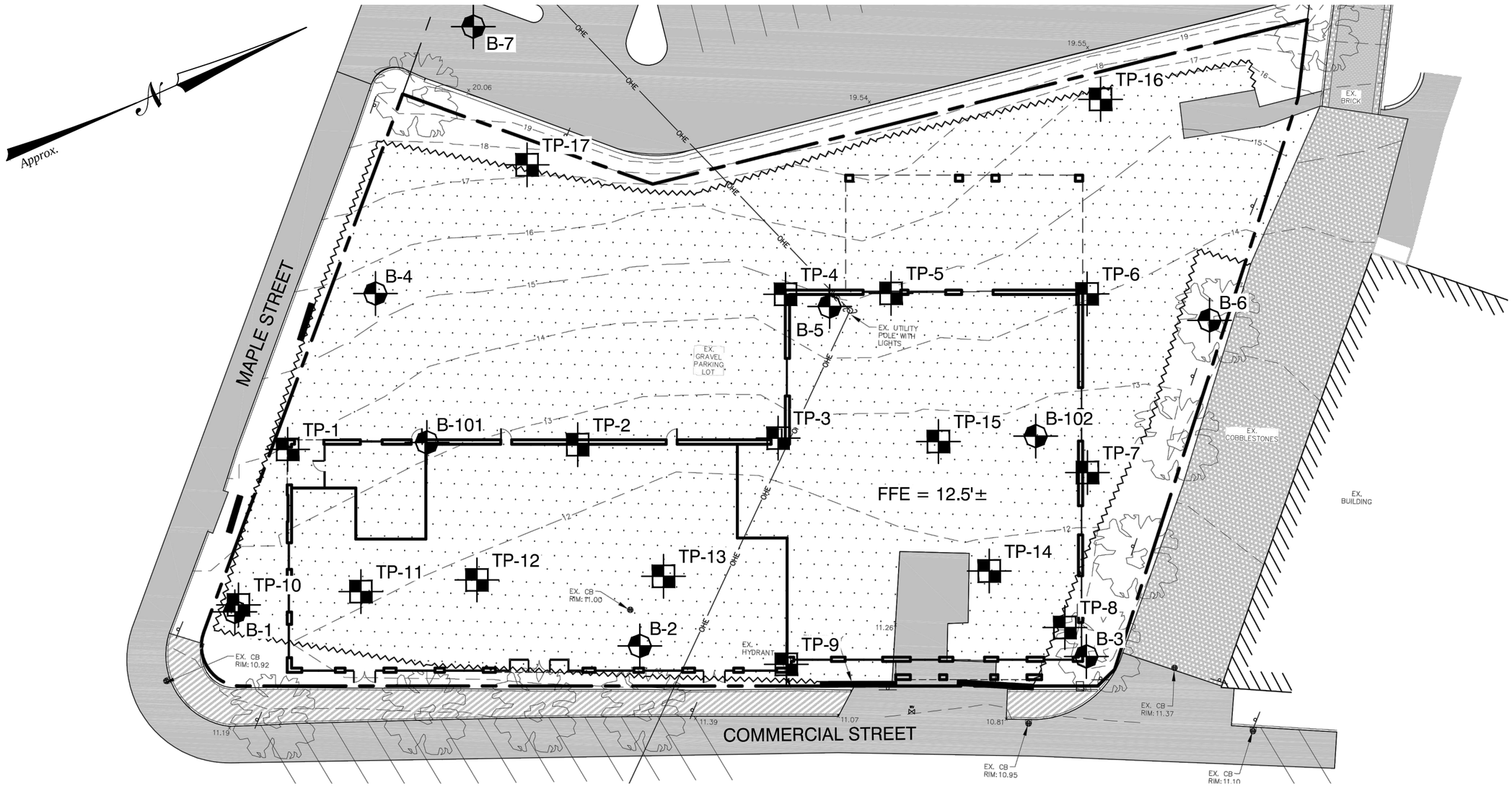
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE ENGINEERING, INC.'s scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE ENGINEERING, INC. should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE ENGINEERING, INC.



LEGEND:

APPROXIMATE BORING LOCATION

APPROXIMATE TEST PIT LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A PLAN OF THE SITE PROVIDED BY OPECHEE CONSTRUCTION CORPORATION, RECEIVED VIA E-MAIL SEPTEMBER 12, 2012 AS A PORTABLE DOCUMENT FORMAT (PDF).
2. THE EXPLORATIONS LOCATIONS WERE SELECTED BY OPECHEE CONSTRUCTION CORPORATION AND S.W. COLE ENGINEERING, INC. AND LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. BORINGS B-1 THROUGH B-7 WERE PERFORMED BY OTHERS, MARCH 2010.
4. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
5. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

J.B. BROWN & SONS, INC.

EXPLORATION LOCATION PLAN

PROPOSED COURTYARD BY MARRIOTT
321 COMMERCIAL STREET
PORTLAND, MAINE

Job No.:	08-0494	Scale:	1" = 30'±
Date :	09/28/2013	Sheet:	1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-101**
SHEET: 1 OF 1
PROJECT NO.: 08-0494
DATE START: 9/26/2012
DATE FINISH: 9/26/2012
ELEVATION: 13' +/-
SWC REP.: NBS

PROJECT / CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	300 lbs	24 in
SAMPLER:	SS	1 3/8"	140 lbs	30 in
CORE BARREL:	NQ2	2"		

WATER LEVEL INFORMATION
SOILS SATURATED BELOW 8' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
										BROWN GRAVELLY SAND WITH SOME SILT WITH BRICK (FILL)
	1D	24"	12"	2.0'	8	10	8	5	2.0'	~ MEDIUM DENSE ~
	2D	24"	6"	4.0'	5	5	2	2		~ LOOSE ~
										BROWN GRAVELLY SILTY SAND WITH BRICK (FILL)
	3D	24"	0"	7.0'	7	12	16	10		~ MEDIUM DENSE ~
									8.0'	
	4D	24"	6"	11.0'	2	2	2	2		~ LOOSE ~
										w = 25.0%
										DARK GRAY-BROWN SILTY SAND SOME GRAVEL WITH BLACK ORGANICS
										AND WOOD FRAGMENTS AND TRACE BICK (BAY MUD)
	5D	24"	8"	17.0'	3	3	2	4		O = 3.1%, w = 21.9%
									20.5'	
	6D	24"	10"	22.0'	5	12	14	12		w = 8.2%
										GRAY SILTY GRAVELLY SAND (GLACIAL TILL)
									24.0'	~ MEDIUM DENSE ~
	7D	24"	10"	27.0'	12	28	22	17		GRAY SILTY GRAVELLY SAND WITH
										OCCASIONAL COBBLES (GLACIAL TILL)
									29.0'	~ DENSE ~
										WEATHERED BEDROCK - ADVANCE BY ROLLER CONE
									30.5'	
	1R	60"	56"	35.5'						BEDROCK
										(SEE ROCK CORE LOG)
	2R	60"	60"	40.5'					40.5'	BOTTOM OF EXPLORATION @ 40.5'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-101**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-102**
SHEET: 1 OF 1
PROJECT NO.: 08-0494

PROJECT / CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

DATE START: 9/26/2012
DATE FINISH: 9/26/2012
ELEVATION: 13' +/-
SWC REP.: NBS

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	300 lbs	24 in
SAMPLER:	SS	1 3/8"	140 lbs	30 in
CORE BARREL:	NQ2	2"		

WATER LEVEL INFORMATION
SOILS SATURATED BELOW 8' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	24"	18"	2.0'	18	30	29	14		BROWN SILTY GRAVELLY SAND WITH BRICK (FILL) ~ DENSE ~
	2D	24"	8"	4.0'	13	14	15	20	4.0'	
	3D	24"	4"	7.0'	5	6	6	7	8.0'	BROWN SILTY SAND WITH WOOD AND BRICK (FILL) ~ MEDIUM DENSE ~
	4D	24"	0"	9.0'	7	5	2	2		
	5D	24"	8"	12.0'	2	2	2	2		DARK BROWN - BLACK SILTY SAND SOME GRAVEL WITH ORGANICS AND TRACE BRICK (BAY MUD) O = 4.2%, w = 27.5.4% ~ LOOSE ~
									16.0'	
	6D	24"	10"	17.0'	5	3	14	6		GRAY SILTY SAND AND GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE ~
	7D	24"	14"	22.0'	5	11	10	25	22.0'	
									23.5'	WEATHERED BEDROCK - ADVANCE BY ROLLER CONE
									33.5'	BEDROCK (SEE ROCK CORE LOG)
										BOTTOM OF EXPLORATION @ 33.3'

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:
STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-102**

S.W.COLE ENGINEERING, INC.

PROPOSED COURTYARD BY MARRIOTT
J.B. BROWN & SONS, INC.

CORE BOX SUMMARY SHEET 1 OF 1

BORING(S) NO: B-101 & B-102

PROJECT NO & LOCATION: 08-0494 / PORTLAND, ME

LOGGED BY PJO **DATE:** 10/3/2012

CHECKED BY EMW **DATE:** 10/11/2012

PHOTO: B-101 (30.5-40.5') & B-102 (23.5-33.5')

BORING	RUN NO.	CORE SIZE	DEPTH & CORE INTERVAL (FT)	RECOVERY (FT)	RQD (%)	ROCK QUALITY	LITHOLOGIC DESCRIPTION
B-101	R1	NQ2	30.5-35.5 (5)	4.7	78	Good	Gray biotite-chlorite-plagioclase-quartz SCHIST. Moderately hard; fine grained; slightly weathered. Quartz veins and foliation parallel fractures at 60, 70 and 90 degrees from horizontal.
	R2		35.5-40.5 (5)	5.0	88	Good	Same as R1.
B-102	R1		23.5-25 (1.5)	1.3	38	Poor	Gray biotite-chlorite-plagioclase-quartz SCHIST. Moderately hard; fine grained; moderate to closely spaced fractures; slightly weathered.
	R2		25-27 (2)	1.6	40	Poor	Same as R1, highly fractured.
	R3		27-30.5 (3.5)	3.5	77	Good	Fracture surfaces stained with iron oxide. Fracture angles at 60-70 degrees from parallel.
	R4		30.5-33.5 (3.0)	2.3	55	Fair	Same as R3.

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-1

DATE: 9/26/2012 SURFACE ELEVATION: 14' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN SAND SOME SILT AND GRAVEL TRACE ORGANICS (FILL)	
		0.8'		
		1.2'	32" THICK CONCRETE AND BRICK MASONRY WALL RUNNING PARALLEL WITH MAPLE STREET BROWN SILTY SAND SOME GRAVEL WITH BRICK, METAL, WOOD, COAL CLINKER (FILL)	
		8.2'		
			APPARENT WALL FOOTING @ 8.2'	

COMPLETION DEPTH: 8.2' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-2

DATE: 9/26/2012 SURFACE ELEVATION: 13' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5'	BROWN SAND SOME SILT AND GRAVEL (FILL)	
			20" THICK CONCRETE WALL RUNNING NE-SW AT LEAST 18' LONG DARK BROWN SILTY GRAVELLY SAND WITH BRICK, METAL, CONCRETE (FILL)	
		6.5'		
			APPARENT WALL FOOTING @ 6.5'	

COMPLETION DEPTH: 6.5' DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-3

DATE: 9/26/2012 SURFACE ELEVATION: 13' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN GRAVELLY SAND SOME SILT (FILL)	
		1.5'	WITH ASPHALT LAYER AT 1.5'	
S1	3'-5'		DARK GRAY-BROWN AND BLACK SILTY SAND SOME GRAVEL AND COBBLES WITH ASH, BRICK, WOODEN TIMBERS, METAL RAIL ~ PETROLEUM ODOR NOTED ~ (FILL)	
		6.0'		
		6.9'	GRAY-BROWN SILTY SAND SOME GRAVEL WITH SILTY CLAY POCKETS WITH ASH AND BRICK (FILL)	

COMPLETION DEPTH: 6.9' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-4

DATE: 9/26/2012 SURFACE ELEVATION: 15' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN SILTY SAND SOME GRAVEL (FILL)	
		1.0'		
			BROWN SILTY GRAVELLY SAND WITH BRICK, PLASTIC DEBRIS, CONCRETE, GLASS (FILL)	
		2.9'		
			REFUSAL ON ASPHALT LAYER @ 2.9' RELIC CONCRETE FOOTINGS ON NORTHWEST AND SOUTHWEST SIDES OF TEST PIT	

COMPLETION DEPTH: 2.9' (REFUSAL) DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-5

DATE: 9/26/2012 SURFACE ELEVATION: 15' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			GRAY-BROWN GRAVELLY SAND SOME SILT (FILL)	
		0.8'		
			BROWN SILTY SAND SOME GRAVEL WITH BRICK AND WOOD DEBRIS (FILL)	
		3.8'		
			REFUSAL @ 3.8' ON PROBABLE CONCRETE SLAB/RUBBLE	

COMPLETION DEPTH: 3.8' (REFUSAL) DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-6

DATE: 9/26/2012 SURFACE ELEVATION: 14' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN GRAVELLY SAND SOME SILT WITH DISCONTINUOUS RELIC ASPHALT LAYER (FILL)	
		1.5'		
			BROWN SILTY SAND SOME GRAVEL WITH BRICK, INTACT PIECES OF BRICK WALL, WOODEN TIMBERS, METAL DEBRIS (FILL)	
		7.0'		

COMPLETION DEPTH: 7.0' DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-7

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.2'	BROWN GRAVELLY SAND SOME SILT (FILL)	
			BROWN SILTY SAND SOME GRAVEL WITH WOOD, BRICK METAL, STYROFOAM (FILL)	
		5.5'		
			5"-DIAMETER STEEL PIPE CROSSING BOTTOM OF TEST PIT EXPLORATION TERMINATED @ 5.5'	

COMPLETION DEPTH: 5.5' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-8

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5'	BROWN GRAVELLY SAND SOME SILT TRACE ORGANICS (FILL)	
			BROWN SILTY SAND SOME GRAVEL WITH WOOD, BRICK, ROOTS, METAL PIPE, CONCRETE PIECES (FILL)	
		6.2'		

COMPLETION DEPTH: 6.2' DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-9

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN AND BLACK SAND SOME SILT AND GRAVEL TRACE ORGANICS	
		0.8'	(FILL)	
			BROWN SILTY SAND TRACE GRAVEL WITH WOOD AND BRICK	
			(FILL)	
		6.4'		

COMPLETION DEPTH: 6.4' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-10

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5'	BROWN SILTY SAND TRACE GRAVEL WITH TRACE ORGANICS	
			BROWN SILTY SAND SOME GRAVEL WITH BRICK, METAL DEBRIS, STYROFOAM	
			(FILL)	
		7.0'		
			GRAY-BROWN SILTY SAND SOME GRAVEL WITH TRACE BRICK	
		7.5'	AND BLACK ORGANIC POCKETS	

COMPLETION DEPTH: 7.5' DEPTH TO WATER: SEEPAGE/PONDING @ 7.0'

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-11

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN SILTY SAND TRACE GRAVEL (FILL)	
		0.8'		
		2.8'	BROWN SILTY SAND SOME GRAVEL WITH BRICK, CMU PIECES, METAL WIRE AND REBAR (FILL)	
			2' THICK CONCRETE WALL WITH CMU FACING RUNNING NE-SW	
		5.3'	APPARENT WALL FOOTING @ 5.3'	

COMPLETION DEPTH: 5.3' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-12

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5'	BROWN SILTY SAND TRACE GRAVEL (FILL)	
S1	2'-5'		BROWN SILTY SAND SOME GRAVEL WITH BRICK, METAL DEBRIS, STEEL DRUM PIECES, PAPER, PLASTIC BAGS, WOOD (FILL)	
		6.0'		
			REFUSAL @ 6.0' ON PROBABLE CONCRETE SLAB/RUBBLE	

COMPLETION DEPTH: 6.0' (REFUSAL) DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-13

DATE: 9/26/2012 SURFACE ELEVATION: _____ LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			TP-13 NOT PERFORMED DUE TO CONFLICT WITH EXISTING UTILITIES	

COMPLETION DEPTH: _____ DEPTH TO WATER: _____

TEST PIT TP-14

DATE: 9/26/2012 SURFACE ELEVATION: 12' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			GRAY-BROWN GRAVELLY SAND SOME SILT (FILL)	
		0.8'	BROWN SILTY GRAVELLY SAND WITH COBBLES, BRICK, INTACT BRICK WALL SEGMENTS, METAL PIPE, METAL MESH, WOOD (FILL)	
		5.8'		

COMPLETION DEPTH: 5.8' DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-15

DATE: 9/26/2012 SURFACE ELEVATION: 13' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5'	BROWN GRAVELLY SAND SOME SILT WITH TRACE ASPHALT (FILL)	
		6.3'	BROWN SILTY GRAVELLY SAND WITH COBBLES AND BOULDERS, WOOD, BRICK, CONCRETE, METAL WIRE, STYROFOAM (FILL)	
			3"-DIAMETER STEEL PIPE CROSSING BOTTOM OF TEST PIT EXPLORATION TERMINATED @ 6.3'	

COMPLETION DEPTH: 6.3' DEPTH TO WATER: NO FREE WATER OBSERVED

TEST PIT TP-16

DATE: 9/26/2012 SURFACE ELEVATION: 17' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION		TEST RESULTS
		0.9'	VEGETATION AND BROWN SILTY SAND SOME GRAVEL WITH TRACE BRICK (FILL)		
		3.9'	RELIC CONCRETE SLAB AND FROST WALL	BROWN SILTY GRAVELLY SAND WITH COBBLES, BRICK, METAL	
			REFUSAL @ 3.9' ON RELIC ASPHALT LAYER OR CONCRETE SLAB		

COMPLETION DEPTH: 3.9' (REFUSAL) DEPTH TO WATER: NO FREE WATER OBSERVED

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED COURTYARD BY MARRIOTT / J.B. BROWN & SONS, INC.
LOCATION: 321 COMMERCIAL STREET - PORTLAND, MAINE

SWCE REP: EMW
PROJECT NO. 08-0494

TEST PIT TP-17

DATE: 9/26/2012 SURFACE ELEVATION: 17' +/- LOCATION: SEE ELP

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		1.0'	VEGETATION AND DARK BROWN SILTY SAND SOME GRAVEL WITH ORGANICS (FILL)	
		8.0'	BROWN SILTY SAND SOME GRAVEL WITH BRICK, INTACT BRICK WALL PIECES, CONCRETE, WOOD, METAL, AND ORGANICS (FILL)	
			REFUSAL @ 8.0' ON PROBABLE CONCRETE SLAB/RUBBLE	

COMPLETION DEPTH: 8.0' (REFUSAL) DEPTH TO WATER: NO FREE WATER OBSERVED

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight
f	-	fines content (percent by weight passing U.S. No. 200 Sieve)

Description of Proportions:

0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

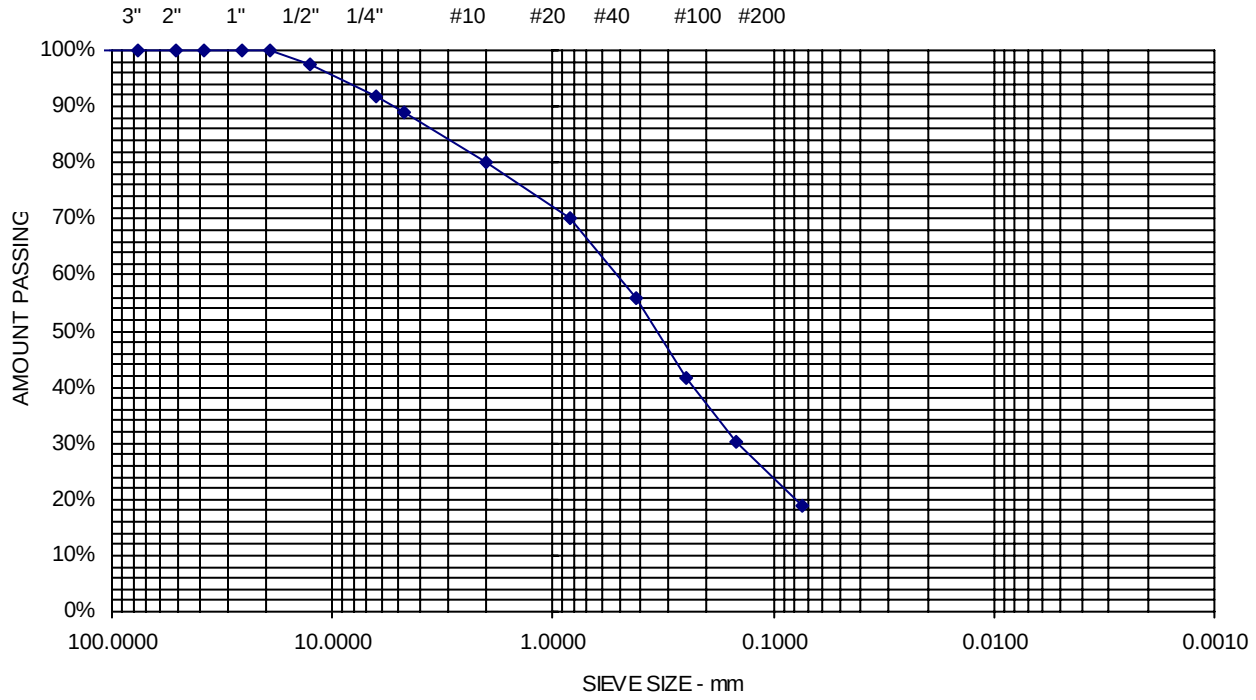
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED COURTYARD BY MARRIOT - GEOTECHNICAL ENGINEERING SERVICES	Project Number	08-0494
Client	J.B. BROWN & SONS	Lab ID	16025G
Exploration	**B-101 4D**	Date Received	10/9/2012
Material Source	**9'-11'**	Date Completed	10/11/2012
		Tested By	CHARLES CROMWELL

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**97**	
6.3 mm	**1/4"**	**92**	
4.75 mm	**No. 4**	**89**	11% Gravel
2.00 mm	**No. 10**	**80**	
850 um	**No. 20**	**70**	
425 um	**No. 40**	**56**	70.1% Sand
250 um	**No. 60**	**41**	
150 um	**No. 100**	**30**	
75 um	**No. 200**	**18.9**	18.9% Fines



Comments: w = 25.0%

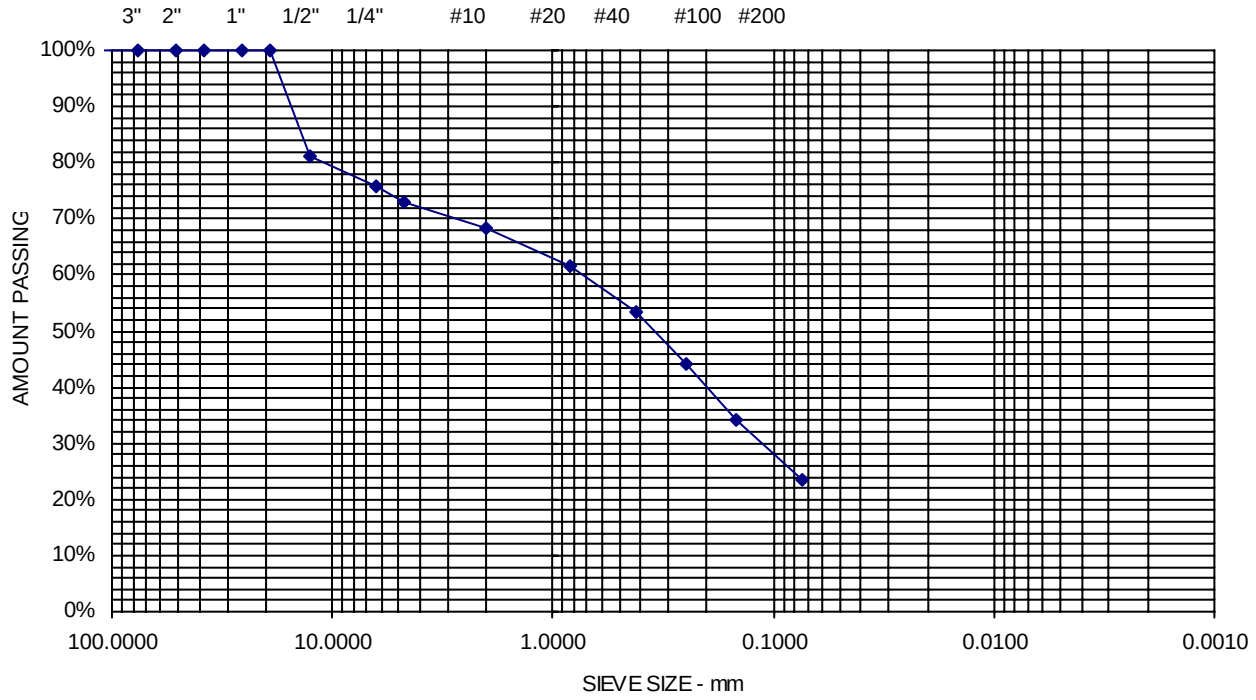
S.W.COLE ENGINEERING, INC.

Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED COURTYARD BY MARRIOT - GEOTECHNICAL ENGINEERING SERVICES	Project Number	08-0494
Client	J.B. BROWN & SONS	Lab ID	16013G
Exploration	**B-101 6D**	Date Received	10/8/2012
Material Source	**20'-22'**	Date Completed	10/11/2012
		Tested By	CHARLES CROMWELL

STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**81**	
6.3 mm	**1/4"**	**76**	
4.75 mm	**No. 4**	**73**	27.2% Gravel
2.00 mm	**No. 10**	**68**	
850 um	**No. 20**	**62**	
425 um	**No. 40**	**53**	49.4% Sand
250 um	**No. 60**	**44**	
150 um	**No. 100**	**34**	
75 um	**No. 200**	**23.5**	23.5% Fines



Comments: w = 8.2%

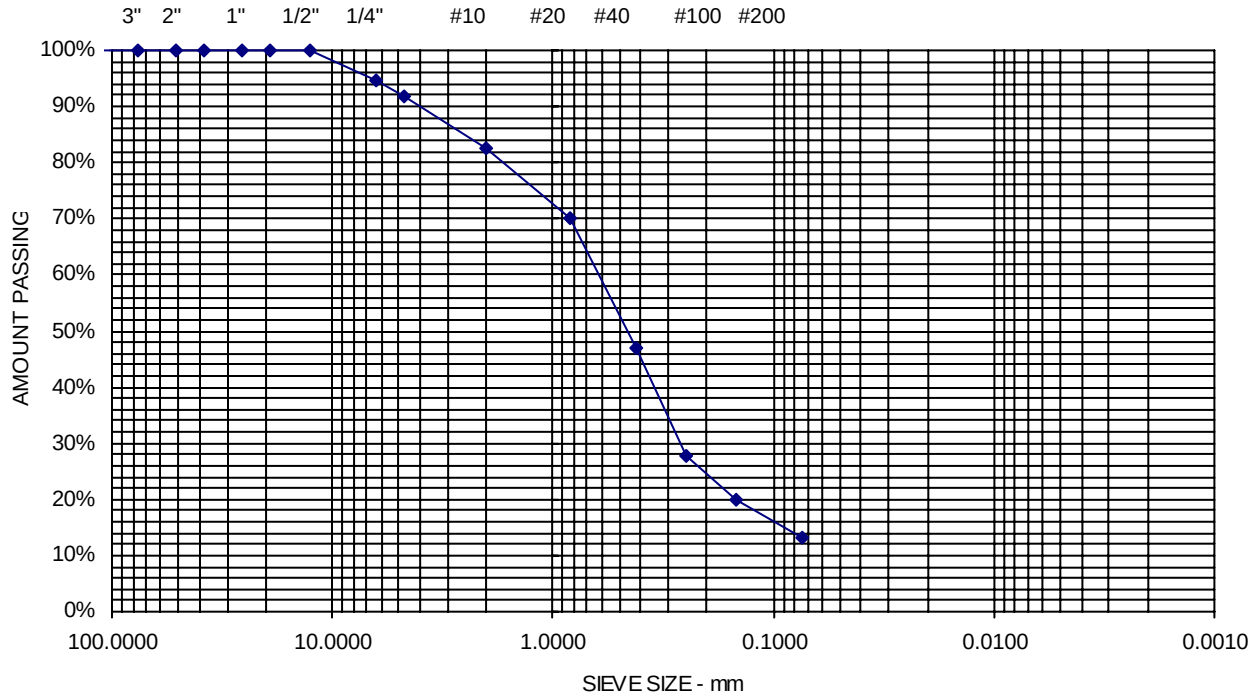
S.W.COLE ENGINEERING, INC.

Report of Gradation

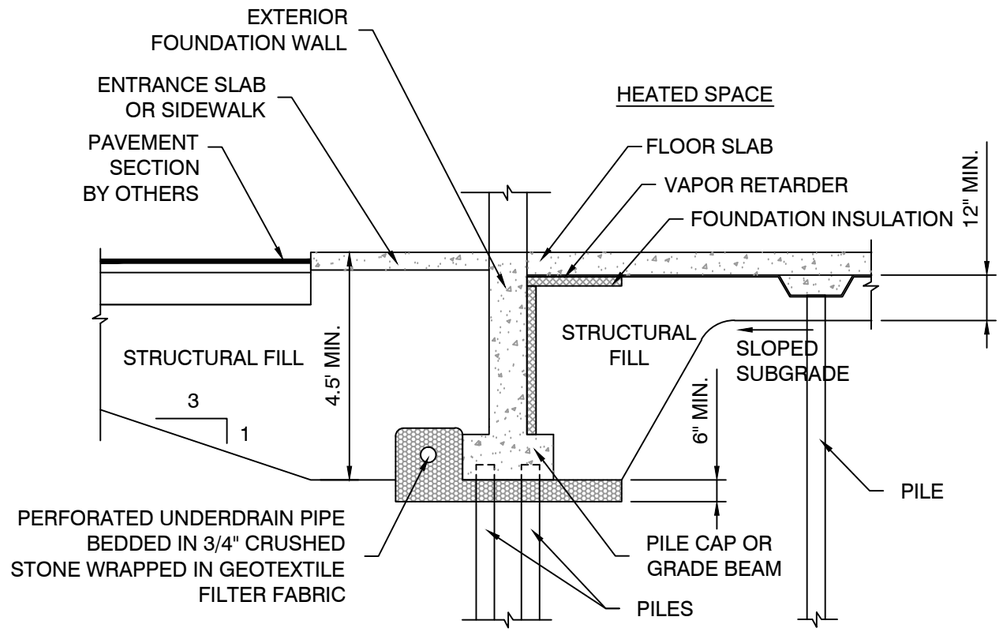
ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED COURTYARD BY MARRIOT - GEOTECHNICAL ENGINEERING SERVICES	Project Number	08-0494
Client	J.B. BROWN & SONS	Lab ID	16026G
Exploration	**B-102 5D**	Date Received	10/9/2012
Material Source	**10'-12'**	Date Completed	10/11/2012
		Tested By	CRAIG TURCOTTE

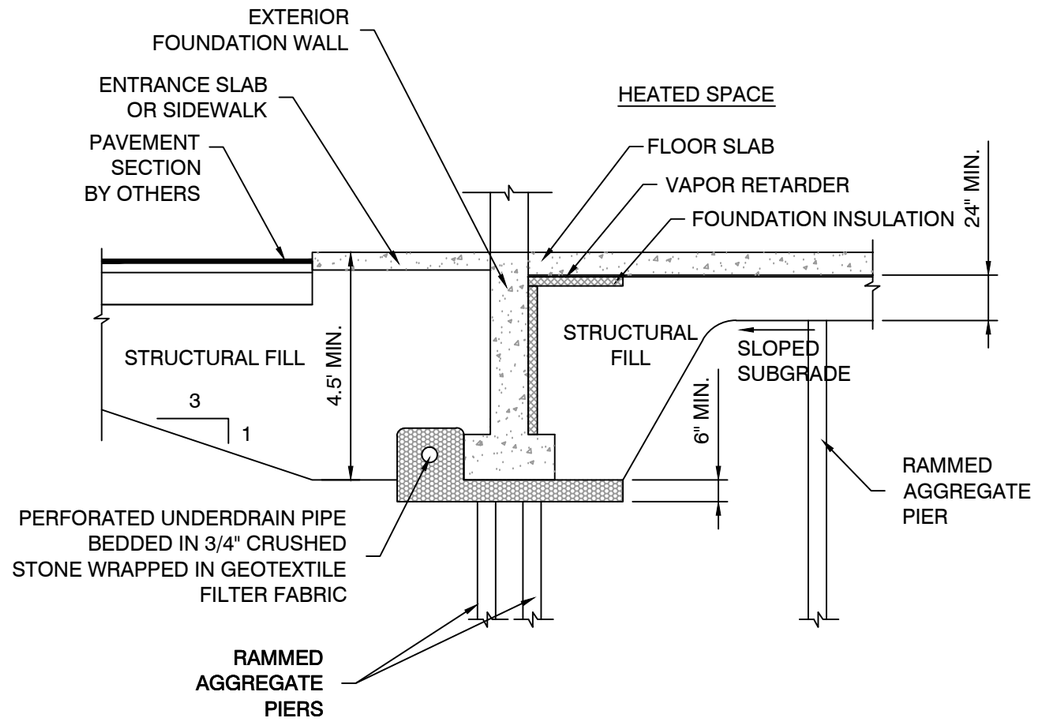
STANDARD DESIGNATION (mm/µm)	SIEVE SIZE	AMOUNT PASSING (%)	
150 mm	**6"**	**100**	
125 mm	**5"**	**100**	
100 mm	**4"**	**100**	
75 mm	**3"**	**100**	
50 mm	**2"**	**100**	
38.1 mm	**1-1/2"**	**100**	
25.0 mm	**1"**	**100**	
19.0 mm	**3/4"**	**100**	
12.5 mm	**1/2"**	**100**	
6.3 mm	**1/4"**	**95**	
4.75 mm	**No. 4**	**92**	8.2% Gravel
2.00 mm	**No. 10**	**83**	
850 um	**No. 20**	**70**	
425 um	**No. 40**	**47**	78.7% Sand
250 um	**No. 60**	**28**	
150 um	**No. 100**	**20**	
75 um	**No. 200**	**13.0**	13% Fines



Comments: w = 27.5%



DRIVEN PILE OPTION



RAMMED AGGREGATE PIER OPTION

NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.
2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

J.B. BROWN & SONS, INC.

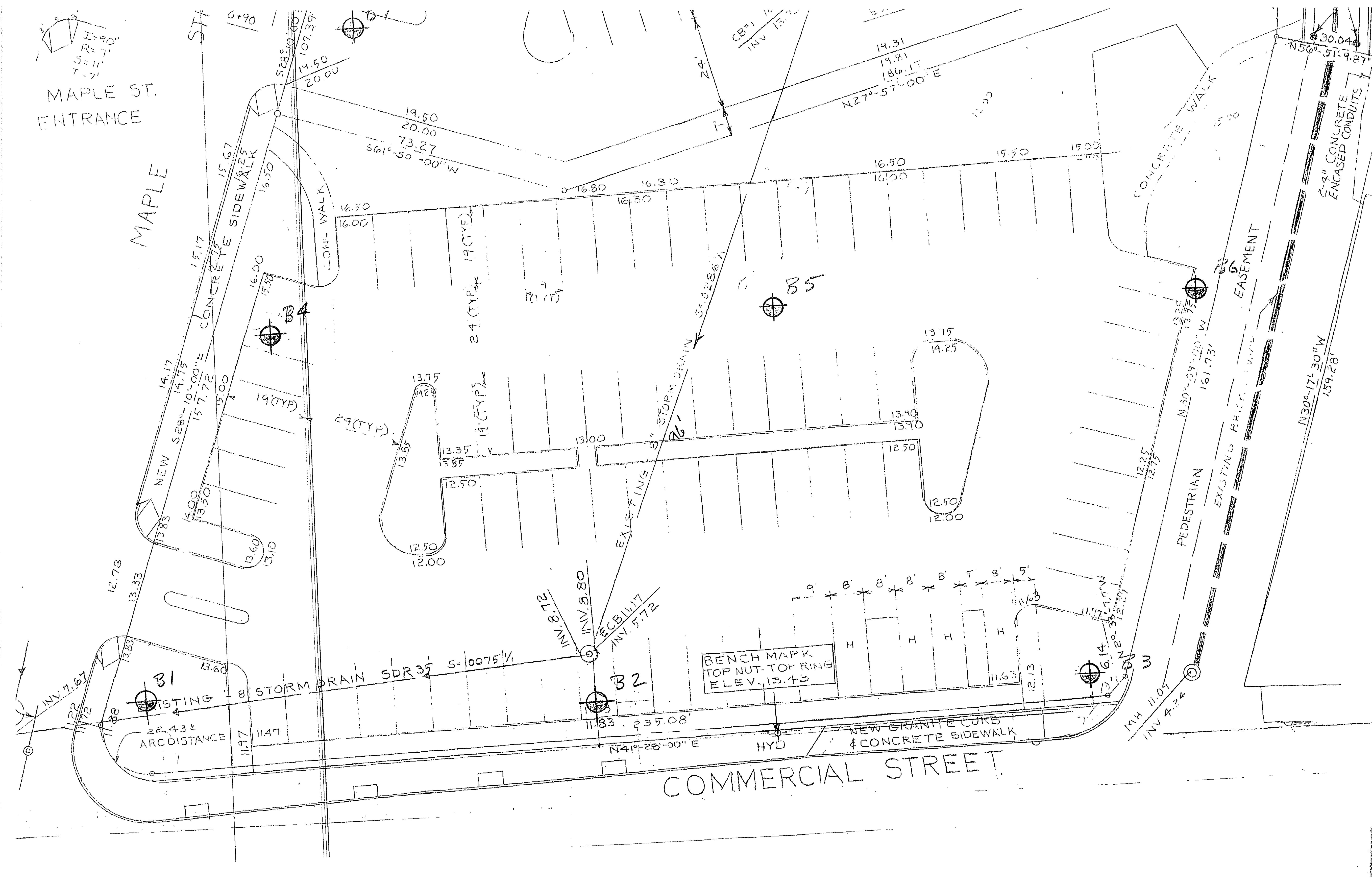
UNDERDRAIN DETAILS

PROPOSED COURTYARD BY MARRIOTT
321 COMMERCIAL STREET
PORTLAND, MAINE

Job No.:	08-0494	Scale:	Not to Scale
Date :	10/12/2012	Sheet:	18

APPENDIX A

PREVIOUS BORING LOGS


MAPLE ST.
ENTRANCE
MAPLE
NEW CONCRETE SIDEWALK
CONC. WALK
CONCRETE WALK
EXISTING 8" STORM DRAIN
EXISTING 8" STORM DRAIN SDR 35
BENCH MARK
TOP NUT-TOP RING
ELEV. 13.43
NEW GRANITE CURB
& CONCRETE SIDEWALK
HYD
COMMERCIAL STREET
PEDESTRIAN
EASEMENT
EXISTING BRICK WALK
2-4" CONCRETE
ENCASED CONDUITS
22.43±
ARC DISTANCE
N41°-28'-00" E
235.08'
N27°-57'-00" E
S61°-50'-00" W
73.27
N30°-17'-30" W
159.28'
161.73'
S28°-10'-00" E
157.72
B1
B2
B3
B4
B5
B6
INV. 8.72
INV. 8.80
ECB 11.17
INV. 5.72
INV 7.67
MH 11.04
INV 4.24
19'(TYP)
24'(TYP)

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B1**

Page 1 of 2

PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/24/2010
DRILLER	M. PORTER	DATE FINISHED	3/24/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

☑ Truck ☐ Tripod ☐ Cat-Head ☑ Safety ☐ Bentonite

☐ ATV ☐ Geoprobe ☑ Winch ☐ Doughnut ☐ Polymer

☐ Track ☐ Air Track ☐ Roller Bit ☐ Automatic ☑ None

☐ Skid ☐ ☑ Cutting Head

Drilling Mud: ☐ Bentonite ☐ Polymer ☑ None

Casing Advance: Type Method Depth — HSA/SPIN/30.0

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	3	S1	0.0			GW	Medium dense, brown well-graded GRAVEL with sand (GW), brick and mortar fragments, mps = 1.3 in., moist	35	25	20	10	10					
	6																
	10				1.5		-FILL-										
	6	8	2.0			SM	Very loose, brown silty SAND (SM), mps = 0.01 in., damp										
5	7	S2	5.0			SM	Loose, brown to olive-brown silty SAND with gravel (SM), mps = 1.25 in., brick, metal, wet	15	15	10	15	20	25				
	2																
	4																
	2	13	7.0														
							-FILL-										
10							Note: debris layer at 10.0 ft., advance HSA to 10.5 ft.										
	1	S3	10.5			GP	Loose, brown to red-brown poorly-graded GRAVEL with sand (GP),	5	45	25	15	5	5				
	1				11.5		wood, bark, mps = 0.75 in., wet -FILL-										
	5					SW-SM	Loose, gray to gray-brown well-graded SAND with silt and gravel (SW-SM), trace wood, brick, mps = 0.5 in., wet		15	20	30	25	10				
	1	18	12.5														
							-HARBOR BOTTOM DEPOSITS-										
15					15.0												
	1	S4	16.0			ML	Very soft, gray to black sandy SILT (ML), trace organics, mps = 2 mm,				15	25	60	S	L	L	
	1				16.9		moderate anaerobic odor, wet -MARINE DEPOSITS-										
	6					SM	Medium dense, gray silty SAND with gravel (SM), mps = 1.0 in.,	15	10	15	20	20	20				
	10	15	18.0				slightly bonded, moist										
							-GLACIAL TILL DEPOSITS-										
20	14	S5	20.0			GW-GM	Dense, gray well-graded GRAVEL with silt and sand (GW-GM), mps = 1.25 in., moist to wet	25	25	15	15	10	10				
	15																
	21																
	21	12	22.0				Note: probable gravel layer at 22.9 ft.										
							-GLACIAL TILL DEPOSITS-										
25	7	S6	25.0			SW	Medium dense, gray well-graded SAND with gravel (SW), mps = 1.25 in., wet	20	15	15	20	25	5				
	11																
	9																
	5	8	27.0														
							-GLACIAL TILL DEPOSITS-										
							Note: probable gravel layer at 28.9 ft.										
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/24/2010	1030	--	30.0	31.2	10.8
3/24/2010	1100	--	--	4.7	3.7

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

Riser Pipe; Screen; Filter Sand; Cuttings; Grout; Concrete; Bentonite Seal

Summary

Overburden (Linear ft.)	30.1
Rock Cored (Linear ft.)	--
Number of Samples	7S
BORING NO.	B1

Field Tests

Dilatancy: R - Rapid S - Slow N - None

Toughness: L - Low M - Medium H - High

Plasticity: N - Nonplastic L - Low M - Medium H - High

Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B1**

Page 2 of 2

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
					30.1												
30	26	S7	30.0				Very dense, gray to olive-brown weathered bedrock										
	45																
	50/2"	11	31.2		31.2		-WEATHERED BEDROCK-										
							Split spoon refusal at 31.2 ft.										
							Bottom of exploration at 31.2 ft. below ground surface										
35																	
40																	
45																	
50																	
55																	
60																	

NOTES:

FILE NO. 10044

BORING NO. B1

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B2**

PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/22/2010
DRILLER	M. PORTER	DATE FINISHED	3/22/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- ☑ Truck ☐ Tripod
- ☐ ATV ☐ Geoprobe
- ☐ Track ☐ Air Track
- ☐ Skid ☐
- ☐ Cat-Head
- ☑ Winch
- ☐ Roller Bit
- ☑ Cutting Head

Hammer Type: ☑ Safety ☐ Doughnut ☐ Automatic

Drilling Mud: ☐ Bentonite ☐ Polymer ☑ None

Casing Advance: Type Method Depth — HSA/SPIN/30.0

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	3	S1	0.0			SW	Medium dense, brown to dark brown well-graded SAND with gravel (SW), brick fragments, mps = 0.75 in., moist	5	20	20	30	25					
	7						-FILL-										
	7																
	19	17	2.0														
							Note: dark brown layer in auger cuttings at 3.5 ft.										
5	7	S2	5.0		5.3	SW	Loose, similar to S1 to 5.3 ft.										
	5				5.8		Loose, brick fragments, ash										
	4					SW-SM	Loose, brown to gray-brown well-graded SAND with silt and gravel (SW-SM), mps = 0.5 in., moist to wet		15	20	25	30	10				
	5	20	7.0				-FILL-										
10	2	S3	10.0		10.2												
	2					SW-SM	Loose, gray-brown well-graded SAND with silt and gravel (SW-SM), mps = 0.75 in., wet	5	20	20	20	25	10				
	3																
	3	15	12.0				-GLACIAL OUTWASH DEPOSITS-										
							Note: running sands in augers										
15	1	S4	15.0			SW/SP	Loose, gray-brown well-graded SAND with gravel (SW) interbedded with poorly-graded SAND (SP), mps = 0.75 in., wet	5	15	25	30	20	5				
	4																
	2																
	3	7	17.0				-GLACIAL OUTWASH DEPOSITS-										
							Note: probable gravel layer at 18.0 ft.										
20	11	S5	20.0			SW/SP	Medium dense, gray-brown well-graded SAND with gravel (SW) interbedded with poorly-graded SAND (SP), mps = 0.75 in., wet	10	15	20	30	20	5				
	6																
	6																
	8	13	22.0				-GLACIAL OUTWASH DEPOSITS-										
25	6	S6	25.0			SP	Medium dense, gray poorly-graded SAND (SP), mps = 1 mm, wet				10	90					
	15				25.6		-GLACIAL OUTWASH DEPOSITS-										
	14				26.8	SM	Medium dense, gray-brown to olive-brown silty SAND with gravel (SM), mps = 1.0 in., moist	10	5		15	40	30				
	14	14	27.0				-GLACIAL TILL DEPOSITS-										
							Medium dense, weathered bedrock										
							-WEATHERED BEDROCK-										
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/22/2010	1245	--	25.0	27.0	11.0
3/22/2010	1340	--	--	8.3	7.1

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

Summary

Overburden (Linear ft.)	26.8
Rock Cored (Linear ft.)	--
Number of Samples	7S
BORING NO.	B2

Field Tests

Dilatancy: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B2**

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
30	32	S7	30.0				Very dense, red-brown to gray weathered bedrock										
	71																
	68						-WEATHERED BEDROCK-										
	119	6	32.0														
							Bottom of exploration at 32.0 ft. below ground surface No refusal										
35																	
40																	
45																	
50																	
55																	
60																	

NOTES:

FILE NO. 10044

BORING NO. B2

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B3**

Page 1 of 2

PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/22/2010
DRILLER	M. PORTER	DATE FINISHED	3/22/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- ☑ Truck ☐ Tripod
- ☐ ATV ☐ Geoprobe
- ☐ Track ☐ Air Track
- ☐ Skid ☐
- ☐ Cat-Head
- ☑ Winch
- ☐ Roller Bit
- ☑ Cutting Head

Hammer Type: ☑ Safety ☐ Doughnut ☐ Automatic

Drilling Mud: ☐ Bentonite ☐ Polymer ☑ None

Casing Advance — Type Method Depth: HSA/SPIN/35.0

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	1	S1	0.0			SW	Loose, brown to dark brown well-graded SAND with gravel (SW), mps = 0.75 in., brick fragments, moist	5	20	20	30	25					
	5						-FILL-										
	4																
	2	11	2.0														
5	7	S2	5.0		5.3	SW	Very loose, similar to S1 to 5.3 ft.										
	2					SM	Very loose, brown to yellow-brown silty SAND with gravel (SM), brick fragments, trace organics, mps = 1.25 in., moist to wet	10	10	15	25	25	15				
	2																
	2	9	7.0														
							-FILL-										
10	50/2"	S3	10.0			SM	Similar to S2. Split spoon refusal on brick fragment.										
		2	10.2														
							-FILL-										
15	1	S4	15.0		15.2												
	2					ML	Medium stiff, brown to gray-brown sandy SILT (ML), trace brick fragments and organics, mps = 0.25 in., moist to wet			5	10	15	70	S	L	L	
	4				16.7		-HARBOR BOTTOM DEPOSITS-										
	5	24	17.0			SW-SM	Loose, gray-brown well-graded SAND with silt (SW-SM), mps = 0.25 in., wet		5	20	35	25	15				
							-HARBOR BOTTOM DEPOSITS-										
20	13	S5	20.0			ML	Medium dense, gray-brown to gray sandy SILT (ML), mps = 1.3 in., wet	5	5	5	10	15	60	S	L	L	
	8																
	16																
	23	12	22.0														
							-HARBOR BOTTOM DEPOSITS-										
25	5	S6	25.0			SP	Medium dense, dark brown poorly-graded SAND (SP), mps = 2 mm, wet, trace brick fragments and organics, slight anaerobic odor				30	70					
	8																
	9				26.2		-HARBOR BOTTOM DEPOSITS-										
	11	22	27.0			SW-SM	Medium dense, gray to gray-brown well-graded SAND with silt and gravel (SW-SM), mps = 1.25 in., wet										
							-GLACIAL TILL DEPOSITS-										
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/22/2010	1440	--	15.0	17.0	13.8
3/22/2010	1550	--	--	26.0	16.6

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (Linear ft.)	31.3
Rock Cored (Linear ft.)	--
Number of Samples	7S
BORING NO.	B3

Field Tests — Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B3**

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
30	4	S7	30.0			SM	Medium dense, gray to gray-brown silty SAND with gravel (SM), mps =	10	15	10	20	25	20				
	7						1.0 in., wet										
	13				31.3		-GLACIAL TILL DEPOSITS-										
	17	13	32.0				Medium dense, gray-brown to white weathered bedrock										
							-WEATHERED BEDROCK-										
35					35.0												
	50/0	NR	35.0				Split spoon refusal at 35.0 ft.										
							Bottom of exploration at 35.0 ft. below ground surface										
40																	
45																	
50																	
55																	

NOTES:

FILE NO. 10044

BORING NO. B3

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B4**

Page 1 of 1

PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/23/2010
DRILLER	M. PORTER	DATE FINISHED	3/23/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- ☑ Truck ☐ Tripod
- ☐ ATV ☐ Geoprobe
- ☐ Track ☐ Air Track
- ☐ Skid ☐
- ☐ Cat-Head
- ☑ Winch
- ☐ Roller Bit
- ☑ Cutting Head

Hammer Type: ☑ Safety ☐ Doughnut ☐ Automatic

Drilling Mud: ☐ Bentonite ☐ Polymer ☑ None

Casing Advance: Type Method Depth: HSA/SPIN/25.0

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	3	S1	0.0			SW	Medium dense, brown well-graded SAND with gravel (SW), mps = 1.3 in., brick and mortar fragments, steel, plastic, wet	15	15	20	30	20					
	9						-FILL-										
	8																
	7	10	2.0														
5	10	S2	5.0			SW	Medium dense, brown well-graded SAND with gravel (SW), mps = 1.3 in., brick, mortar and ceramic fragments, wet	15	15	20	30	20					
	6																
	8																
	7	9	7.0														
							-FILL-										
10	2	S3	10.0			SW	Loose, brown to gray and black well-graded SAND with gravel (SW), brick, ash, cotton, mps = 1.3 in., wet	20	20	20	25	15					
	3																
	2				11.2		-FILL-										
	4	10	12.0		11.8	SW-SM	Loose, well-graded SAND with silt (SW-SM), mps = 0.25 in., wet		5	20	35	30	10				
							-HARBOR BOTTOM DEPOSITS-										
15	8	S4	15.0			SW-SM	Loose, gray-brown well-graded SAND with silt and gravel (SW-SM), mps = 0.75 in., wet	15	25	15	15	20	10				
	5				15.8												
	2					ML	Loose, gray to black sandy SILT (ML), occasional poorly-graded sand layers, wood, organics, moderate anaerobic odor, mps = 1.0 in., wet		5	10	20	15	50	S	L	L	
	5	15	17.0														
							-HARBOR BOTTOM DEPOSITS-										
					19.5												
20	13	S5	20.0			SM	Medium dense, gray silty SAND with gravel (SM), mps = 1.25 in., wet, occasional silt layers	15	10	10	20	15	30				
	8																
	7																
	9	14	22.0														
							-GLACIAL TILL DEPOSITS-										
					24.0												
25	46	S6	25.0				Very dense, gray to gray-brown weathered bedrock										
	50/1"	7	25.6		25.6		-WEATHERED BEDROCK-										
							Split spoon refusal on bedrock at 25.6 ft.										
							Bottom of exploration at 25.6 ft. below ground surface										
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/23/2010	1135	--	25.0	25.6	16.0
3/23/2010	1150	--	--	16.0	5.2

Sample ID

- O Open End Rod
- T Thin Wall Tube
- U Undisturbed Sample
- S Split Spoon Sample
- G Geoprobe
- FV Field Vane

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (Linear ft.)	24.0
Rock Cored (Linear ft.)	--
Number of Samples	6S

BORING NO. B4

Field Tests — Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B5**

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PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/23/2010
DRILLER	M. PORTER	DATE FINISHED	3/23/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- [x] Truck
- [ ] ATV
- [ ] Track
- [ ] Skid
- [ ] Tripod
- [ ] Geoprobe
- [ ] Air Track
- [ ] Cat-Head
- [x] Winch
- [ ] Roller Bit
- [x] Cutting Head

Hammer Type: [x] Safety [ ] Doughnut [ ] Automatic

Drilling Mud: [ ] Bentonite [ ] Polymer [x] None

Casing Advance: Type Method Depth — HSA/SPIN/21.9

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	8	S1	0.0			SW	Medium dense, brown well-graded SAND with gravel (SW), mps = 1.3	10	25	20	30	15					
	8						in., brick and mortar fragments, wet										
	14						-FILL-										
	8	9	2.0														
5	8	S2	5.0			SW	Medium dense, brown to gray and black well-graded SAND with gravel	10	15	20	30	20	5				
	16						(SW), brick, wood, ash, mps = 1.3 in., wet										
	11																
	9	11	7.0				-FILL-										
10	3	S3	10.0		10.3	SW	Similar to S2, mps = 0.75 in., wet -FILL-										
	WOH					SM	Very loose, gray silty SAND with gravel (SM), mps = 0.5 in., wet		15	15	20	30	20				
	1																
	1	19	12.0				-HARBOR BOTTOM DEPOSITS-										
15	2	S4	15.0			SM	Loose, gray to gray-brown silty SAND (SM), mps = 0.5 in., wet		5	15	25	30	25				
	2						-HARBOR BOTTOM DEPOSITS-										
	3				16.2												
	50/4"	21	16.8			SW-SM	Very dense, dark brown well-graded SAND with silt and gravel (SW-SM),	15	15	15	25	20	10				
					17.2		wood, slag, mps = 1.3 in., wet -HARBOR BOTTOM DEPOSITS-										
							-HARBOR BOTTOM DEPOSITS-										
20	1	S5	20.0			SM	Loose, gray to dark brown silty SAND (SM), mps = 0.75 in., wet,	15	10	10	20	15	30				
	4				21.0		trace organics, slight anaerobic odor										
	50/5"	17	21.4				Very dense, olive-brown weathered bedrock										
					21.9		-WEATHERED BEDROCK-										
							HSA refusal on bedrock at 21.9 ft.										
							Bottom of exploration at 21.9 ft. below ground surface										
25																	
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/23/2010	1000	--	--	9.0	7.4

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (Linear ft.)	21.0
Rock Cored (Linear ft.)	--
Number of Samples	5S
BORING NO.	B5

Field Tests

Dilatancy: R - Rapid S - Slow N - None

Toughness: L - Low M - Medium H - High

Plasticity: N - Nonplastic L - Low M - Medium H - High

Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B6**

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PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/23/2010
DRILLER	M. PORTER	DATE FINISHED	3/23/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- [x] Truck
- [ ] ATV
- [ ] Track
- [ ] Skid
- [ ] Tripod
- [ ] Geoprobe
- [ ] Air Track
- [ ] Cat-Head
- [x] Winch
- [ ] Roller Bit
- [x] Cutting Head

Hammer Type: [x] Safety [ ] Doughnut [ ] Automatic

Drilling Mud: [ ] Bentonite [ ] Polymer [x] None

Casing Advance: Type Method Depth — HSA/SPIN/18.2

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	7	S1	0.0			SW	Medium dense, brown well-graded SAND with gravel (SW), mps = 1.25 in., brick fragments, wet	15	15	20	25	25					
	11																
	17						-FILL-										
	14	11	2.0														
							Note: debris layer from 2.5 to 3.8 ft.- bricks, wood, cotton batts										
5	5	S2	5.0			SW	Medium dense, brown well-graded SAND with gravel (SW), mps = 1.25 in., brick, wood, moist	15	15	20	25	25					
	8																
	6																
	7	10	7.0				Note: layer of bricks, wood at 7.0 ft.										
							-FILL-										
10	3	S3	10.0			SW-SM	Loose, dark brown to black well-graded SAND with silt and gravel (SW-SM), wood, ash, mps = 1.0 in., wet	10	15	20	25	20	10				
	6																
	4						-FILL-										
	2	12	12.0				Note: debris layer at 12.4 ft.										
15	8	S4	15.0			GW	Dense, brown to gray and black well-graded GRAVEL with sand (GW), brick fragments, wood, ash, mps = 1.25 in., wet -FILL-	30	20	15	20	10	5				
	22				15.8												
	50/2"	14	16.2		16.2	SW	Very dense, gray-brown to gray well-graded SAND with gravel (SW), trace wood, ash, mps = 1.0 in., wet -HARBOR BOTTOM DEPOSITS-										
							Split spoon refusal at 16.2 ft.										
							-WEATHERED BEDROCK-										
					18.2												
							HSA refusal on bedrock at 18.2 ft.										
20							Bottom of exploration at 18.2 ft. below ground surface										
25																	
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/23/2010	0840	--	--	11.0	8.2

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (Linear ft.)	16.2
Rock Cored (Linear ft.)	--
Number of Samples	4S
BORING NO.	B6

Field Tests

Dilatancy: R - Rapid S - Slow N - None

Toughness: L - Low M - Medium H - High

Plasticity: N - Nonplastic L - Low M - Medium H - High

Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.

SEBAGO TECHNICS, INC.

TEST BORING REPORT

BORING NO. **B7**

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PROJECT	OFFICE BUILDING AND GARAGE	STI JOB NO.	10044
LOCATION	321 COMMERCIAL STREET, PORTLAND, MAINE	PROJECT MGR.	K. RECKER
CLIENT	J. B. BROWN & SONS	FIELD REP.	R. ESTES
CONTRACTOR	MAINE TEST BORINGS, INC.	DATE STARTED	3/25/2010
DRILLER	M. PORTER	DATE FINISHED	3/25/2010

Elevation ft. Datum — Boring Location See Plan

Item	Casing	Sampler	Core Barrel
Type	HSA	SS	
Inside Diameter (in.)	2.5	1.375	
Hammer Weight (lb.)		140	
Hammer Fall (in.)		30	

Rig Make & Model: Mobile B53

- ☑ Truck ☐ Tripod ☐ Cat-Head
- ☐ ATV ☐ Geoprobe ☑ Winch
- ☐ Track ☐ Air Track ☐ Roller Bit
- ☐ Skid ☐ ☑ Cutting Head

Hammer Type: ☑ Safety ☐ Doughnut ☐ Automatic

Drilling Mud: ☐ Bentonite ☐ Polymer ☑ None

Casing Advance: Type Method Depth — HSA/SPIN/19.4

Drilling Notes:

Depth (ft.)	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft.)	Well Diagram	Stratum Change (ft.)	USCS Symbol	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					0.3		-BITUMINOUS CONCRETE-										
	19	S1	0.5			SW	Very dense, yellow-brown well-graded SAND with gravel (SW), mps =	5	25	25	30	15					
	35				1.5		1.25 in., moist -FILL-										
	35					SW	Very dense, dark brown well-graded SAND with gravel (SW), mps = 0.75		20	20	30	25	5				
	21	19	2.5				in., brick fragments, ash, moist			20	30	25					
							-FILL-										
5	10	S2	5.0			SW	Medium dense, brown to dark brown well-graded SAND with gravel (SW),	15	20	40	20	15					
	10						mps = 1.3 in., brick and mortar, wood, ash, moist										
	9																
	8	11	7.0														
							-FILL-										
10	2	S3	10.0			SW	Very loose, brown to dark brown well-graded SAND with gravel (SW),	25	20	20	25	10					
	1						wood, brick and mortar fragments, mps = 1.3 in., wet										
	1																
	4	6	12.0				-FILL-										
							Note: debris layer from 12.2 to 13.8 ft.										
					13.8												
15	2	S4	15.0			ML	Loose, gray sandy SILT (ML), mps = 3 mm, brick, wood, ash, moist to				10	20	70	S	L	L	
	1						wet										
	2				16.7		-HARBOR BOTTOM DEPOSITS-										
	2	24	17.0			OL	Soft, black organic soil, wood, wet						100				
							-HARBOR BOTTOM DEPOSITS-										
					19.2												
20					19.4		-WEATHERED BEDROCK-										
							HSA refusal on bedrock at 19.4 ft.										
							Bottom of exploration at 19.4 ft. below ground surface										
25																	
30																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth in feet to: Bottom of Casing	Bottom of Hole	Water
3/25/2010	1255	--	--	15.2	11.5

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe
FV	Field Vane

Well Diagram

- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

Summary

Overburden (Linear ft.)	19.2
Rock Cored (Linear ft.)	--
Number of Samples	4S
BORING NO.	B7

Field Tests — Dilatancy: R - Rapid S - Slow N - None; Toughness: L - Low M - Medium H - High; Plasticity: N - Nonplastic L - Low M - Medium H - High; Dry Strength: N - None L - Low M - Medium H - High V - Very High

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil identifications based on visual-manual methods of the USCS system as practiced by Sebago Technics, Inc.