REPORT

September 08, 2015
15-0577 S

Explorations and Geotechnical Engineering Services

Proposed Gymnasium and Lower School Replacement
Waynflete School
360 Spring Street
Portland, Maine

PREPARED FOR:
Scott Simons Architects
Attention: Austin Smith
75 York Street
Portland, ME 04101

PREPARED BY:
S. W. Cole Engineering, Inc.
286 Portland Road
Gray, ME 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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15-0577 S

September 08, 2015

Scott Simons Architects
Attention: Austin Smith
75 York Street
Portland, ME 04101

Subject: Explorations and Geotechnical Engineering Services
Proposed Gymnasium and Lower School Replacement
Waynflete School
360 Spring Street
Brewer, Maine

Dear Austin:

In accordance with our Proposal dated June 23, 2015, we have performed subsurface explorations for the subject project. This report summarizes 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 services 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 services included the review of previous explorations performed for the nearby Arts Building, making of four test boring explorations, laboratory testing, geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Proposed Construction

We understand the existing high bay, steel and masonry gymnasium will be razed to allow for the construction of a new gymnasium. We understand the existing gymnasium is on the order of 60 by 60 feet in plan dimensions and that the new gymnasium will cover approximately the same footprint. We also understand the new gymnasium floor will be at elevation 130.4 ft. (project datum), which is about 6 feet lower than the exiting gymnasium. A portion of the gymnasium will be at elevation 141.6 feet.

We understand the southerly portion of the two-story lower school will be removed and replaced with a new two-story structure. We understand the new structure will be irregularly shaped and cover a footprint on the order of 90 by 100 feet in plan dimensions. The proposed finish first floor elevation will be 128.1 feet and the finish second floor will be 141.64 feet.

Existing and proposed grades, as well as proposed structural loading information is not available at this time.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Four test borings (B-15-101 to B-15-104) were made at the site on August 8, 2015 by S. W. Cole Explorations, LLC of Londonderry, New Hampshire working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The boring locations were selected by Becker Structural Engineers and established in the field by S.W.COLE. The approximate exploration locations are shown on Sheet 1. Logs of the explorations are attached as Sheets 2 through 6. The elevations shown on the logs were interpolated from the contours shown on Sheet 1. A key to the notes and symbols used on the logs is attached as Sheet 7. Previous explorations performed for the existing Arts Building are provided as Appendix A.

2.2 Testing

The borings were performed using hollow stem augers and the soils were sampled at 2 to 5 foot intervals using Standard Penetration Testing (SPT) techniques. SPT blow counts are shown on the logs. Soil samples obtained from the explorations were

returned to our laboratory for visual classification and testing. Moisture content tests were performed and the results are provided on the test boring logs. Four grain size analysis tests were performed on selected samples of the glacial till soils and results are presented on Sheets 8 through 11.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Surficial Conditions

The site is located at the existing Waynflete School facility off Spring Street in Portland, Maine. The existing gymnasium structure measuring about 60 by 95 feet in plan dimensions will be razed in favor of the new gymnasium. The existing south wing of the classroom building measuring about 60 by 75 feet in plan dimensions will be razed in favor of a new classroom building. The area west of the existing south wing is open and slopes downward from northwest to southeast from about elevation 138 to 127 feet, respectively. Existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

3.2 Subsurface Conditions

The explorations generally encountered surficial topsoil overlying 2.5 to 7 feet of loose to medium dense dark brown silty sand with varying amounts of organics, gravel, brick and wire (fill). Test Boring B-15-102 encountered concrete and brick from 7 to 9 feet in depth. Test Boring B-15-104 encountered medium dense to dense sand with some silt and gravel (fill) from 3 to 7.5 feet. Below the fill materials each boring encountered dense to very dense silty sand with some gravel (glacial till). Test Borings B-15-101 through B-15-104 were terminated in the glacial till at depths of 22, 52, 22 and 22 feet, respectively.

Refer to the attached logs for more detailed descriptions of the subsurface findings.

3.3 Groundwater Conditions

Free water was not observed in the test borings at the time of exploration work. The soils appeared wet at B-15-101 at a depth of about 16 feet below the existing ground surface. Long term groundwater information is not available. It should be anticipated that seasonal groundwater levels will fluctuate, especially during periods of snowmelt and precipitation. Water likely perches atop the dense glacial till soils.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principle geotechnical considerations are:

- Spread footing foundations and on-grade floor slabs bearing on properly prepared subgrades appear appropriate for the proposed construction. Spread footings should bear on 6-inches of compacted Crushed Stone wrapped in a non-woven geotextile fabric such as Mirafi 160N overlying native glacial till. On-grade floor slabs should bear on at least 12-inches of compacted Structural Fill for the Classroom Building and 12-inches of Crushed Stone for the Gymnasium overlying properly prepared subgrades.
- Perimeter foundation underdrains should be provided for the proposed buildings.
- Excavations for the Gymnasium and northern portion of the Classroom Building may require braced shoring. We anticipate soldier piles and lagging will be feasible for shoring. The use of rakes or tie backs may be necessary based upon shoring wall heights. Open cut excavations may be feasible in areas not adjacent to existing streets, utilities and buildings.
- Imported Structural Fill and Crushed Stone will be needed for construction. The existing fill soils and native soils are unsuitable for reuse below the proposed building or as backfill for foundations.

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. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

All topsoil, fill soils, foundations and utilities must be completely removed from beneath the proposed buildings and entrance slabs until undisturbed native glacial till is encountered. The over-excavation should occur downward and outward at a 1H:1V bearing splay from the edge of foundations. S.W.COLE should observe exposed subgrades prior to placement of footings.

4.3 Excavation and Dewatering

Excavation work will generally encounter granular fill and glacial till soils. Saturated soils and groundwater may be encountered in deeper excavations. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier Summer and Fall seasons. Rubber tired construction equipment should not operate directly on the native soils. Final cuts to subgrade elevation in soil should be performed with a smooth-edged bucket to help reduce soil disturbance.

Sumping and pumping dewatering techniques should be adequate to control groundwater in shallower excavations. Controlling the water levels to at least 1 foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. Excavations for the Gymnasium and northern portion of the Classroom building will likely require braced shoring. We anticipate soldier piles and wood lagging will be feasible for shoring. The use of rakes or tie-backs may be necessary based upon shoring wall heights. Open cut excavations may be feasible in areas not adjacent to existing streets, utilities and buildings.

The design, planning and construction of excavations, excavation support and dewatering are the responsibility of the contractor. We recommend the contract documents require engineered shop drawings of shoring and dewatering plans for excavations below groundwater.

4.4 Foundations

We recommend the proposed buildings be supported on spread footings founded on 6-inches of Crushed Stone wrapped in a non-woven geotextile fabric such as Mirafi 160N overlying undisturbed native glacial till subgrades. We recommend the following geotechnical parameters for design consideration:

- Design Frost Depth = 4.5 feet
- Allowable Soil Bearing Pressure = 4 ksf (Crushed Stoner overlying dense glacial till)
- Seismic Site Soil Class = D (IBC 2009)

- Base Friction Factor = 0.40 (compacted Crushed Stone)
- Lateral Earth Pressure = 65 pcf (equivalent fluid pressure)
- Unit Weight of Backfill = 130 pcf (compacted Structural Fill)
- At-Rest Lateral Earth Pressure Coefficient = 0.5 (compacted Structural Fill)
- Internal Friction Angle of Backfill = 30° (compacted Structural Fill)

We estimate total building settlement will be ½-inch or less. Footings should be at least 18-inches in width regardless of bearing pressure.

4.5 Foundation Drainage

We recommend an underdrain system be installed within the outside edge of the geotextile fabric wrapped Crushed Stone layer recommended below perimeter footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the buildings for positive surface water drainage. Below grade foundation walls such as for the Gymnasium should be moisture proofed and a layer of insulation placed on the exterior side of the foundation walls. A general underdrain detail is illustrated on Sheet 12.

4.6 Slab-On-Grade

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 150 pci (pounds per cubic inch) provided the slab is underlain by at least 12-inches of compacted Structural Fill (Classroom Building) and 12-inches of compacted Crushed Stone (Gymnasium) overlying properly prepared subgrades. 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 buildings 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

Entrance slabs adjacent to buildings must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and sidewalks. 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 illustrated on Sheet 12.

4.8 Backfill and Compaction

We recommend the following fill and backfill materials for use during construction:

Structural Fill: Clean, non-frost susceptible, sand and gravel, free of organics and other deleterious materials meeting the following gradation:

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

Structural Fill is recommended for:

- Fill to raise building areas
- Backfill for foundations exposed to freezing temperatures (interior and exterior of perimeter building foundations, as well as outdoor structures such as light pole bases)
- Slab-on-grade base material (Classroom Building)
- Backfill within the frost-free transition zones for building entrances and sidewalks

Crushed Stone: Crushed Stone used around underdrains and beneath the Gymnasium slab and footings should consist of crushed rock meeting the gradation requirements of the MDOT Standard Specifications 703.22 “Underdrain Backfill Type C”.

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. We recommend that basement wall backfill be compacted to between 92 to 95 percent of its maximum dry density as determined by ASTM D-1557 to avoid overstressing the wall. Crushed Stone should be compacted in loose lifts not exceeding 12-inches with 2 to 3 passes of a vibratory plate compactor with a static weight of at least 600 lbs.

4.9 Paved Areas

We anticipate that the paved parking lot will be subjected primarily to passenger car traffic. We offer the following pavement sections for your consideration. The materials are based on Maine Department of Transportation Specifications.

Standard Duty Pavement (Passenger Car Traffic)	
Maine DOT 9.5 mm Superpave 703.09 (50 gyration design)	1.25 Inches
Maine DOT 19.0 mm Superpave 703.09 (50 gyration design)	2.25 Inches
Maine DOT Crushed Aggregate Base 703.06 Type A	6 Inches
Maine DOT Aggregate Subbase 703.06 Type D	12 Inches

Bituminous pavement should be compacted to 92 to 97 percent of its theoretical maximum density as determined by ASTM D-2041. Tack coat is recommended between lifts of asphalt pavement. Base and subbase materials should be compacted according to Section 4.8. Paved areas should be graded to promote surface drainage away from structures.

Frost penetration can be on the order of 4.5 feet or more in this area. In the absence of full depth excavation of frost susceptible soils or use of insulation, frost will penetrate into the subgrade and some frost heaving and pavement distress must be anticipated.

4.10 Weather Considerations

Construction activity should be limited during wet weather and the site soils may require drying before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. 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 should be retained to review the final design and specifications to determine that our earthwork and foundation recommendations have been properly interpreted and implemented.

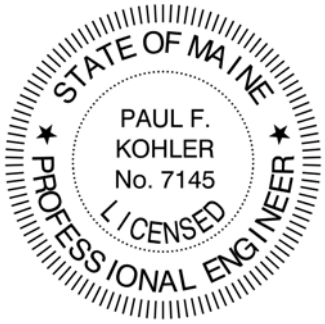
A soils and concrete testing program should also be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to provide subgrade observations for foundations as well as special inspection and material testing services for soils and concrete 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 the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.



Paul F. Kohler, P.E.
Senior Geotechnical Engineer

ATTACHMENT A

Attachment A
Limitations

This report has been prepared for the exclusive use of Scott Simons Architects for specific application to the proposed Gymnasium and Lower School Replacement project at 360 Spring Street in Portland, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil and bedrock 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.

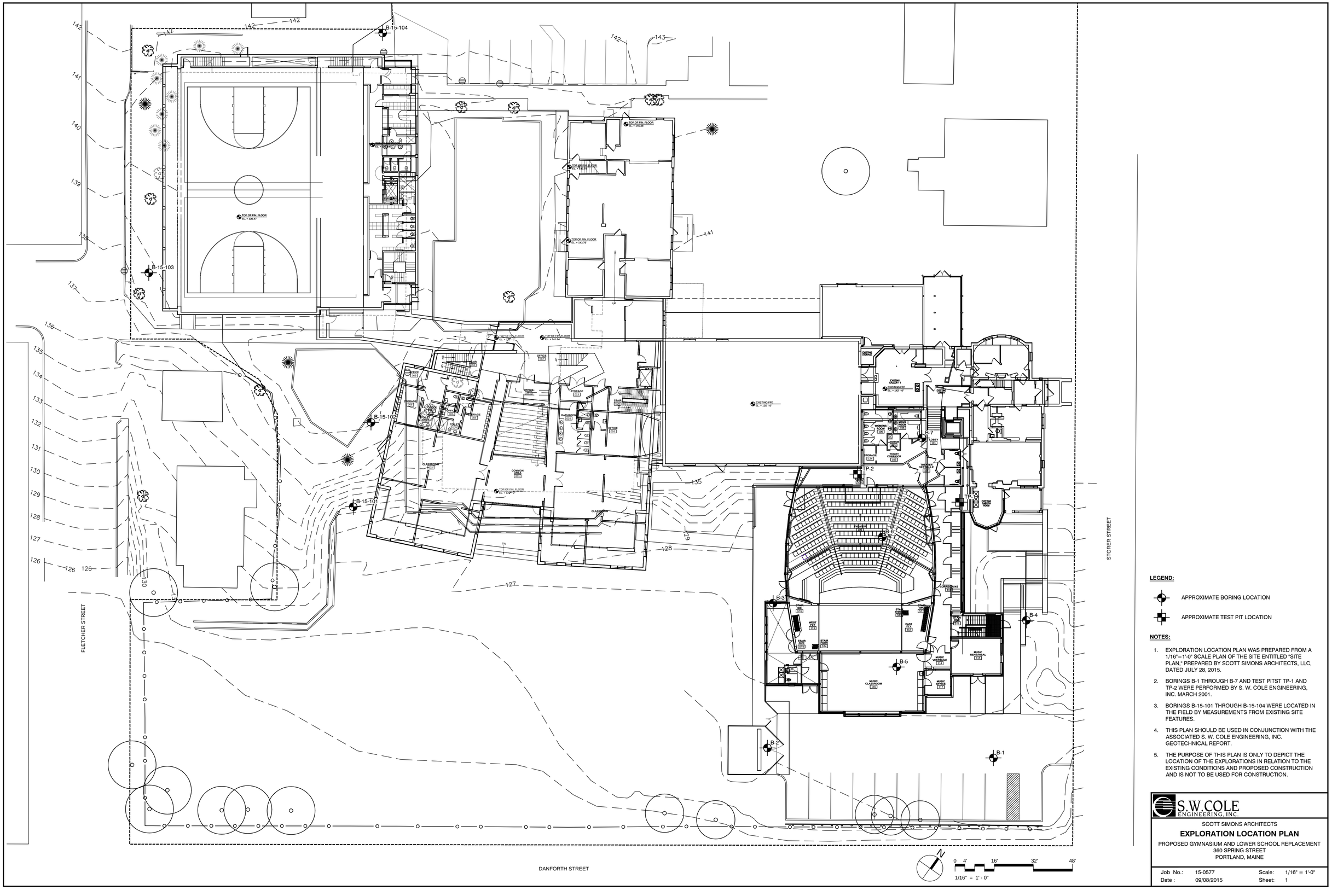
The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations 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's scope of services 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 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.

SHEETS



LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE TEST PIT LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1/16"=1'-0" SCALE PLAN OF THE SITE ENTITLED "SITE PLAN," PREPARED BY SCOTT SIMONS ARCHITECTS, LLC, DATED JULY 28, 2015.
2. BORINGS B-1 THROUGH B-7 AND TEST PITST TP-1 AND TP-2 WERE PERFORMED BY S. W. COLE ENGINEERING, INC. MARCH 2001.
3. BORINGS B-15-101 THROUGH B-15-104 WERE LOCATED IN THE FIELD BY MEASUREMENTS FROM EXISTING SITE FEATURES.
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.

SCOTT SIMONS ARCHITECTS

EXPLORATION LOCATION PLAN

PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
360 SPRING STREET
PORTLAND, MAINE

Job No.:	15-0577	Scale:	1/16" = 1'-0"
Date :	09/08/2015	Sheet:	1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-15-101**
SHEET: 1 OF 1
PROJECT NO.: 15-0577

PROJECT: PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
CLIENT : SCOTT SIMONS ARCHITECTS
LOCATION: WAYNFLETE SCHOOL / PORTLAND, MAINE
DRILLING FIRM: S.W. COLE EXPLORATIONS, LLC. DRILLER: BOB MARCOUX

DATE START: 8/7/2015
DATE FINISH: 8/7/2015
ELEVATION: 130.0' +/-
SWC REP.: P. OTTO

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	H S A	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED
SOILS WET AT 16.0' ±

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
									1.0'	TOPSOIL WITH ORGANICS
	1D	24"	16"	2.0'	2	2	2	4		~LOOSE~
										DARK BROWN SILTY SAND, TRACE GRAVEL, TRACE ORGANICS (FILL)
									4.0'	
										BROWN-GRAY SILTY SAND, SOME GRAVEL (TILL)
	2D	24"	23"	7.0'	12	30	30	38		~ VERY DENSE~
	3D	12"	12"	8.0'	31	52				w = 9.4%
									10.0'	
	4D	24"	24"	12.0'	24	49	35	40		~VERY DENSE~
										GRAY SILTY SAND, SOME GRAVEL (TILL)
	5D	23"	23"	16.9'	15	28	49	50/5"		
	6D	24"	3"	22.0'	22	20	35	44	22.0'	
										BOTTOM OF EXPLORATION AT 22.0'

SAMPLES:
D = SPLIT SPOON
C = 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-15-101**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-15-102**
SHEET: 1 OF 2
PROJECT NO.: 15-0577

PROJECT: PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
CLIENT : SCOTT SIMONS ARCHITECTS
LOCATION: WAYNFLETE SCHOOL / PORTLAND, MAINE
DRILLING FIRM: S.W. COLE EXPLORATIONS, LLC. DRILLER: BOB MARCOUX

DATE START: 8/7/2015
DATE FINISH: 8/7/2015
ELEVATION: 138.0' +/-
SWC REP.: P. OTTO

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	H S A	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED
SOILS WET AT 45'

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	24"	16"	2.0'	4	6	8	8		DARK BROWN SILTY SAND WITH ORGANICS, BRICK AND WIRE (FILL) ~MEDIUM DENSE TO LOOSE~
	2D	24"	7"	7.0'	5	5	4	12	7.0'	
	3D	12"	4"	8.0'	5	5	50/5"			APPEARS TO BE PRIMARILY CONCRETE AND BRICK PIECES (FILL)
									9.0'	
	4D	24"	23"	12.0'	19	21	25	23		LIGHT BROWN-GRAY SILTY SAND, SOME GRAVEL (TILL) ~DENSE~ w = 9.8%
									14.0'	
	5D	24"	23"	17.0'	18	15	22	20		~DENSE~ GRAY SILTY SAND, SOME GRAVEL (TILL)
	6D	24"	24"	22.0'	13	20	20	20		
									30.0'	
	7D	24"	24"	32.0'	7	8	6	10		~MEDIUM DENSE~ q_p = 4 - 5 ksf DARK GRAY CLAYEY SANDY SILT
	8D	24"	24"	37.0'	5	8	11	18		q_p = 4 - 5 ksf
									38.0'	

SAMPLES:
D = SPLIT SPOON
C = 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-15-102**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-15-102**
SHEET: 2 OF 2
PROJECT NO.: 15-0577

PROJECT: PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
CLIENT : SCOTT SIMONS ARCHITECTS
LOCATION: WAYNFLETE SCHOOL / PORTLAND, MAINE
DRILLING FIRM: S.W. COLE EXPLORATIONS, LLC. DRILLER: BOB MARCOUX

DATE START: 8/7/2015
DATE FINISH: 8/7/2015
ELEVATION: 138.0' +/-
SWC REP.: P. OTTO

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	H S A	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED
SOILS WET AT 45'

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
										DARK GRAY SILTY SAND, SOME GRAVEL (TILL)
	9D	24"	24"	47.0'	23	16	17	19		~DENSE~
	10D	24"	24"	52.0'	5	11	13	21	52.0'	~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 52.0'

SAMPLES:
D = SPLIT SPOON
C = 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-15-102**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-15-103**
SHEET: 1 OF 1
PROJECT NO.: 15-0577

PROJECT: PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
CLIENT : SCOTT SIMONS ARCHITECTS
LOCATION: WAYNFLETE SCHOOL / PORTLAND, MAINE
DRILLING FIRM: S.W. COLE EXPLORATIONS, LLC. DRILLER: BOB MARCOUX

DATE START: 8/7/2015
DATE FINISH: 8/7/2015
ELEVATION: 138.5' +/-
SWC REP.: P. OTTO

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	H S A	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									1.0'	TOPSOIL WITH ORGANICS
	1D	24"	12"	2.0'	5	7	5	3	4.0'	DARK BROWN SILTY SAND, SOME GRAVEL AND ORGANICS (FILL) ~MEDIUM DENSE~
	2D	24"	20"	7.0'	18	15	12	13		~MEDIUM DENSE BECOMING… LIGHT BROWN SILTY SAND, SOME GRAVEL (TILL)
	3D	24"	24"	9.0'	21	20	33	45		w = 9.1 % ...DENSE~
	4D	24"	24"	12.0'	17	24	20	22	11.8'	
	5D	24"	24"	17.0'	21	15	22	24		DARK GRAY SILTY SAND, SOME GRAVEL (TILL) ~DENSE~
	6D	24"	24"	22.0'	9	13	17	23	22.0'	~MEDIUM DENSE TO DENSE~
										BOTTOM OF EXPLORATION AT 22.0'

SAMPLES:
D = SPLIT SPOON
C = 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-15-103**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-15-104**
SHEET: 1 OF 1
PROJECT NO.: 15-0577

PROJECT: PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
CLIENT : SCOTT SIMONS ARCHITECTS
LOCATION: WAYNFLETE SCHOOL / PORTLAND, MAINE
DRILLING FIRM: S.W. COLE EXPLORATIONS, LLC. DRILLER: BOB MARCOUX

DATE START: 8/7/2015
DATE FINISH: 8/7/2015
ELEVATION: 142.0' +/-
SWC REP.: P. OTTO

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	H S A	2 1/4"		
SAMPLER:	SS	1 3/8"	140 LBS.	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.5'	TOPSOIL WITH ORGANICS
	1D	24"	12"	2.0'	2	2	2	4		~VERY LOOSE~
									3.0'	DARK BROWN SILTY SAND (FILL)
										BROWN SAND, SOME SILT, SOME GRAVEL (FILL)
	2D	24"	8"	7.0'	6	15	21	24		~MEDIUM DENSE TO DENSE~
									7.5'	
	3D	24"	18"	9.0'	39	38	22	31		~VERY DENSE~
									10.0'	GRAY-BROWN SILTY GRAVELLY SAND (TILL)
	4D	24"	20"	12.0'	14	13	28	20		~DENSE~ w = 8.9 % GRAY SILTY SAND, SOME GRAVEL (TILL)
									15.0'	
	5D	24"	24"	17.0'	13	18	21	26		~DENSE~ DARK GRAY SILTY SAND, SOME GRAVEL (TILL)
	6D	24"	24"	22.0'	11	13	11	17	22.0'	~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 22.0'

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

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

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

BORING NO.: **B-15-104**

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

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.

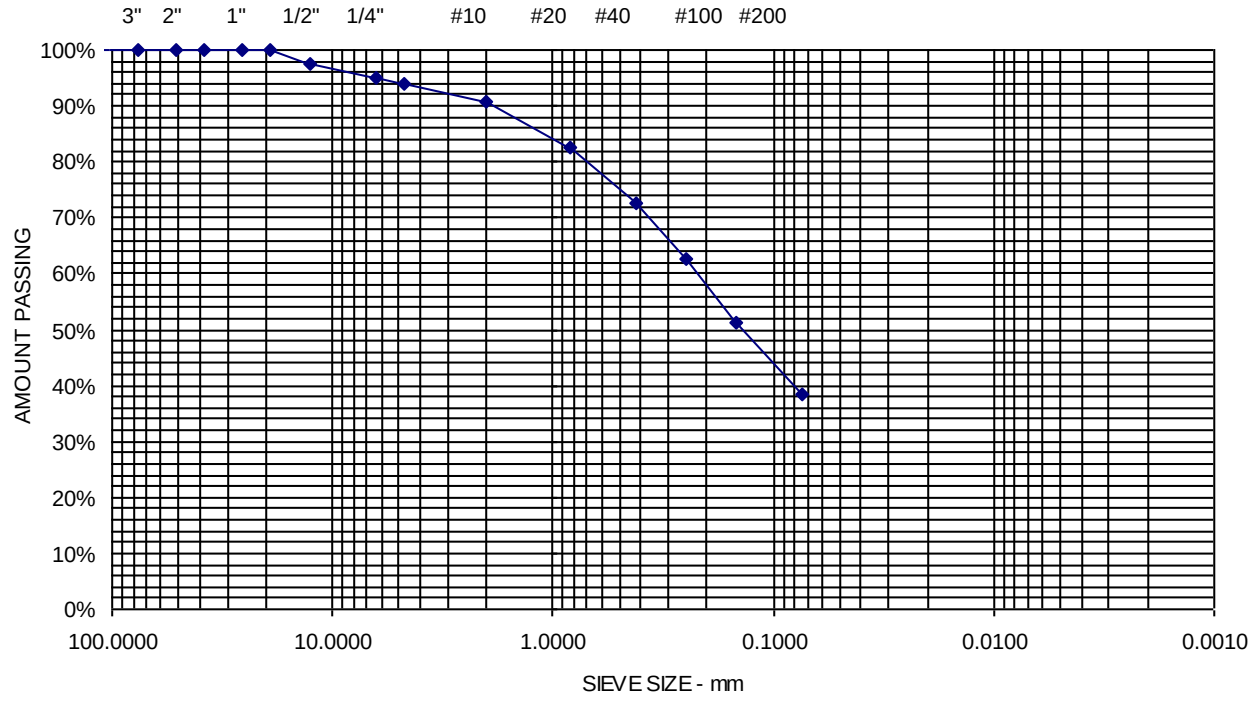
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED WAYNFLETE SCHOOL GYMNASIUM - GEOTECHNICAL ENGINEERING SERVICES	Project Number	15-0577
Client	SCOTT SIMONS ARCHITECTS INC.	Lab ID	19755G
		Date Received	8/12/2015
		Date Completed	8/14/2015
Material Source	**B-101 3D 7-8'**	Tested By	JUSTIN BISSON

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"**	**95**	
4.75 mm	**No. 4**	**94**	6% Gravel
2.00 mm	**No. 10**	**91**	
850 um	**No. 20**	**83**	
425 um	**No. 40**	**73**	55.5% Sand
250 um	**No. 60**	**63**	
150 um	**No. 100**	**51**	
75 um	**No. 200**	**38.5**	38.5% Fines

SAND AND SILT, SOME GRAVEL



Comments: w = 9.4%

S.W.COLE ENGINEERING, INC.

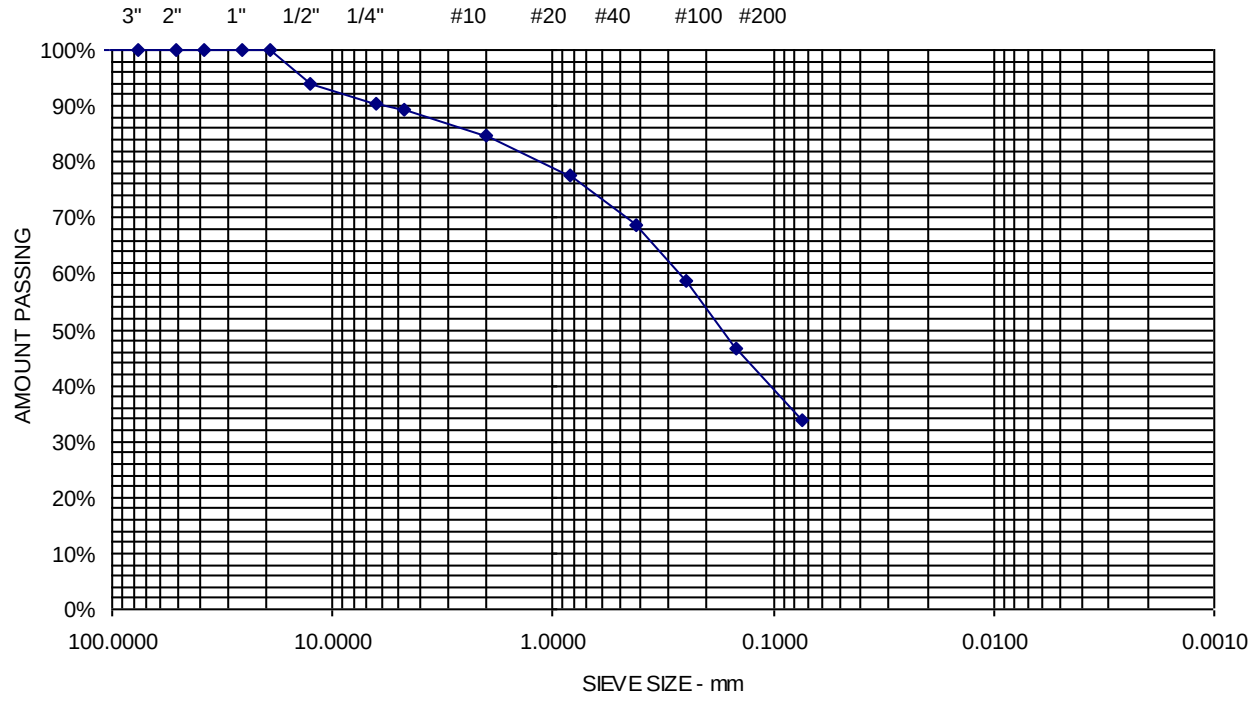
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED WAYNFLETE SCHOOL GYMNASIUM - GEOTECHNICAL ENGINEERING SERVICES	Project Number	15-0577
Client	SCOTT SIMONS ARCHITECTS INC.	Lab ID	19757G
		Date Received	8/12/2015
		Date Completed	8/14/2015
Material Source	**B-102 4D 10-12'**	Tested By	JUSTIN BISSON

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"**	**94**	
6.3 mm	**1/4"**	**91**	
4.75 mm	**No. 4**	**89**	10.7% Gravel
2.00 mm	**No. 10**	**85**	
850 um	**No. 20**	**77**	
425 um	**No. 40**	**69**	55.4% Sand
250 um	**No. 60**	**59**	
150 um	**No. 100**	**47**	
75 um	**No. 200**	**33.9**	33.9% Fines

SILTY SAND, SOME GRAVEL



Comments: w = 9.8%

S.W.COLE ENGINEERING, INC.

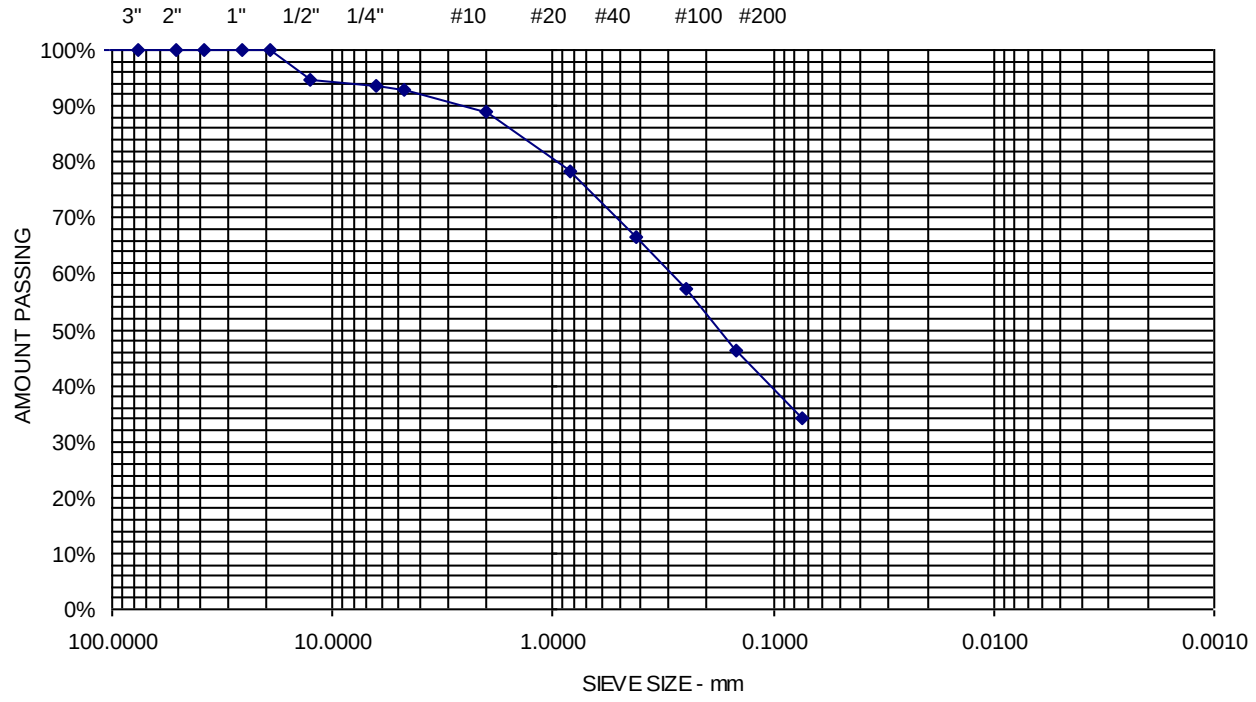
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND ME - PROPOSED WAYNFLETE SCHOOL GYMNASIUM - GEOTECHNICAL ENGINEERING SERVICES	Project Number	15-0577
Client	SCOTT SIMONS ARCHITECTS INC.	Lab ID	19759G
		Date Received	8/12/2015
		Date Completed	8/14/2015
Material Source	**B-103 3D 7-9'**	Tested By	JUSTIN BISSON

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"**	**95**	
6.3 mm	**1/4"**	**93**	
4.75 mm	**No. 4**	**93**	7.2% Gravel
2.00 mm	**No. 10**	**89**	
850 um	**No. 20**	**78**	
425 um	**No. 40**	**67**	58.6% Sand
250 um	**No. 60**	**57**	
150 um	**No. 100**	**46**	
75 um	**No. 200**	**34.2**	34.1% Fines

SAND AND SILT, SOME GRAVEL



Comments: w = 9.1%

S.W.COLE ENGINEERING, INC.

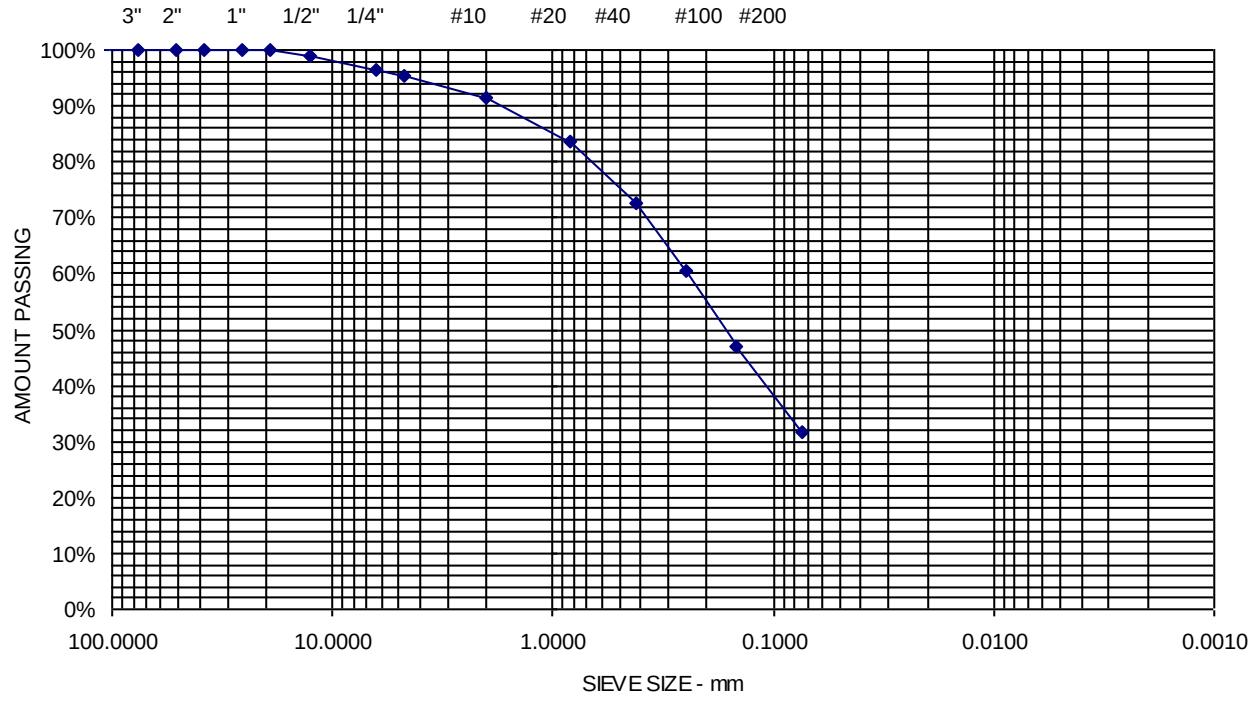
Report of Gradation

ASTM C-117 & C-136

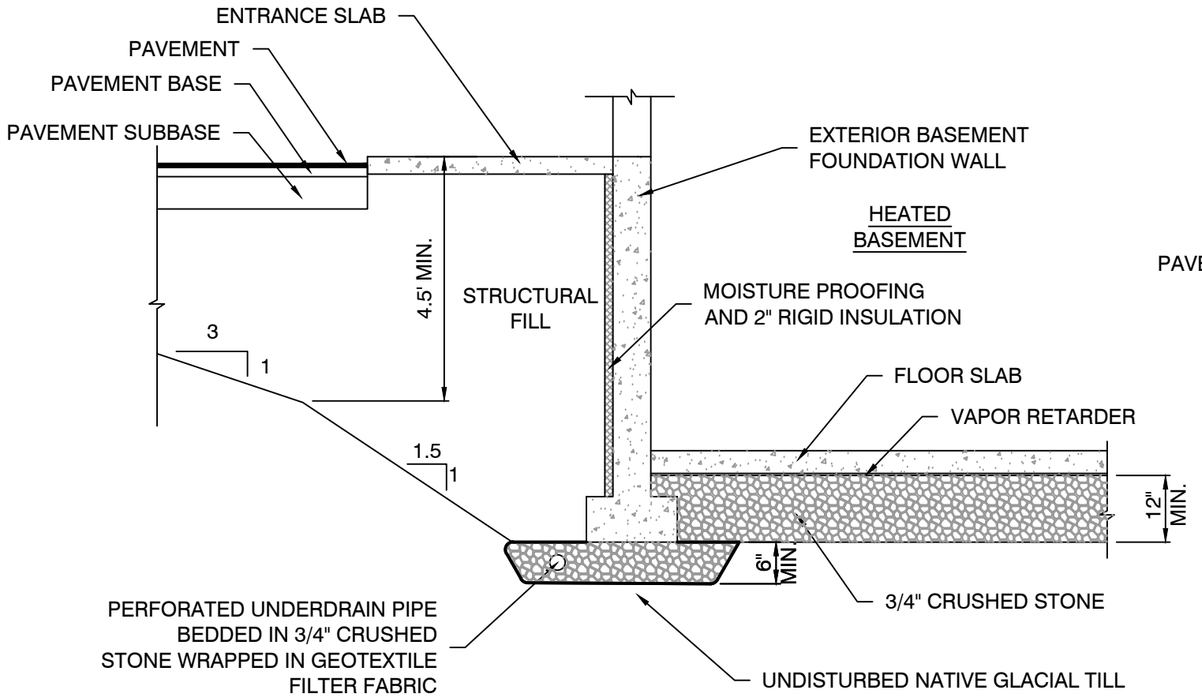
Project Name	PORTLAND ME - PROPOSED WAYNFLETE SCHOOL GYMNASIUM - GEOTECHNICAL ENGINEERING SERVICES	Project Number	15-0577
Client	SCOTT SIMONS ARCHITECTS INC.	Lab ID	19760G
		Date Received	8/12/2015
		Date Completed	8/14/2015
Material Source	**B-104 4D 10-12'**	Tested By	JUSTIN BISSON

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"**	**99**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**95**	4.5% Gravel
2.00 mm	**No. 10**	**92**	
850 um	**No. 20**	**84**	
425 um	**No. 40**	**72**	63.7% Sand
250 um	**No. 60**	**60**	
150 um	**No. 100**	**47**	
75 um	**No. 200**	**31.8**	31.8% Fines

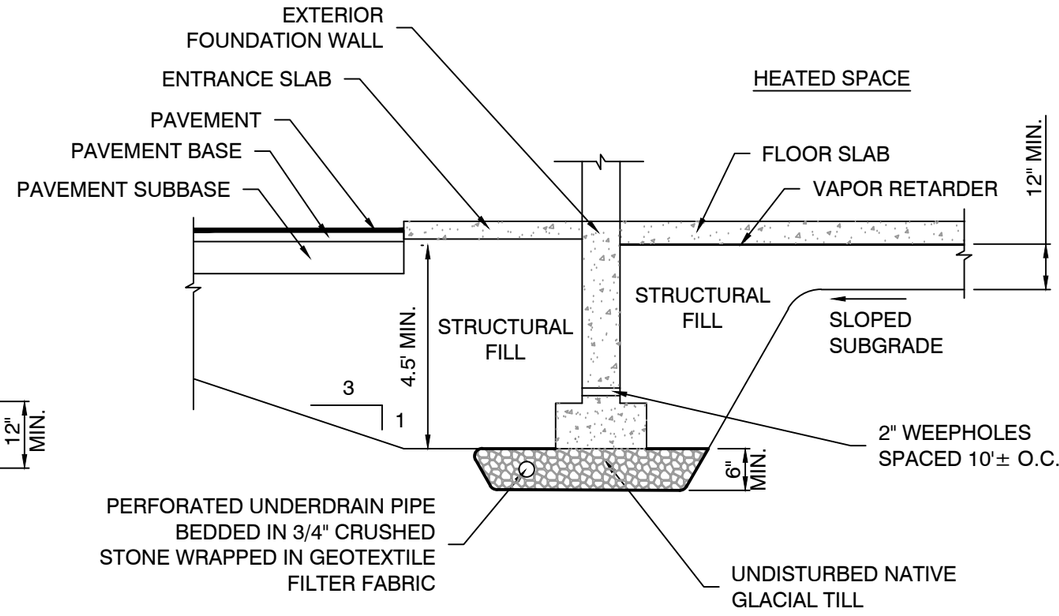
SILTY SAND, TRACE GRAVEL



Comments: w = 8.9%



BASEMENT AREA
(GYMNASIUM)



SLAB ON-GRADE AREAS
(CLASSROOM BUILDING)

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.

SCOTT SIMONS ARCHITECTS

UNDERDRAIN DETAIL

PROPOSED GYMNASIUM AND LOWER SCHOOL REPLACEMENT
360 SPRING STREET
PORTLAND, MAINE

Job No.:	15-0577	Scale:	Not to Scale
Date :	09/08/2015	Sheet:	12