REPORT

December 27, 2013
13-1392 S

Geotechnical Engineering Services

Proposed Pre-Engineered Building
421 Warren Avenue
Portland, Maine

PREPARED FOR:
Peter F. Holmes
c/o Harbour Auto Body
401 Warren Avenue
Portland, Maine 04103

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

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Scope and Purpose 1
1.2 Proposed Construction 1
2.0 EXPLORATION AND TESTING 2
2.1 Explorations 2
2.2 Testing 2
3.0 SITE AND SUBSURFACE CONDITIONS 2
3.1 Surficial Conditions 2
3.2 Subsurface Conditions 3
3.3 Groundwater Conditions 3
3.4 Seismic and Frost Conditions 3
4.0 EVALUATION AND RECOMMENDATIONS 4
4.1 General Findings 4
4.2 Site and Subgrade Preparation 4
4.3 Excavation and Dewatering 5
4.4 Foundations 6
4.5 Foundation Drainage 6
4.6 Slab-On-Grade 6
4.7 Entrance Slabs 7
4.8 Backfill and Compaction 7
4.9 Weather Considerations 8
4.10 Design Review and Construction Testing 9
5.0 CLOSURE 9

Attachment A	Limitations
Sheet 1	Exploration Location Plan
Sheets 2 - 8	Exploration Logs
Sheet 9	Key to the Notes and Symbols
Sheet 10	Underdrain Detail

13-1392 S

December 27, 2013

Peter F. Holmes
c/o Harbour Auto Body
401 Warren Avenue
Portland, Maine 04103

Subject: Geotechnical Engineering Services
Proposed Pre-Engineered Building
421 Warren Avenue
Portland, Maine

Dear Peter:

In accordance with our Proposal dated December 12, 2013, we have performed subsurface explorations for the subject project 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 the making of thirteen test pit explorations, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Proposed Construction

Based on the information provided by FST, Inc. (project civil engineer), we understand development plans call for construction of a new L-Shaped, pre-engineered steel building with associated paved and stormwater management areas. We understand the building will occupy a plan area of about 38,500 SF and is proposed at a finished floor

elevation of 72.0 feet, requiring about 1 to 3 feet of tapered fill over the building pad. Proposed and existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Thirteen test pits (TP-101 through TP-109 and TP-ST-1 through TP-ST-4) were made at the site on December 20, 2013, by Eastern Excavation, Inc. of Westbrook, Maine working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected and established by S.W.COLE using taped measurements from existing site features.

The approximate exploration locations are shown on the "Exploration Location Plan" attached as Sheet 1. Logs of the explorations are attached as Sheets 2 through 8. A key to the notes and symbols used on the log is attached as Sheet 9. The ground surface elevations shown on the logs were estimated based on topographic information shown on Sheet 1.

2.2 Testing

The soils were visually classified as they were encountered at the explorations. Pocket Penetrometer Tests (PPT) were performed on some cohesive soils encountered at the test pits. PPT results are shown on the test pit logs.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Surficial Conditions

The site is located at 421 Warren Avenue in Portland, Maine. The site consists of an open gravel lot adjacent to Warren Avenue transitioning to a lightly wooded area and open grassed field area to the north and to the rear of the existing Harbour Auto Body Facility. The site is relatively flat and level with existing grades varying from about elevation 68 to 70 feet within the proposed building footprint.

Existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

3.2 Subsurface Conditions

Underlying a surficial layer of topsoil, the test pits encountered a soils profile generally consisting of fill and/or reworked soils overlying a layer of relic topsoil overlying glaciomarine sands, silts, and clays. The principal strata encountered are summarized below. Refer to the attached logs for more detailed descriptions of the subsurface findings.

Fill and Reworked Soils: Each test pit encountered a layer of fill and/or reworked soils extending to depths varying from 0.8 to 3.2 feet below ground surface. The fill generally consisted of sand or clay with varying portions of silt, gravel, cobbles, organics and miscellaneous debris such as bricks and plastic. The reworked soils generally consisted of disturbed silt and clay with varying portions of sand and organics.

Relic Topsoil: Underlying the fill and/or reworked soils, test pits TP-105 through TP-109 encountered a layer of relic topsoil up to about 1 foot in thickness. The relic topsoil generally consisted of dark brown silty sand with organics. A layer of reworked, disturbed silty sandy clay was encountered below the relic topsoil at test pit TP-105 to a depth of about 3.5 feet.

Glaciomarine Soils: Underlying the fill, reworked soils, and/or relic topsoil, the test pits encountered glaciomarine soils generally consisted of brown to gray-brown sands, silts, and relatively stiff silty clays. The test pits were terminated in the glaciomarine soils at depths varying from 4.0 to 6.2 feet below the ground surface.

3.3 Groundwater Conditions

The soils encountered at the explorations were generally moist to wet. Groundwater seepage was encountered at some of the explorations at depths varying from 3.1 to 5.5 feet. Groundwater likely becomes perched on the relatively impervious glaciomarine silts and clays encountered beneath the site. It should be anticipated that seasonal groundwater levels will fluctuate, especially during periods of snowmelt and precipitation.

3.4 Seismic and Frost Conditions

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 findings at the explorations and our experience on adjacent sites, we interpret the site soils to correspond to Seismic Soil Site Class E according to 2009 IBC.

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:

- The existing fill, relic topsoil, and reworked/disturbed soils must be completely removed beneath the proposed building footprint and replaced with compacted Granular Borrow.

- Spread footing foundations and on-grade floor slabs bearing on properly prepared subgrades appear appropriate for the proposed construction.

- A 6-inch thick layer of crushed stone wrapped in geotextile fabric is recommended beneath the perimeter building foundations. Interior footings may bear on compacted Granular Borrow or stable, native non-organic soils.

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

- Imported Granular Borrow, Structural Fill and Crushed Stone will be needed for construction. The existing fills 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 organics, existing fills, relic topsoil, and reworked/disturbed soils must be completely removed from beneath the proposed building and entrance slabs until undisturbed native non-organic soils are encountered. Overexcavation of existing unsuitable materials should

extend 1-foot horizontally outward from outer edge of perimeter footings for each foot of excavation depth (1H:1V bearing splay). Overexcavations should be backfilled to grade with properly compacted Structural Fill (over wet subgrades and during wet/cold weather conditions) or with properly compacted Granular Borrow (over dry subgrades and during non-freezing, dry conditions).

At least 6-inches of Crushed Stone wrapped in non-woven geotextile, such as Mirafi 160N or equivalent, should be provided below perimeter foundations. The crushed stone and geotextile should overlay undisturbed native glaciomarine soils and/or properly compacted Structural Fill or Granular Borrow overlying undisturbed native glaciomarine soils.

We recommend that excavations be completed with a smooth-edged bucket to help lessen disturbance of native soils and foundation bearing surfaces. S.W.COLE should observe exposed subgrades prior to placement of compacted fills and geotextile wrapped crushed stone mats below the footings.

4.3 Excavation and Dewatering

Excavation work will generally encounter existing fills, relic topsoil, reworked native soils and native glaciomarine sands, silts, and clays. Care must be exercised during construction to minimize disturbance of the bearing soils. Final cuts to subgrade elevation should be performed with a smooth-edged bucket to help minimize soil disturbance.

Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations. The layer of geotextile wrapped Crushed Stone recommended below foundations will provide a media from which to sump and pump, as needed. Controlling the water levels to below planned excavation depths will help stabilize subgrades during construction.

Excavations must be properly shored and/or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. The contractor is ultimately responsible for dewatering and stability of excavations.

4.4 Foundations

We recommend the proposed building be supported on spread footings bearing on properly prepared subgrades. We recommend the following geotechnical parameters for design consideration:

- Design Frost Depth = 4.5 feet
- Allowable Soil Bearing Pressure = 1.5 ksf or less
- Seismic Site Soil Class = E (IBC 2009)
- Base Friction Factor = 0.40
- 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)

Footings should be at least 18-inches in width regardless of bearing pressure.

4.5 Foundation Drainage

We recommend an underdrain system be installed along the exterior side of the perimeter foundations. The underdrain system should consist of a 4-inch diameter, perforated SDR-35 foundation drain pipe surrounded by at least 6-inches of Crushed Stone, fully enveloped in non-woven geotextile, such as Mirafi 160N or equivalent. The underdrain pipe must be connected to a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for positive drainage. General underdrain details are illustrated on Sheet 10.

If a drip strip is used, S.W.COLE should be consulted to provide recommendations for frost protection.

4.6 Slab-On-Grade

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 120 pci (pounds per cubic inch) provided the slab is underlain by at least 12-inches of compacted Structural Fill 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 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

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 10.

4.8 Backfill and Compaction

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

Granular Borrow: Sand or silty sand meeting the requirements of MDOT Standard Specification 703.19 Granular Borrow. Granular Borrow is recommended for use as:

- Fill to raise site grades and backfill overexcavations (dry and non-freezing conditions and over dry subgrades)

Structural Fill: 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

Structural Fill is recommended for use as:

- Fill to raise site grades and backfill overexcavations (wet and cold weather conditions and over wet subgrades)
- Backfill for building foundations and below entrance slabs
- Slab-on-grade base material

Crushed Stone: Crushed Stone used below footings and around underdrains should consist of crushed rock meeting the gradation requirements of 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. 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 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.

4.10 Design Review and Construction Testing

S.W.COLE should be retained to review the foundation and earthwork construction documents to determine that our geotechnical 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 earthwork observations as well as testing services for soils, concrete, asphalt, steel and spray-applied fireproofing construction materials.

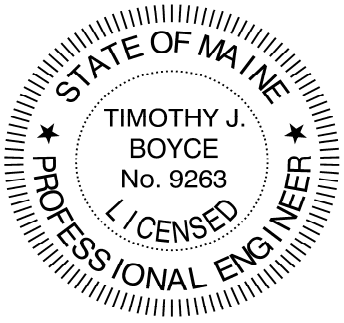
5.0 CLOSURE

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 the construction phase of the project.

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 Peter F. Holmes for specific application to the proposed Pre-Engineered Building at 421 Warren Avenue in Portland, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

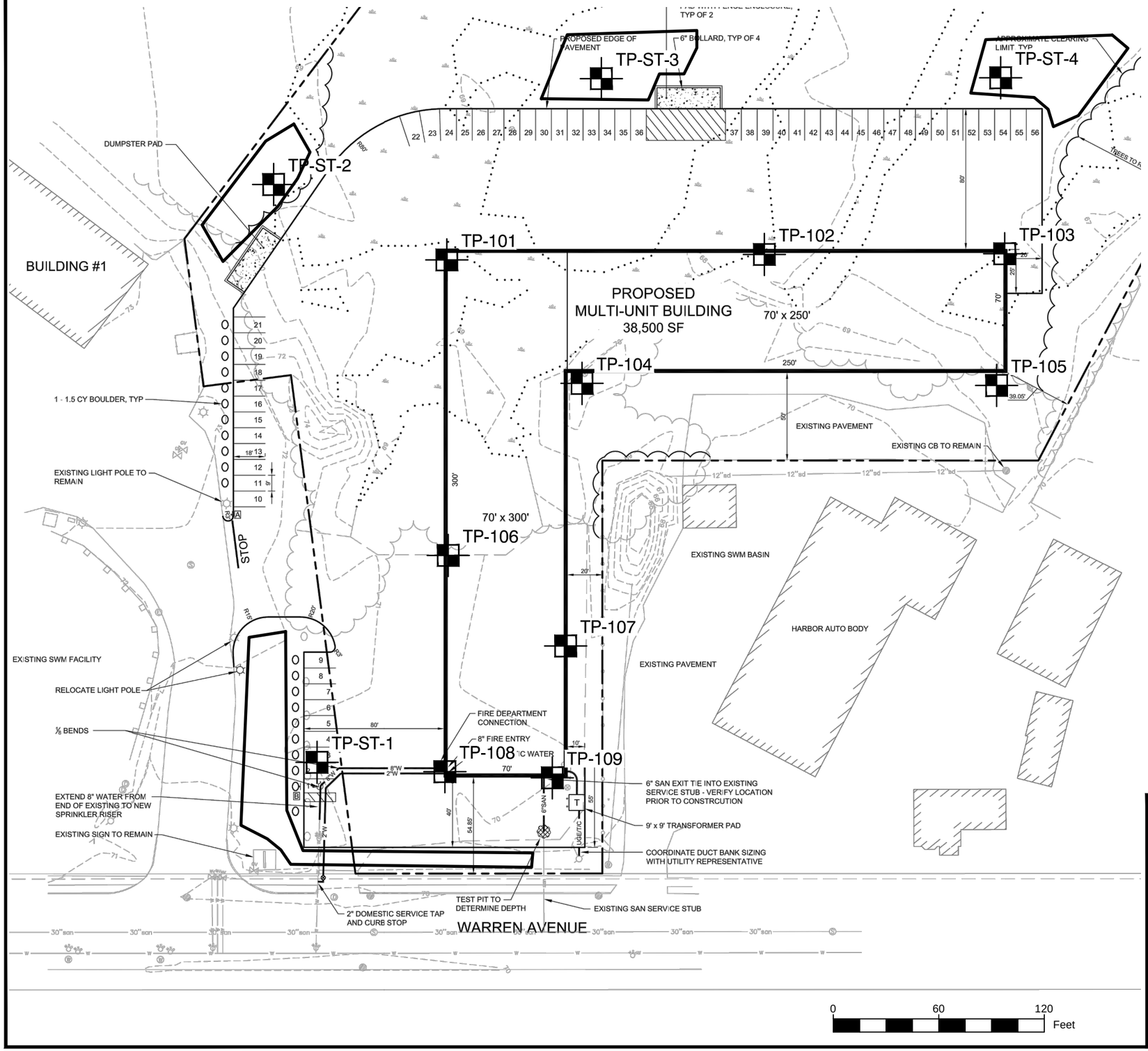
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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'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 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.



LEGEND:

APPROXIMATE TEST PIT LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=30' SCALE PLAN OF THE SITE ENTITLED "SITE LAYOUT AND UTILITY PLAN," PREPARED BY FAY, SPOFFORD & THORNDIKE, INC., DATED NOVEMBER 2013.
2. THE TEST PITS WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. 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.

PETER F. HOLMES

EXPLORATION LOCATION PLAN

PROPOSED PRE-ENGINEERED BUILDING
424 WARREN AVENUE
PORTLAND, MAINE

Job No.:	13-1392	Scale:	1" =60'
Date :	12/24/2013	Sheet:	1

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-101

DATE: 12/20/13 SURFACE ELEVATION: 69' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5	VEGETATION / BROWN CLAYEY SILTY SAND WITH ORGANICS (TOPSOIL)	
		1.5	REWORKED DARK GRAY AND BROWN SILTY SAND CLAYEY WITH ORGANICS (FILL / DISTURBED SOILS)	
		5.5	BROWN SILTY FINE SAND WITH SILT SEAMS	

COMPLETION DEPTH: 5.5' DEPTH TO WATER: SEEPAGE/CAVING @ 4.6'

TEST PIT TP-102

DATE: 12/20/13 SURFACE ELEVATION: 68' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.2	VEGETATION / DARK BROWN CLAYEY SILTY SAND WITH ORGANICS (TOPSOIL)	
		0.8	DARK GRAY-BROWN AND BLACK SANDY SILTY CLAY WITH BRICK, ORGANICS (FILL)	
		3.6	GRAY-BROWN WITH RUST-BROWN STAINING SILTY FINE SAND WITH SILT LAYERS	
		5.3	BROWN SILTY CLAY WITH SAND SEAMS ~ VERY STIFF ~	@ 4' : q_p = 7 KSF

COMPLETION DEPTH: 5.3' DEPTH TO WATER: SEEPAGE @ 3.9', SOILS MOIST ABOVE 3.9'

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-103

DATE: 12/20/13 SURFACE ELEVATION: 68' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.3	VEGETATION / BROWN CLAYEY SILTY SAND WITH ORGANICS (TOPSOIL)	
		2.0	REWORKED BROWN SILTY CLAY WITH SAND SEAMS WITH ORGANICS (FILL / DISTURBED SOILS)	
		4.8'	LAYERED BROWN SILTY FINE SAND, CLAYEY SILT AND SILTY CLAY	

COMPLETION DEPTH: 4.8' DEPTH TO WATER: SEEPAGE @ 3.1'

TEST PIT TP-104

DATE: 12/20/13 SURFACE ELEVATION: 70' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		2.0	DARK BROWN SILTY SAND WITH COBBLES, ORGANICS, BRICKS, PLASTIC DEBRIS (FILL)	
		2.5	ORANGE-BROWN SILTY FINE SAND	
		6.0	LAYERED GRAY-BROWN SILTY CLAY WITH SILTY FINE SAND LAYERS	

COMPLETION DEPTH: 6.0' DEPTH TO WATER: SEEPAGE @ 5.5'. SOILS MOIST ABOVE 5.5'

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-105

DATE: 12/20/13 SURFACE ELEVATION: 69' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.3	VEGETATION / BROWN SILTY SAND WITH ORGANICS (TOPSOIL)	@ 4' : q_p = 6 KSF
		1.1	YELLOW-BROWN SILTY SAND TRACE ORGANICS (FILL)	
		2.1	DARK BROWN SILTY SAND WITH ORGANICS (RELIC TOPSOIL)	
		3.5	REWORKED GRAY-BROWN WITH RUST-BROWN STAINING SILTY SANDY CLAY (DISTURBED SOILS)	
		6.2'	LAYERED BROWN SILTY FINE SAND, SILTY CLAY, AND CLAYEY SILT	

COMPLETION DEPTH: 6.2' DEPTH TO WATER: SEEPAGE @ 5.5', SOILS MOIST ABOVE 5.5'

TEST PIT TP-106

DATE: 12/20/13 SURFACE ELEVATION: 70' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		2.0	DARK GRAY-BROWN SILTY SAND SOME GRAVEL WITH COBBLES, ORGANICS, BRICK (FILL)	
		3.2	BROWN SAND SOME SILT, SOME GRAVEL (FILL)	
		3.6	DARK BROWN AND BLACK SILTY SAND WITH ORGANICS (RELIC TOPSOIL)	
		5.6	GRAY WITH BROWN MOTTLING CLAYEY SILT AND FINE SAND WITH SAND LAYERS	

COMPLETION DEPTH: 5.6' DEPTH TO WATER: ALL SOILS MOIST

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-107

DATE: 12/20/13 SURFACE ELEVATION: 69' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN GRAVELLY SAND SOME SILT WITH COBBLES ORGANICS IN UPPER 6" +/-	
		1.5	(FILL)	
		2.0	DARK BROWN SILTY SAND WITH ORGANICS (RELIC TOPSOIL)	
		5.0	LAYERED GRAY-BROWN SILTY SAND AND SILTY CLAY	

COMPLETION DEPTH: 5 DEPTH TO WATER: ALL SOILS MOIST TO WET

TEST PIT TP-108

DATE: 12/20/13 SURFACE ELEVATION: 70' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN GRAVELLY SAND SOME SILT WITH COBBLES (FILL)	
		0.6		
		1.4	DARK BROWN AND BLACK SILTY SAND WITH ORGANICS (RELIC TOPSOIL)	
		1.7	ORANGE-BROWN SILTY SAND	
		3.5	LIGHT GRAY-BROWN SILTY SAND	
		6.0	GRAY-BROWN CLAYEY SANDY SILT WITH SAND LAYERS	@ 4.5' : q_p = 7 KSF

COMPLETION DEPTH: 6.0' DEPTH TO WATER: ALL SOILS MOIST

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-109

DATE: 12/20/13 SURFACE ELEVATION: 70' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			BROWN SILTY GRAVELLY SAND WITH COBBLES (FILL)	
		1.9		
		2.1	DARK BROWN SILTY SAND WITH ORGANICS (TOPSOIL)	
			GRAY SILTY FINE SAND WITH SILT AND SILTY CLAY SEAMS TRACE ROOTLETS	
		4.0		
			GRAY-BROWN WITH RUST-BROWN MOTTLING SILTY SANDY CLAY	
		6.2		

COMPLETION DEPTH: 6.2' DEPTH TO WATER: ALL SOILS MOIST

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-ST-1

DATE: 12/20/13 SURFACE ELEVATION: 71' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
			DARK BROWN SILTY SAND SOME GRAVEL WITH ORGANICS (FILL)	
		0.9		
			BROWN SILTY FINE TO MEDIUM SAND WITH SILT SEAMS	
		4.0		
		4.3	BROWN CLAYEY SILT AND SAND	
			NOTE: TEST PIT ALSO LOGGED BY ALBERT FRICK ASSOCIATES	

COMPLETION DEPTH: 4.3' DEPTH TO WATER: ALL SOILS MOIST

TEST PIT TP-ST-2

DATE: 12/20/13 SURFACE ELEVATION: 69' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5	VEGETATION / DARK BROWN CLAYEY SILTY SAND WITH ORGANICS (TOPSOIL)	
			REWORKED GRAY-BROWN CLAYEY SANDY SILT (FILL / DISTURBED SOILS)	
		2.0		
			GRAY-BROWN CLAYEY SILT AND SAND WITH FINE SAND LAYERS	
		3.5		
			BROWN SILTY FINE SAND	
		4.2		
			NOTE: TEST PIT ALSO LOGGED BY ALBERT FRICK ASSOCIATES	

COMPLETION DEPTH: 4.2' DEPTH TO WATER: HEAVY SEEPAGE @ 4'

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / PETER F. HOLMES
LOCATION: 424 WARREN AVENUE, PORTLAND, MAINE
EXCAVATOR: EASTERN EXCAVATION, INC. / KOMATSU PC 50 MR

SWC REP.: EMW
PROJECT NO. 13-0912

TEST PIT TP-ST-3

DATE: 12/20/13 SURFACE ELEVATION: 69' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.3	VEGETATION / BROWN SILTY SAND WITH ORGANICS (TOPSOIL)	
		1.8	REWORKED GRAY-BROWN CLAYEY SANDY SILT WITH ORGANICS (FILL / DISTURBED SOILS)	
		4.5	GRAY-BROWN CLAYEY SILT, SOME SAND	
			NOTE: TEST PIT ALSO LOGGED BY ALBERT FRICK ASSOCIATES	

COMPLETION DEPTH: 4.5' DEPTH TO WATER: HEAVY SEEPAGE @ 4'

TEST PIT TP-ST-4

DATE: 12/20/13 SURFACE ELEVATION: 68' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.5	VEGETATION / BROWN CLAYEY SILT SAND WITH ORGANICS (TOPSOIL)	
		2.5	REWORKED CLAYEY SILT AND SAND WITH ORGANICS (FILL / DISTURBED SOILS)	
		4.0'	GRAY-BROWN WITH BROWN MOTTLING CLAYEY SILT AND SAND WITH SAND SEAMS	
			NOTE: TEST PIT ALSO LOGGED BY ALBERT FRICK ASSOCIATES	

COMPLETION DEPTH: 4.0' DEPTH TO WATER: ALL SOILS MOIST

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

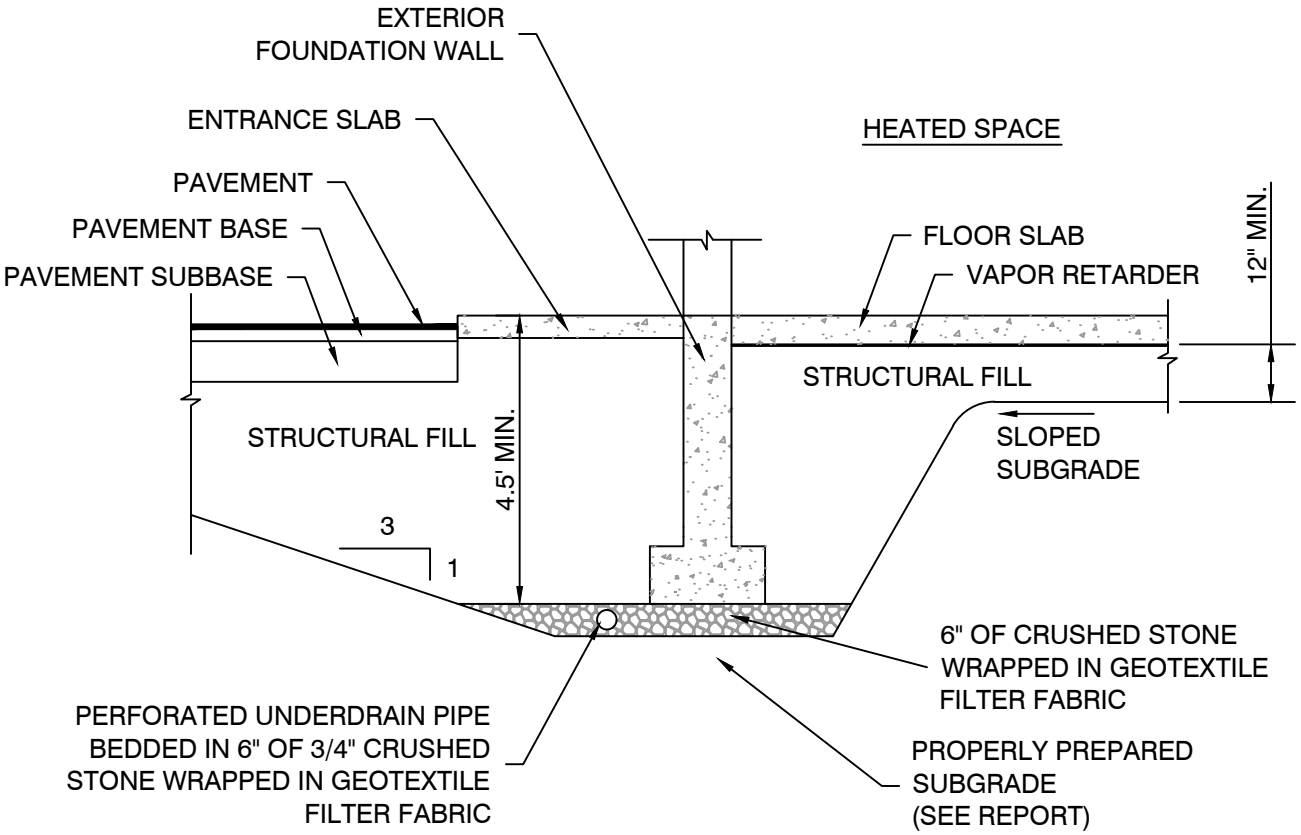
Description of Proportions:

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.



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.

PETER F. HOLMES

UNDERDRAIN DETAIL

PROPOSED PRE-ENGINEERED BUILDING
424 WARREN AVENUE
PORTLAND, MAINE

Job No.:	13-1392	Scale:	Not to Scale
Date :	12/24/2013	Sheet:	10