REPORT

July 22, 2015
15-0676 S

Geotechnical Engineering Services

Proposed Pre-Engineered Building
91 Industrial Parkway
Portland, Maine

PREPARED FOR:
Deerfield 91 Industrial, LLC
c/o CBRE \ Boulos Asset Management
Attn: Paul Ureneck
One City Center
Portland, Maine 04101

PREPARED BY:
S. W. Cole Engineering, Inc.
286 Portland Road
Gray, Maine 04039-9586
T: (207) 657-2866

S.W.COLE
ENGINEERING, INC.

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

www.swcole.com

CONTENTS

15-0676 S

July 22, 2015

Deerfield 91 Industrial, LLC
c/o CBRE | Boulos Asset Management
Attn: Paul Ureneck
One City Center
Portland, Maine 04101

Subject: Explorations and Geotechnical Engineering Services
Proposed Pre-Engineered Building
91 Industrial Parkway
Portland, Maine

Dear Paul:

In accordance with our Proposal, dated July 8, 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 four test boring explorations, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction

The site is an undeveloped parcel of land located at 91 Industrial Way in Portland, Maine. We understand development plans call for construction of a 9,900 SF pre-engineered metal building with associated paved parking and stormwater management area. Based on the site plans prepared by Sebago Technics, Inc. (STI), we understand the building is proposed at a finished floor elevation (FFE) of 76.1 feet (project datum) requiring 2 to 3 ½ feet of fill to achieve proposed FFE. Similarly, the parking lot will require 2 ½ to 3 feet of fill to achieve proposed grades. Proposed and existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Four test borings (B-1 through B-4) were made at the site on July 17, 2015 by Great Works Test Boring, Inc. of Rollinsford, New Hampshire working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected and established in the field by S.W.COLE based on 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 5. The 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 6.

2.2 Testing

The test borings were drilled using a combination of solid stem auger and cased wash-boring techniques. The soils were sampled at 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) techniques. Pocket Penetrometer Tests (PPT) were performed where stiffer clay soils were encountered. Vane Shear Tests (VST) where performed where soft clay soils where encountered. SPT blow counts, VST and PPT results are shown on the logs.

Soil samples obtained from the explorations were returned to our laboratory for classification and testing. Moisture content test results are noted on the logs.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Surficial

The site is undeveloped and mostly wooded. The site is relatively flat and slopes gently downward from the front to the rear about 5 feet. The site is about 1 to 2 feet below Industrial Drive along its frontage. Existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

3.2 Soil and Bedrock

Test borings B-1 through B-3 were made in the area of the proposed building. Test boring B-4 was made in the area of a proposed sanitary sewer manhole. Below a surficial layer of forest duff and topsoil, the test borings encountered a soil profile generally consisting of dessicated sandy silty overlying very stiff olive-brown silty clay extending to depths of 11 to 13 feet overlying stiff to medium gray silty clay extending to depths of about 26 feet overlying stratified silty clay and sand. Test borings B-1 through B-3 were terminated in the stratified silty clay and sand at depths of 27 to 28 feet. Test boring B-4 was terminated in the gray silty clay at a depth of 12 feet.

Not all the strata were encountered at each exploration. Please refer to the attached logs for more detailed subsurface information.

3.3 Groundwater

Saturated soils were encountered at depths of 11 to 13 feet. Long-term groundwater levels were not obtained. Groundwater levels will fluctuate seasonally, especially during periods of snowmelt and precipitation, as well as in response to changes in site use. Stormwater likely does not readily infiltrate and becomes perched on the relatively impervious native clays.

3.4 Frost and Seismic

The 100-year Air Freezing Index for the Portland, Maine area is about 1,407-Fahrenheit degree-days, which corresponds to a frost penetration depth on the order of 4.5 feet. Based on the subsurface findings, we interpret the site soils to correspond to Seismic Soil Site Class D according to 2012 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 as follows:

- Spread footing foundations and on-grade floor slabs bearing on properly prepared subgrades appear suitable for the proposed building. Perimeter footings should bear on at least 6-inches of Crushed Stone wrapped in geotextile filter fabric.

Interior footings are anticipated to bear on compacted Granular Borrow. On-grade floor slabs should bear on at least 12-inches of compacted Structural Fill.

- Subgrades across the site will consist of sensitive native silts and clays. Earthwork and grading activities should occur during drier Summer and Fall seasons. Tracked equipment will be needed and temporary haul roads overlying geotextile fabric may be necessary. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.

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. Surficial organics, roots, topsoil, and stumps must be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction area to lessen the potential for erosion and site disturbance.

Following removal of organics and topsoil, we recommend pavement and building areas be fill with imported compacted Granular Borrow to raise grades. We anticipate that footing subgrades will consist of native stiff silt to very stiff silty clay and compacted Granular Borrow overlying stiff to very stiff silts and clays. Excavation to subgrade should be completed with a smooth-edged bucket to preclude disturbance of the bearing soils. We recommend that perimeter footings be underlain with 6 inches of Crushed Stone wrapped in geotextile filter fabric, such as Mirafi 160N. Interior footings are anticipated to bear at a higher elevation on compacted Granular Borrow.

4.3 Excavation, Blasting and Dewatering

Excavation work will generally encounter silts and silty clays. 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. Tracked equipment will be needed and temporary haul roads overlying geotextile fabric may be necessary. Final cuts to subgrade should be performed with a smooth-edged bucket to help minimize soil disturbance.

Bedrock was not encountered within the depth explored; therefore blasting for bedrock removal is not anticipated.

Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations. Controlling the water levels to at least one 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. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.4 Foundations

For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design consideration:

Geotechnical Parameters for Spread Footings	
Design Frost Depth	4.5 feet
Net Allowable Soil Bearing Pressure	3.0 ksf or less
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coeff	0.5
Internal Friction Angle of Backfill	30°
Seismic Soil Site Class	D (IBC 2012)

Wall footings should be at least 12 inches wide and column footings should be at least 24 inches in their least lateral dimension. Based on the subsurface findings and anticipated foundation loads, we estimate that total post-construction settlement will be 1-inch or less with differential settlement of less than ½-inch in 40 feet.

4.5 Foundation Drainage

We recommend an underdrain pipe be installed on the outside edge of the geotextile-wrapped Crushed Stone layer recommended below perimeter footings. The underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe bedded in Crushed Stone and wrapped in non-woven geotextile fabric. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for positive surface water drainage. General underdrain details are illustrated on Sheet 7.

4.6 Slab-On-Grade

We recommend on-grade concrete 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 should 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 the building must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that non-frost susceptible 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 slab and outward at least 4.5 feet, thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. General details of this frost transition zone are attached as Sheet 7.

4.8 Backfill and Compaction

The native silts and clays are unsuitable for reuse in building and paved areas. For building and paved areas, we recommend the following fill and backfill materials:

Granular Borrow: Fill to raise grades in building and paved areas should be sand or silty sand meeting the gradation requirements for MaineDOT Standard Specification 703.19 "Granular Borrow" as given below:

Granular Borrow		
Sieve Size	**Percent Finer by Weight**	
	Under Water (Wet Subgrade)	Above Water (Dry Subgrade)
12 inch	100	100
3 inch	Portion Passing 3 inch Sieve	
#40	0 to 70	0 to 70
#200	0 to 5	0 to 20

Structural Fill: Fill to repair soft areas, backfill for foundations, base material below on-grade floor slabs, exterior entrance slabs and sidewalks 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 for underdrain aggregate, should meet the gradation requirements of ASTM No. 57 Stone. A nominally sized ¾-inch washed crushed stone usually meets this requirement.

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 and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.9 Weather Considerations

The native clays and silts are sensitive to strength loss when disturbed, especially when wet. Construction activity should be limited during wet and freezing 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 construction documents to determine that our earthwork and foundation recommendations have been properly interpreted and implemented.

A soils and concrete testing program should 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 field and laboratory testing services for soils, concrete, steel, masonry, asphalt, 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.

STATE OF MAINE
TIMOTHY J. BOYCE
No. 9263
LICENSED
PROFESSIONAL ENGINEER

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

TJB:rec

Attachment A
Limitations

This report has been prepared for the exclusive use of Deerfield 91 Industrial, LLC for specific application to the proposed Pre-Engineered Building at 91 Industrial Way 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.

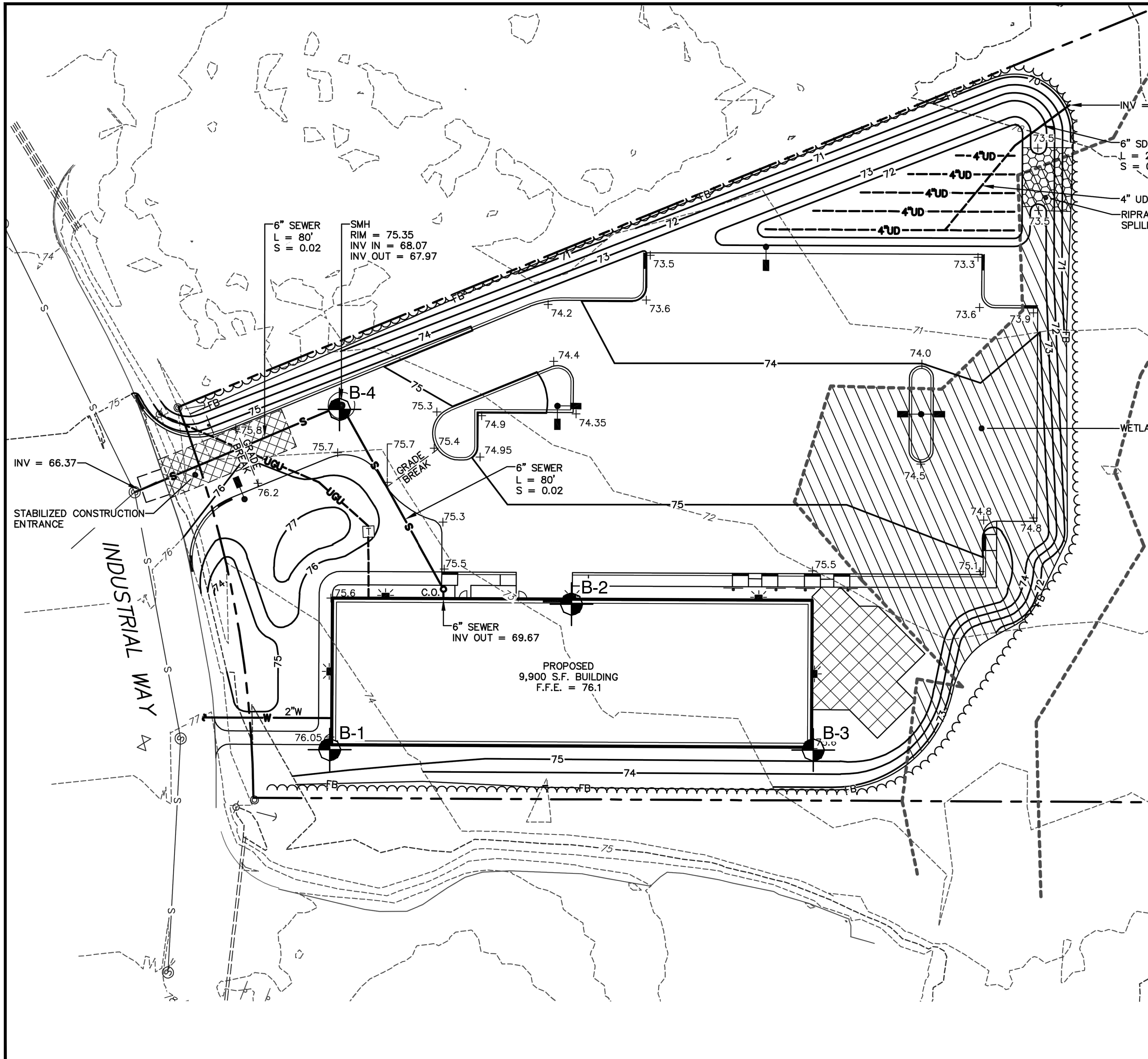
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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.



LEGEND:

APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=30' SCALE PLAN OF THE SITE ENTITLED "GRADING AND UTILITY PLAN," PREPARED BY SEBAGO TECHNICS, DATED MAY 15, 2015 AND PROVIDED AS A PORTABLE DOCUMENT FORMAT (PDF) FILE.
2. THE BORINGS 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.

0 40 80 Feet

S.W.COLE ENGINEERING, INC.

DEERFIELD 91 INDUSTRIAL LLC

EXPLORATION LOCATION PLAN

PROPOSED BUILDING
91 INDUSTRIAL WAY
PORTLAND, MAINE

Job No.:	15-0676	Scale:	1" = 40'
Date :	07/22/2015	Sheet:	1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-1**
SHEET: 1 OF 1
PROJECT NO.: 15-0676
DATE START: 7/17/2015
DATE FINISH: 7/17/2015
ELEVATION: 74'
SWCOLE: TJB

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / DEERFIELD 91 INDUSTRIAL, LLC
LOCATION: 91 INDUSTRIAL WAY, PORTLAND, MAINE
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"		
SAMPLER:	D	1 3/8"	140 #	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SATURATED @ 13'

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
									0.8'	FOREST DUFF & TOPSOIL
									2.0'	GRAY-BROWN SILTY SAND WITH ORGANICS ~ LOOSE ~
										OLIVE-BROWN SILTY CLAY
										~ VERY STIFF ~ q_P = 5 ksf
	1D	24"	24"	7.0'	4	6	6	7		
										q_P = 3 to 1.5 ksf
	2D	24"	24"	12.0'	2	2	3	5		
									13.0'	
										GRAY SILTY CLAY
	1V			15.6'	2.5" x 5" TAPERED					S_V = 0.97 / 0.14 ksf
	1V'			16.2'	2.5" x 5" TAPERED					S_V = 0.94 / 0.11 ksf ~ MEDIUM ~
	2V			20.6'	2.5" x 5" TAPERED					S_V = 0.71 / 0.14 ksf
	2V'			21.2'	2.5" x 5" TAPERED					S_V = 0.74 / 0.14 ksf
									25.0'	
										STRATIFIED GRAY SILTY CLAY AND BROWN SILTY FINE SAND
	3D	24"	24"	27.0'	2	1	2	3		~ MEDIUM & LOOSE ~
										BOTTOM OF EXPLORATION @ 27.0'

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
[ ] LABORATORY TEST

REMARKS:

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

2

BORING NO.: **B-1**

BORING LOG

S.W.COLE ENGINEERING, INC.

BORING NO.:	B-2
SHEET:	1 OF 1
PROJECT NO.:	15-0676
DATE START:	7/17/2015
DATE FINISH:	7/17/2015
ELEVATION:	73'
SWCOLE:	TJB

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / DEERFIELD 91 INDUSTRIAL, LLC
LOCATION: 91 INDUSTRIAL WAY, PORTLAND, MAINE
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"		
SAMPLER:	D	1 3/8"	140 #	30"
CORE BARREL:				

WATER LEVEL INFORMATION

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
									0.8'	FOREST DUFF AND TOPSOIL
	1D	24"	20"	2.0'	1	2	4	5		GRAY-OXIDE MOTTLED SANDY SILT WITH ROOTLETS TO 12"
									3'	~ VERY STIFF ~ q_P = 8 ksf
										OLIVE-BROWN SILTY CLAY
										~ VERY STIFF ~ q_P = 4.5 ksf
	2D	24"	24"	7.0'	3	4	7	7		w = 26.4%
									11.5'	q_P = 3.5 ksf
	3D	24"	24"	12.0'	2	2	4	4		w = 34.3% q_P < 0.5 ksf
										GRAY SILTY CLAY
										~ STIFF TO….
	1V			15.6'	2.5" x 5" TAPERED					S_V = 1.25 / 0.17 ksf
	1V'			16.2'	2.5" x 5" TAPERED					S_V = 1.48 / 0.14 ksf
	2V			20.6'	2.5" x 5" TAPERED					S_V = 0.68 / 0.11 ksf ...MEDIUM ~
	2V'			21.2'	2.5" x 5" TAPERED					S_V = 0.71 / 0.11 ksf
	3V			25.6'	2.5" x 5" TAPERED					S_V = 0.85 / 0.20 ksf
	3V'				2.5" x 5" TAPERED					VANE REFUSED TO ADVANCE << PROBABLE SAND SEAM >>
									28'	
										STRATIFIED BROWN SILTY SAND AND BROWN SILTY CLAY
										~ MEDIUM DENSE & MEDIUM ~
	4D	24"	15"	32.0'	8	7	6	12		
										BOTTOM OF EXPLORATION @ 32'

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
[ ] LABORATORY TEST

REMARKS:

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

3

BORING NO.: B-2

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	**B-3**
SHEET:	1 OF 1
PROJECT NO.:	15-0676
DATE START:	7/17/2015
DATE FINISH:	7/17/2015
ELEVATION:	73'
SWCOLE:	TJB

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / DEERFIELD 91 INDUSTRIAL, LLC

LOCATION: 91 INDUSTRIAL WAY, PORTLAND, MAINE

DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"		
SAMPLER:	D	1 3/8"	140 #	30"
CORE BARREL:				

WATER LEVEL INFORMATION

CASING BLOWS PER FOOT	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									0.8'	FOREST DUFF AND TOPSOIL	
	1D	24"	17"	2.0'	1	2	5	6		OLIVE-GRAY, MOTTLED SANDY SILT WITH ROOTLETS TO 18"	
									3.0'	~ VERY STIFF ~	q_P = 6.5 ksf
										OLIVE-BROWN SILTY CLAY	
											q_P = 5.5 ksf
	2D	24"	24"	7.0'	3	4	7	9			
										~ VERY STIFF ~	
	1V			10.5'	2" x 4" TAPERED					S_V = 3.0 / 0.46 ksf	
									12.0'		
										GRAY SLTY CLAY	
	2V			15.6'	2.5" x 5" TAPERED					S_V = 1.14 / 0.17 ksf ~ STIFF TO....	
	2V'			16.2'	2.5" x 5" TAPERED					S_V = 1.14 / 0.17 ksf	
	3V			20.6'	2.5" x 5" TAPERED					S_V = 0.71 / 0.14 ksf ...MEDIUM ~	
	3V'			21.2'	2.5" x 5" TAPERED					S_V = 0.74 / 0.14 ksf	
									26.5'		
										BROWN SAND SOME SILT ~ LOOSE ~	
										BOTTOM OF EXPLORATION @ 27'	

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
	LABORATORY TEST

REMARKS:

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

4

BORING NO.: **B-3**

BORING LOG

S.W.COLE ENGINEERING, INC.

BORING NO.:	B-4
SHEET:	1 OF 1
PROJECT NO.:	15-0676
DATE START:	7/17/2015
DATE FINISH:	7/17/2015
ELEVATION:	73'
SWCOLE:	TJB

PROJECT / CLIENT: PROPOSED PRE-ENGINEERED BUILDING / DEERFIELD 91 INDUSTRIAL, LLC
LOCATION: 91 INDUSTRIAL WAY, PORTLAND, MAINE
DRILLING CO. : GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	SSA	4 1/2" O.D.		
SAMPLER:	D	1 3/8"	140 #	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SATURATED @ 10'

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
									0.5'	FOREST DUFF AND TOPSOIL
	1D	24"	15"	2.0'	1/12"		2	2	3'	GRAY-OXIDE MOTTLED SANDY SILT WITH ROOTLETS TO 12" ~ STIFF ~
	2D	24"	24"	7.0'	4	6	7	9	11'	OLIVE-BROWN SILTY CLAY WITH OCCASOINAL SAND PARTINGS ~ VERY STIFF ~ q_P = 6 ksf
	3D	24"	24"	12.0'	3	3	3	5		~ MEDIUM ~ GRAY SILTY CLAY q_P = 1 ksf
										BOTTOM OF EXPLORATION @ 12'

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
[ ] LABORATORY TEST

REMARKS:

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

5

BORING NO.: B-4

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. - laboratory 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. – 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.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

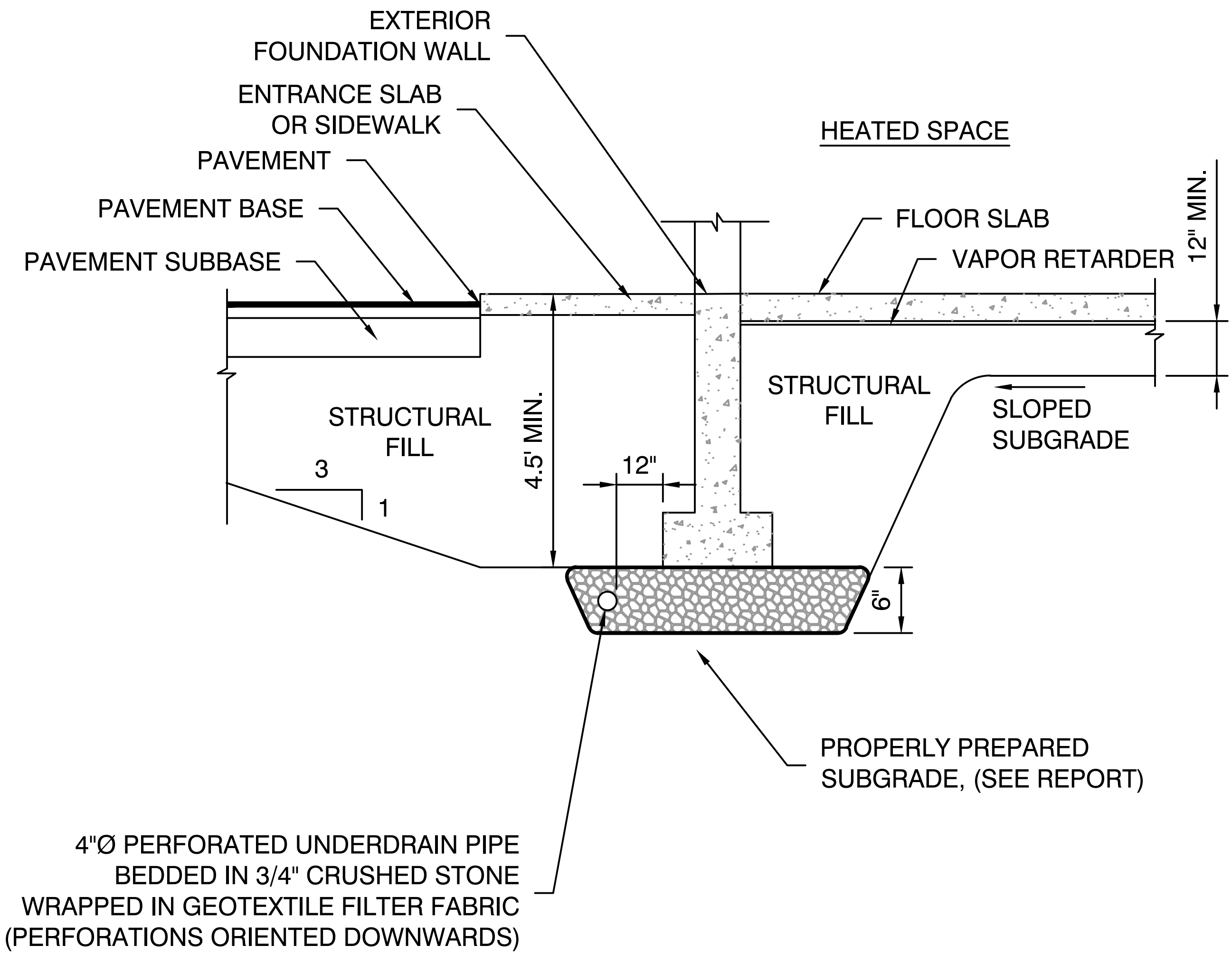
Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

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.

DEERFIELD 91 INDUSTRIAL LLC

UNDERDRAIN DETAIL

PROPOSED BUILDING
91 INDUSTRIAL WAY
PORTLAND, MAINE

Job No.:	15-0676	Scale:	Not to Scale
Date :	07/22/2015	Sheet:	7