REPORT

March 16, 2011
Revised March 1, 2012
09-0201.3 S

Geotechnical Engineering Services

Proposed Adams School Redevelopment
Vesper Street, Wilson Street, & Moody Street
Portland, Maine

PREPARED FOR:
AVESTA Housing
Attention: Mr. Seth Parker
307 Cumberland Avenue
Portland, ME 04101

PREPARED BY:
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S.W.COLE ENGINEERING, INC.

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

www.swcole.com

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1.0 INTRODUCTION

1.1 Scope of Work

In accordance with our Proposal dated October 14, 2010, we have made subsurface explorations and provided geotechnical engineering services for the proposed Adams School Redevelopment in Portland, Maine. The purpose of our services was to explore subsurface conditions below the site and to provide recommendations for foundation design and earthwork relative to the proposed building construction. Our work has included the making of ten test borings, four test pits, laboratory testing, and a geotechnical evaluation of the findings as they relate to the proposed construction. The contents of this report are subject to the limitations set forth in Attachment A.

1.2 Existing Site Conditions

The proposed site is located in the Munjoy Hill section of Portland, Maine. For the purpose of site description and use of cardinal direction, we have assumed that Vesper Street is oriented in a north-south direction and located east of the site. The site is bound by Vesper Street to the east, Wilson Street to the south, and Moody Street to the north. The site is currently occupied by the former Adams School building in the central portion and associated paved parking and grass surfaced lawn and playground areas to the east. We understand the existing building consists of a 2-story masonry structure with a slab-on-grade and no basement. We understand an underground heating oil tank is present on the southwesterly side of the existing school building.

The overall site generally slopes gently downward to the southeast, from about elevation 129 feet to about elevation 117 feet. A concrete retaining wall approaching about 3 feet in height is located along the site border along Vesper Street.

The general site location is shown on the "Site Location Map," attached as Sheet 1. The existing conditions are shown on the "Exploration Location Plan," attached as Sheet 1A.

1.3 Proposed Construction

Based on information provided by PDT Architects (project architect), we understand the existing site facility will be razed in favor of four new individual 2-story multi-unit housing units in the easterly portion of the site. We understand the structures will utilize wood frame construction and will not have basements. As such, we anticipate slab-on-grade construction will be utilized. We understand fills up to about 3 feet in height will be required to achieve finish grade in some areas. The row of housing along Vesper Street will have finish floor elevations that step upward to the north, ranging from 121.5 to 122.5 feet. The housing furthest from Vesper Street will have a finish floor elevations of 124.0 feet. A paved parking and drive area running approximately north-south, connecting Wilson Street and Moody Street, will be located between the two rows of housing units.

Available proposed construction information is shown on the "Exploration Location Plan," attached as Sheet 1A.

2.0 EXPLORATION AND TESTING

2.1 Exploration

Ten test borings (B-101 through B-110) were made at the site on November 2, 2010 by Great Works Test Boring, Inc. of Rollinsford, New Hampshire working under subcontract to S. W. COLE ENGINEERING, INC. Four test pits (TP-1 through TP-4) were made at the site on November 9, 2010 by Shaw Brothers Construction of Gorham, Maine also under subcontract to S. W. COLE ENGINEERING, INC. The test boring locations were selected and established in the field by S. W. COLE ENGINEERING, INC. using tapped measurements from existing site features. The borings were advanced using hollow-stem augers and cased-wash drilling techniques. Split-spoon soil samples were generally obtained at 2-foot intervals within existing fills and 5-foot intervals thereafter

using Standard Penetration Testing procedures. The approximate exploration locations are shown on the "Exploration Location Plan," attached as Sheet 1A. Test boring logs are attached as Sheets 2 through 11. Test pit logs are attached as Sheet 12 and 13. A key to the notes and symbols used on the logs is attached as Sheet 14.

2.2 Laboratory Work

Soil samples recovered from the test borings were visually examined and classified in our laboratory. Laboratory testing included two gradation and moisture content tests. Gradation test results are shown on Sheets 15 through 16. The results of moisture content tests are shown on the appropriate test boring logs.

3.0 SUBSURFACE CONDITIONS

3.1 Soils

The test borings generally encountered a layer of fill overlying medium dense to dense glacial till. Details of each strata encountered are described below. Not all strata were encountered at each boring.

Surficial Pavement and Topsoil: Several test borings encountered a surficial layer of 2 to 3 inches of asphalt pavement. The remaining explorations encountered 0.7 feet of surficial topsoil.

Fill: Below the surficial materials, the explorations encountered very loose to medium dense various fill materials extending to depths varying from 4.0 to 10.5 feet below the existing ground surface. The fill was observed to be generally granular in composition with various mixed debris such as pockets of organics, pockets and layers of ash, bricks, mortar, metal, cobbles, boulders, and relic foundations. We understand that the fill materials were tested and determined by others to be considered contaminated, but non-hazardous. Photographs of the fill encountered in the test pits are attached as Sheet 18 through 21.

Glacial Till: Below the fill, the test borings encountered medium dense to dense glacial till consisting of a heterogeneous mixture of silt, sand, gravel and cobbles. The explorations were terminated in the glacial till at depths varying from 7.1 to 39.8 feet.

3.2 Groundwater

Free water and saturated soil conditions were observed in the explorations at depths varying from about 5 to 10 feet. Water seepage was observed at the test pit locations within the fills, likely indicative of perched water conditions in the variable density and composition fill materials. Groundwater levels will fluctuate seasonally and following periods of precipitation and snowmelt.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

The predominant soils encountered at the explorations are granular fill with various mixed debris overlying medium dense to dense glacial till. It is our opinion that the existing fill soils are not suitable in their current conditions for support of the proposed foundations and on-grade floor slabs. It is our understanding the fill material is classified by others as contaminated, but non-hazardous, and can remain on site. Because of the environmental characterization, it will be costly to remove the material from the site and dispose of at an off-site facility. Therefore, we have worked with the design team to develop two options for improvement of the site fills and use of a conventional spread footing foundation system with frost walls and a slab-on-grade. These two options are described in more detail in Section 4.2.

4.2 Site Improvement and Preparation

Option 1 – Over-excavation, sorting/selective reuse, and use of conventional spread footing with frost wall foundation placed on replaced fill: This option would involve over-excavation of the fill at the site extending at least 1 foot laterally beyond the exterior foundation edges for every 1-foot of over-excavation below the foundation. Based on the test boring information, the fill extends to depths varying from 4.0 to 10.5 feet below existing grade. The fill was observed to be generally granular in composition with various mixed debris such as pockets of organics, pockets and layers of ash, bricks, mortar, metal, cobbles, boulders, and relic foundations. The larger particles (greater than 9 inches) and unsuitable items (metal, organics, wood, and ash) should be segregated from the fill during excavation and set aside for future off-site disposal.

The remaining materials (soil, gravel, cobbles, bricks, and concrete) should be stockpiled on-site for re-use. The stockpiled materials should be thoroughly mixed and blended with import sand (estimated at 10 to 20% by volume) to "dilute" the small

volumes of intermixed unsuitable materials that could not be segregated. It must be understood that the fill material will be variable, and the percent suitable for re-use is difficult to determine. The mixed soils should be placed in the over-excavation in lifts of 12 inches or less and compacted to 95 percent of its maximum dry density as determined by ASTM D-1557. Once the site is raised to subgrade, foundation excavation and construction of a typical foundation placed at frost depth can occur.

This option relies on excavation, handling, sorting, and selective re-use of the removed existing fills and supplementing with imported blended granular soils. The owner must be aware that re-use of these types of fills results in less than an ideal product for support of the buildings, and there is risk of some post-construction movement associated with the use of the blended fill material below the buildings. However, it is our opinion that, with careful segregation of debris, selective re-use of the existing fill soils, and proper replacement and compaction methods, the potential for post-construction movement is significantly reduced.

Option 2 – Rammed Aggregate Piers for Building Support: This option would involve the use of a rammed aggregate pier (RAP) system, in lieu of over-excavation, to derive support for the proposed building foundations and slab. The RAP system includes drilling vertical holes in soil and backfilling with compacted crushed aggregate to form a stiff column. The RAP helps densify adjacent loose soil and/or fill and allows foundation loads to be distributed to the relatively stiff column. Design of the RAP system is the responsibility of the specialty contractor.

Pavement Areas: We anticipate that over-excavation, if Option 1 is employed, will continue into the paved areas between the buildings. Further, we understand that the area between the buildings will be a utility corridor where the majority of the soils will be removed to depths of about 5 feet below finish grade. Existing fills should be over-excavated where needed to achieve the pavement section thickness as described in our Pavement Areas section (Section 4.10). If fills soils exist at pavement subgrade, the fills should be proof-rolled with at least 5 passes of a vibratory drum roller having a static weight of at least 10 tons. The utilities should be backfilled with soils prepared in the same manner as the soils used below the buildings.

Subgrade soils are frost-susceptible; and without use of non-frost susceptible material within the frost zone (4.5-foot depth), frost heaving will occur. The Owner must

understand and accept the risk and consequences of some pavement movement and distress from seasonal frost heaving where full frost-depth excavation below pavement areas is not performed.

General: Site preparation should begin with the construction of an erosion control system to protect drainageways and areas outside the construction limits. Existing utilities to be abandoned, pavement, topsoil, and surficial organic material should be removed from beneath the proposed site.

The soils that will be exposed during stripping and over-excavation will be subject to erosion. When practicable, vegetation adjacent to the construction site should remain undisturbed to lessen the potential for erosion. Based on the findings from the test boring explorations, approximately 1± foot of topsoil will require removal. Actual stripping depths will depend on the moisture of the underlying soil, seasonal conditions at the time of construction, and the contractor's means and methods of topsoil removal.

4.3 Foundation Design

Based on our findings, the building will be supported on conventional spread footings with on-grade floor slabs over improved soils. The design freezing index for the Portland, Maine area is approximately 1,250 Fahrenheit degree-days, which corresponds to a frost penetration depth of 4.5 feet. We recommend that foundations exposed to freezing be cast at least 4.5 feet below exterior finish grade.

4.3.1 Spread Footing on Over-Excavated/Replaced Soils

We recommend that footings be designed for a net allowable bearing capacity of 3.0 ksf for exterior foundations placed on native soils or compacted fill overlying native soils.

We recommend foundation design consider the following parameters:

GEOTECHNICAL FOUNDATION DESIGN PARAMETERS	
Design Frost Depth	4.5 feet
Total Unit Weight of Backfill (γ_t) – Structural Fill	125 pcf
Internal Friction Angle – Structural Fill	30°
Base Friction Factor – Concrete to Crushed Stone or Structural Fill	0.45
Active Lateral Earth Pressure Coefficient – Structural Fill	0.3
Passive Lateral Earth Pressure Coefficient – Structural Fill	3.0
At-Rest Lateral Earth Pressure Coefficient – Structural Fill	0.5
Post-Construction Settlement	Less than 1 inch

Strip footings should be at least 18 inches wide and column footings should be at least 24 inches wide, regardless of bearing pressure.

4.3.2 Rammed Aggregate Pier System

For this option, the building would derive support from spread footings founded on rammed aggregate piers designed by the contractor. The contractor is responsible for the design and performance of the RAP system with regard to foundation and slab support and settlement. We offer the following performance criteria for consideration in design of the RAP system:

RAMMED AGGREGATE PIER PERFORMANCE CRITERIA	
Net Allowable Bearing Capacity (footings supported by soils improved by RAP system)	3.0 ksf
Modulus of Subgrade Reaction (soils improved by RAP system)	200 pci
Post-Construction Settlement Magnitude (footings or slab supported by RAP system)	≤ 1 inch
Differential Post-Construction Settlement Magnitude (between adjacent footings or across floor slab supported by soils improved by RAP system)	≤ ½-inch

The RAP design contractor is responsible for:

- Rammed aggregate pier design
- Achieving floor slab design parameters
- Achieving allowable soil bearing capacity

- Achieving post-construction settlement criteria within soil strata treated with RAP

The RAP design contractor should provide proof of professional liability insurance.

4.4 Seismic Considerations

Assuming that the existing fill is removed and replaced as described herein, we interpret the subsurface site conditions to correspond to a Site Class C as defined by the standard penetration resistance (N) method in the 2009 International Building Code (IBC). It should be noted this site classification is for subsurface conditions comprised on over-excavated and replaced fill and does not consider any improvement due to the installation of a RAP system. Improvement in site class due to an installed RAP system should be determined by the design-build contractor. The information obtained at the exploration locations suggests that liquefaction of soils is not a design consideration.

4.5 Excavation Work

Excavation work will encounter soil that can undergo strength loss when subjected to construction traffic and excavation activities, particularly during periods of precipitation. Water seepage was observed at depths varying from 5 to 10 feet below the existing ground surface. Care must be exercised during construction to reduce disturbance of the bearing soils. We recommend excavation to subgrade be performed using a smooth-edge excavator bucket to reduce the potential for disturbance of the subgrade soils. Should the subgrade become yielding or difficult to work, disturbed areas should be excavated and backfilled with compacted 3/4-inch Crushed Stone overlying geotextile fabric, such as Mirafi 140N or equivalent. Crushed Stone, if used, should be compacted to at least 100 percent of its dry rodded unit weight as determined by ASTM C-29.

It is our opinion that construction dewatering can likely be accomplished with the use of gravity drainage and a sump and pump system.

Excavations must be properly shored and/or sloped to prevent sloughing and caving of the sidewalls and to protect adjacent sidewalks and roadways during construction. Based on the information obtained at the explorations, we recommend that temporary unsupported excavations be cut to a slope of 1.5:1 (horizontal:vertical) or flatter. All excavations must be consistent with OSHA regulations. Based on the depth of excavation for the perimeter foundations along portions of Moody Street, Vesper Street,

and Wilson Street, sloped excavations using 1.5H:1V slope are not possible without encroaching into the sidewalk. If sidewalks cannot be closed during construction, shored excavation will likely be necessary.

The contractor is responsible for developing, designing and implementing an appropriate dewatering and excavation shoring plan.

4.6 Fill and Compaction

Although a wide range of soil materials can be used successfully, it has been our experience that granular soils with good drainage characteristics provide significant advantages, particularly in wet conditions and during cold weather construction. We recommend that either filling be limited during these times or more applicable materials be used.

We recommend that material used as backfill adjacent to the exterior sides of foundation walls be a clean, non-frost susceptible, meeting the requirements of Structural Fill as described below. This is to improve drainage and reduce potential for ad-freeze and frost related heaving of the foundations and the adjacent soils. Since this often requires a large volume of imported material, we understand that this may not be economically feasible on this project, particularly if this lead to additional off-site disposal of materials. In lieu if use of Structural Fill as backfill, a 12-inch horizontal measure chimney drain of ¾-inch crushed stone could be used as backfill directly adjacent to the exterior side of the perimeter foundations and the remainder backfilled with the re-used on-site segregated and blended existing fills. The crushed stone should be hydraulically connected to the foundation underdrain placed at footing depth. We recommend a layer of non-woven geotextile filter fabric be used to separate the outer side of the crushed stone from the adjacent backfill.

We recommend the following materials be considered:

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
No. 40	0 to 30
No. 200	0 to 5

Structural Fill is recommended for use as:

- Backfill for exterior side of perimeter foundations (if feasible)
- Slab base material
- Backfill within frost transition zone for entrance walks to buildings
- Backfill for repair of soft or yielding areas

Crushed Stone: Crushed, washed, hard, durable rock meeting the gradation requirements for ASTM D-448, No. 67 stone. Crushed Stone is recommended for use as:

- Drainage aggregate for underdrains
- Chimney drain/backfill on exterior side of perimeter foundations

Placement and Compaction: Fill should be placed in horizontal lifts and be compacted. Lift thickness should range between 6 to 12 inches depending upon the size and type of equipment such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. We recommend that fill placed below the building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Foundation backfill should be compacted to at least 95 percent of ASTM D-1557. Crushed Stone should be compacted to 100 percent of its dry rodded weight as determined by ASTM C-29.

4.7 Foundation Drainage

We recommend that foundation underdrains be provided around the perimeter of the proposed building on the exterior side of spread footings. The underdrain pipe should be a minimum of 4 inches in diameter and have perforations of 1/4 to 5/8 inch. We recommend that at least 6 inches of 3/4 inch crushed stone bedding be provided around the underdrains and that the stone be wrapped with a non-woven geotextile filter fabric such as Mirafi 140N or equivalent. The backfill adjacent to foundations should be sloped to promote surface drainage away from the building periphery. The foundation backfill in areas not surface with pavement should be capped with low permeable topsoil to reduce the potential for surface water to enter the foundation backfill. General underdrain details are shown on Sheet 17.

The underdrain system should be hydraulically connected to the Crushed stone chimney drain on the exterior side of the foundation if this backfill option is utilized.

4.8 On-grade Floor Slabs

We recommend on-grade concrete floors be supported on a minimum of 12 inches of compacted Structural Fill. Provided the appropriate base materials are used, we recommend a modulus of subgrade reaction of 120 pci be considered in the floor slab design. The structural engineer or concrete consultant shall design steel reinforcing and joint spacing appropriate to slab thickness and function.

We recommend consideration of 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 to reduce the potential for floor covering damage from moisture. The vapor retarder shall have a permeance that is less than the floor cover 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 flooring and adhesive materials.

4.9 Entrances and Sidewalks

The existing site soils are susceptible to frost heaving. Additionally, segregated/blended reused fill material may be susceptible to frost heaving. Concrete entrances and sidewalks adjacent to building entrances should be designed to reduce the effects of frost action. We recommend that excavation beneath the width of entrances and sidewalks abutting the building continue to at least 4.5 feet below finish grade. The entrance and sidewalk areas should be backfilled with compacted non-frost susceptible fill meeting the Structural Fill gradation specifications. Gradual transition (3 horizontal to 1 vertical) of the Structural Fill thickness should be provided from the 4.5-foot depth to the bottom of gravel base thickness at the paved areas and concrete slabs away from the building entrances. This transition will reduce the potential for detrimental differential movement due to frost action. The 4.5-foot depth of Structural Fill should be provided below all exterior concrete areas adjacent to the building where frost heaving will be detrimental.

Backfill below entrances should be placed in lifts and be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. General backfill details are shown on Sheet 17.

4.10 Pavement Areas

4.10.1 Conventional Pavement

We anticipate that paved areas will be subjected to both passenger car and occasional heavy truck traffic. Considering the site soils and proposed usage, we offer the following recommendations for a new pavement section. Materials are based on 2002 Maine Department of Transportation Standard Specifications.

FLEXIBLE (ASPHALT) PAVEMENT	
MDOT 703.09 Type 9.5 mm Hot Mix Asphalt (50 Gyration)	1 ¼ inches
MDOT 703.09 Type 19 mm Hot Mix Asphalt (50 Gyration)	1 ¾ inches
MDOT 703.06 Type A Crushed Gravel Base Course	6 inches
MDOT 703.06 Type D Gravel Subbase	9 inches

Pavement base and subbase materials should be compacted to 95 percent of ASTM D-1557. Hot mix bituminous asphalt pavement should be compacted to 92 to 97 percent of its theoretical maximum density as determined by ASTM D-2041. A tack coat should be used between lifts of asphalt.

Consideration should be given to the development of both surface and subgrade drainage. The paved areas should be graded to promote surface drainage away from the building, and design should consider sloping of the subgrade to enhance drainage.

Where new utilities are proposed beneath the new paved areas, backfilling of the utility trenches should be made in a manner to limit differential frost action. Utility pipes should be bedded and surrounded using materials consistent with the manufacturer's specifications. Above the utility bedding, backfill in trenches should be material similar to that in the trench sidewalls to lessen the potential for differential frost action between the trench and the adjacent materials. The backfill material should be placed in horizontal lifts not exceeding 12 inches in thickness and should be compacted to a density similar to that of the material in the adjacent trench sidewalls.

Frost penetration can be on the order of 4.5 feet in this area of the state. 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.

4.10.2 Porous Pavement

We understand that porous pavement is being considered and the project civil engineer is responsible for development of porous pavement design sections. As requested, we

offer comment on the general feasibility of the site soils regarding infiltration of stormwater. In general the site soils consist of variable density and composition fills and relatively impermeable glacial till with high percentages of fines. Further, due to site preparation, it is highly likely that the subgrade soils following excavation and filling will differ from current conditions. Therefore, we do not recommend account for any infiltration into the subgrade soils. Further, we do not recommend using porous pavement in areas of existing fill subgrades. Infiltrating water can expedite and facilitate settlement of loose fills and react poorly in soils containing organics, resulting in settlement of the pavement surface and expedited pavement deterioration.

4.11 Weather Considerations

If foundation construction takes place during fall or winter, foundation elements and floor slabs must be protected during freezing conditions. Concrete and new soil must not be placed on frozen soil; and once placed, the soil beneath the concrete structures must be protected from freezing.

Site soils are moisture sensitive and subgrades will be susceptible to disturbance during wet conditions. Site work and construction activities should take appropriate measures to protect exposed subgrades.

4.12 Design Review and Construction Testing

S. W. COLE ENGINEERING, INC. should be retained to review the sitework and foundation design drawings to determine that our interpretation of the subsurface conditions and geotechnical recommendations have been appropriately interpreted and implemented.

Further, S. W. COLE ENGINEERING, INC. should be retained to provide soils engineering and testing services during the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and design recommendations and to allow design changes in the event that subsurface conditions are found to differ from those anticipated prior to the start of construction. S. W. COLE ENGINEERING, INC. is available to provide testing of soil, concrete, masonry, steel, spray-applied fireproofing and asphalt construction materials.

5.0 CLOSURE

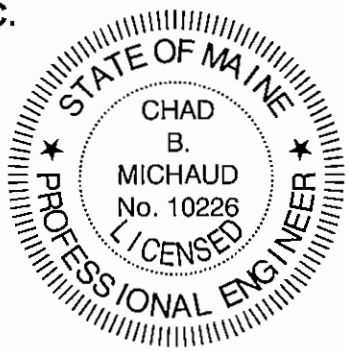
It has been a pleasure to be of assistance to you with this phase of your project. If you have any questions or if we may be of further assistance, please do not hesitate to contact us.

Very truly yours,

S. W. COLE ENGINEERING, INC.

Chad B. Michaud, P.E.
Senior Geotechnical Engineer

CBM:nbs



Attachment A
Limitations

This report has been prepared for the exclusive use of AVESTA Housing for specific application to the proposed Adams School Redevelopment project on Vesper Street, Wilson Street, and Moody Street in Portland, Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

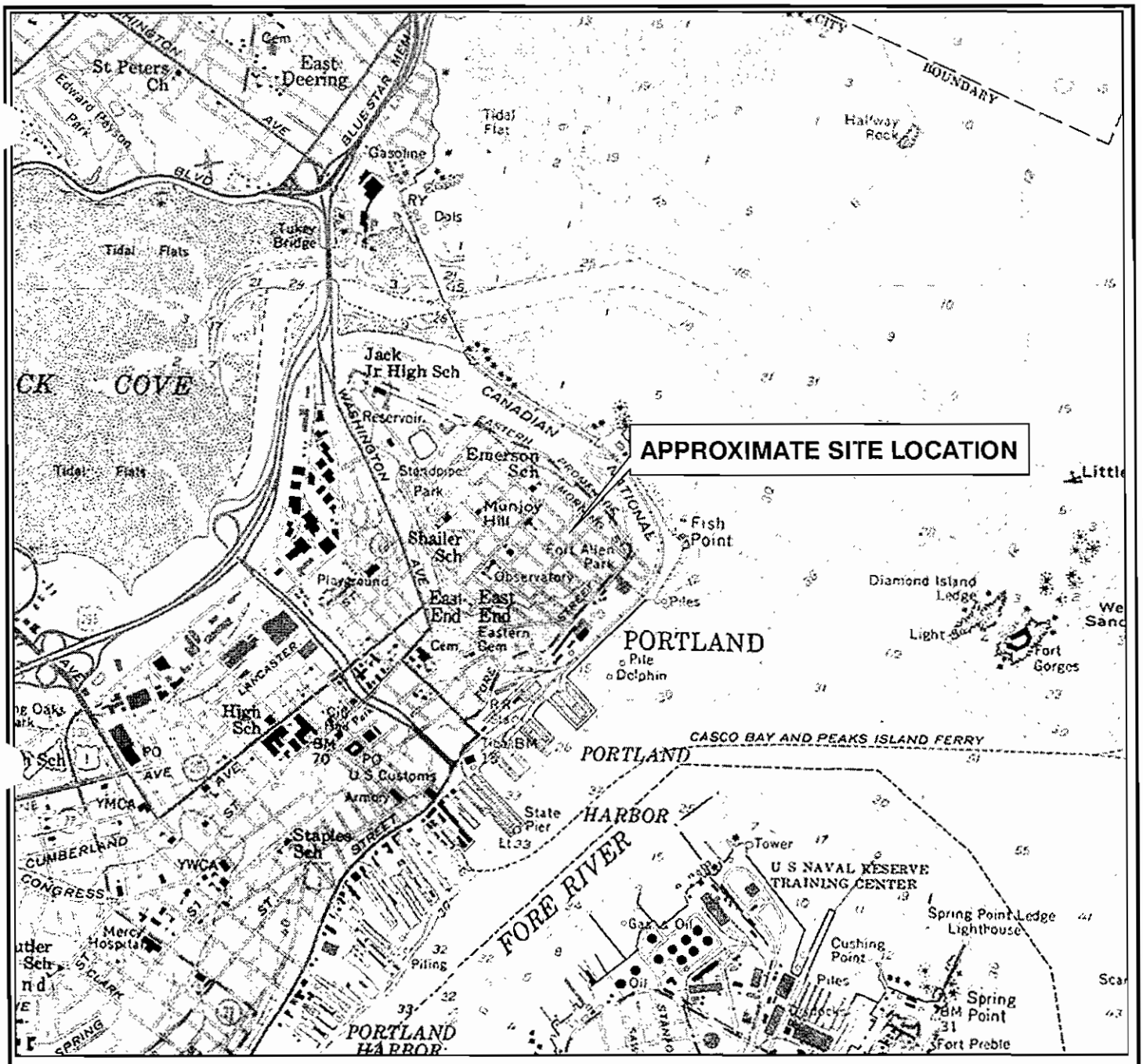
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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

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

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

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



S.W.COLE ENGINEERING, INC.

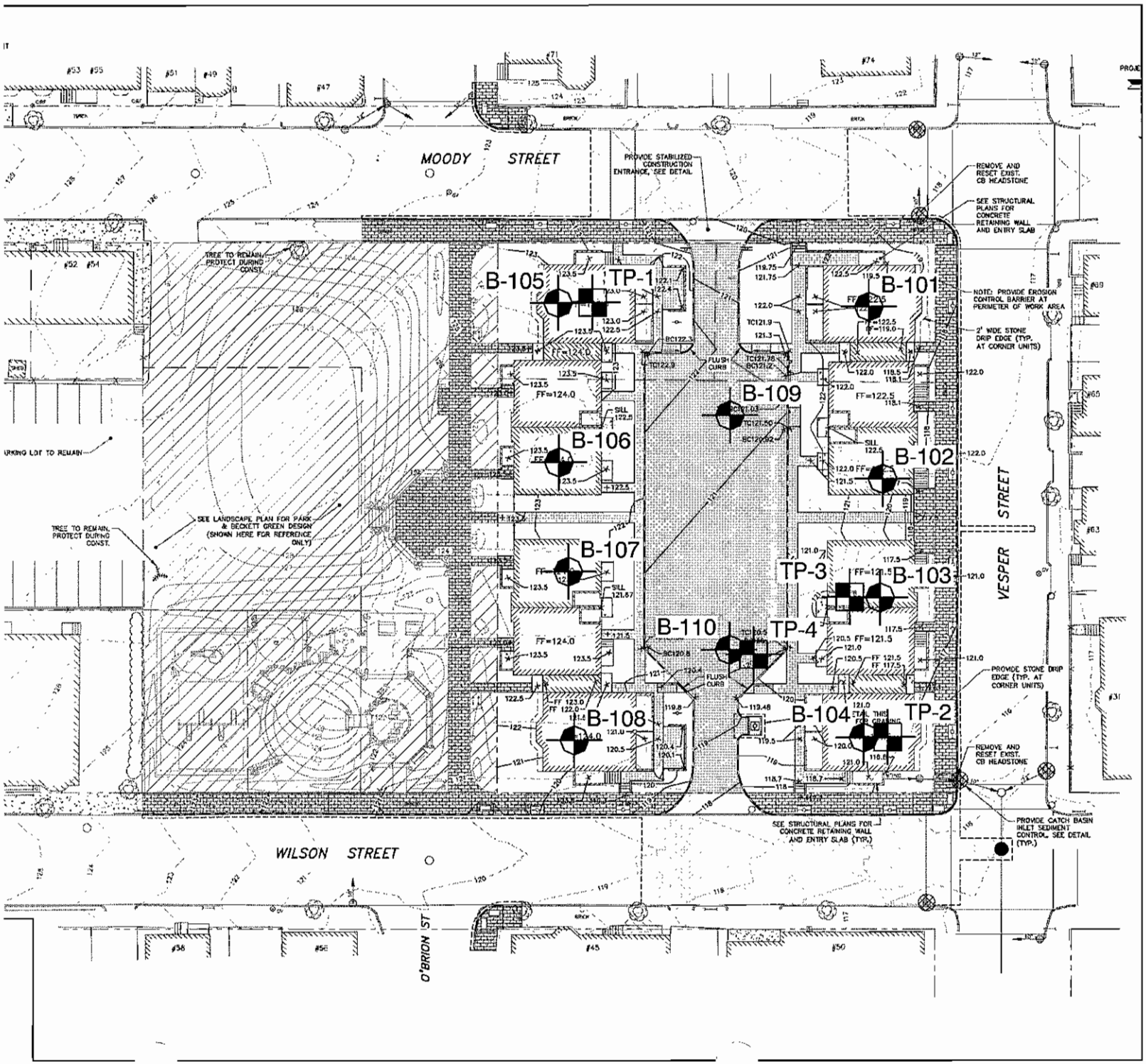
AVESTA HOUSING

SITE LOCATION MAP

PROPOSED ADAMS SCHOOL REDEVELOPMENT
VESPER STREET, WILSON STREET AND MOODY STREET
PORTLAND, MAINE

Job No.	09-0201.3	Scale	1:24000
Date:	03/15/2011	Sheet	1

NOTE:
SITE LOCATION MAP PREPARED FROM ESRI ArcGIS ONLINE AND DATA PARTNERS INCLUDING USGS AND © 2007 NATIONAL GEOGRAPHIC SOCIETY.



LEGEND:

APPROXIMATE BORII

APPROXIMATE TEST

NOTES:

1. EXPLORATION LOCATION F PLAN OF THE SITE ENTITLE CONTROL PLAN", PROVIDE MARCH 5, 2012, AND PROV DOCUMENT FORMAT (PDF)
2. THE EXPLORATIONS WERE TAPED MEASUREMENTS FI
3. THIS PLAN SHOULD BE US ASSOCIATED S.W. COLE EI GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PL LOCATION OF THE EXPLOF EXISTING CONDITIONS ANI AND IS NOT TO BE USED F

NO.	DATE	DE
1	03/01/2012	FINAL REPOR
--	03/15/2011	REPORT SUB

S.W.COLE ENGINEERING, INC.

AVESTA H

EX ORATION L

PROPOSED ADAMS SCH

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-101**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3

ROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

DATE START: 11/2/2010
DATE FINISH: 11/2/2010
ELEVATION: 122' +/-
SWC REP.: E. WALKER

	TYPE	SIZE	HAMMER WT.	HAMMER FALL
CASING:	HW	4" I.D.	DRILL AHEAD	
SAMPLER:	SS	1 3/8" I.D.	140-lbs	30"
CORE BARREL:	N/A			

WATER LEVEL INFORMATION
WATER AT 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
SSA									0.1'	2-INCHES ASPHALT PAVEMENT
	1D	24"	16"	2.5'	7	11	16	21		BROWN GRAVELLY SILTY SAND (FILL)
	2D	24"	16"	4.5'	10	15	22	20		~ MEDIUM DENSE ~
									5.0'	
5-FEET									6.0'	BROWN SILTY SAND SOME GRAVEL (GLACIAL TILL)
CASING	3D	24"	24"	7.0'	8	11	15	19		w = 10.6%
OPEN										GRAY SAND AND SILT TRACE GRAVEL
HOLE										WITH OCCASIONAL COBBLES (GLACIAL TILL)
BELOW										
										~MEDIUM DENSE~
	4D	24"	18"	12.0'	7	14	13	18		w = 9.0%
										GRAY GRAVELLY SAND AND SILT
										WITH OCCASIONAL COBBLES (GLACIAL TILL)
	5D	24"	3"	17.0'	18	24	24	31		[SPOON PUSHED COBBLE - POOR RECOVERY]
	6D	24"	22"	22.0'	8	13	17	20		
	7D	18"	12"	26.5'	23	34	23			~DENSE~
	8D	18"	18"	31.5'	14	20	26			
	9D	18"	16"	36.5'	7	15	25			...WITH FREQUENT COBBLES
									39.8'	[ADVANCED BORING BY ROLLER CONE]
										BOTTOM OF EXPLORATION AT 39.5'

AMPLES:
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-101**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-102**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: 11/2/20
DATE FINISH: 11/2/2010
ELEVATION: 121' +/-
SWC REP.: E. WALKER

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

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

WATER LEVEL INFORMATION
WATER AT 5' +/-

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'	BROWN SILTY SAND TRACE CLAY WITH ORGANICS (LAWN AREA)
	1D	24"	8"	2.0'	1	3	3	7		BROWN SAND SOME SILT TRACE ORGANICS (FILL)
										~ MEDIUM DENSE ~
	2D	24"	12"	4.0'	13	13	7	4		...WITH BRICK, CONCRETE BLOCK AND ASH
										~ VERY LOOSE TO LOOSE ~
	3D	24"	3"	7.0'	5	1	1	5		BROWN SILTY SAND
										WITH CONCRETE AND BRICK (FILL)
									8.5'	
										GRAY GRAVELLY SAND AND SILT
	4D	24"	18"	12.0'	6	12	16	22		WITH OCCASIONAL COBBLES (GLACIAL TILL)
										~MEDIUM DENSE~
	5D	24"	14"	17.0'	8	13	16	23		
									20.0'	[ADVANCED BY AUGER TO 20']
										BOTTOM OF EXPLORATION AT 20.0'

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-102**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-103
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT: AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

DATE START: 11/2/2010
DATE FINISH: 11/2/2010
ELEVATION: 121' +/-
SWC REP.: E. WALKER

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

WATER LEVEL INFORMATION
WATER AT 7' +/-

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'	BROWN SILTY SAND TRACE CLAY WITH ORGANICS (FILL/LAWN AREA)
	1D	24"	18"	2.0'	2	4	4	5		BROWN SILTY SAND SOME GRAVEL WITH ASH (FILL)
	2D	24"	18"	4.0'	4	5	8	3		~ LOOSE TO MEDIUM DENSE ~
	3D	24"	16"	7.0'	4	9	14	8	8.0'	
	4D	24"	20"	12.0'	10	13	17	30		GRAY GRAVELLY SAND AND SILT (GLACIAL TILL) ~MEDIUM DENSE~
	5D	24"	22"	17.0'	7	11	14	18		
	6D	24"	24"	22.0'	9	12	13	24	22.0'	
										BOTTOM OF EXPLORATION AT 22.0'

AMPLES:
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-103

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-104**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: 11/2/20
DATE FINISH: 11/2/2010
ELEVATION: 120' +/-
SWC REP.: E. WALKER

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

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

WATER LEVEL INFORMATION
WATER AT 6' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-16	16-24	DEPTH	STRATA & TEST DATA
									0.5'	BROWN SILTY SAND TRACE CLAY WITH ORGANICS (LAWN AREA)
	1D	24"	12"	2.0'	2	6	9	11		BROWN SILTY SAND SOME GRAVEL WITH ASH (FILL) ~ MEDIUM DENSE TO...
	2D	24"	3"	4.0'	9	6	8	11		
	3D	24"	16"	7.0'	2	1	1	2	6.5'	...VERY LOOSE TO LOOSE ~
										DARK BROWN ORGANICS (PROBABLE FILL)
									8.5'	~ LOOSE ~
	4D	24"	18"	12.0'	8	10	14	16		GRAY GRAVELLY SAND AND SILT WITH OCCASIONAL COBBLES (GLACIAL TILL) ~MEDIUM DENSE~
	5D	24"	16"	17.0'	11	15	17	21		
	6D	24"	20"	22.0'	9	15	17	21	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
[ ] LABORATORY TEST

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

BORING NO.: **B-104**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-105
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT: AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

DATE START: 11/3/2010
DATE FINISH: 11/3/2010
ELEVATION: 123' +/-

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

SWC REP.: K. GIMPEL

WATER LEVEL INFORMATION
WATER AT 6.5' +/-

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
									0.3'	BROWN SILTY SAND TRACE CLAY WITH ORGANICS (FILL/LAWN AREA)
	1D	24"	10"	2.0'	1	6	7	3		BROWN GRAVELLY SILTY SAND WITH BRICKS (FILL) ~ LOOSE ~
	2D	24"	5"	4.0'	3	3	5	3	6.0'	
	3D	24"	18"	7.0'	6	11	17	25	8.0'	BROWN SAND AND GRAVEL TRACE SILT (PROBABLE FILL) ~ MEDIUM DENSE ~
	4D	24"	24"	12.0'	7	9	12	15		GRAY SAND AND SILT SOME GRAVEL (GLACIAL TILL) ~MEDIUM DENSE~
	5D	24"	24"	17.0'	8	13	18	16		
	6D	24"	24"	22.0'	9	16	19	22	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
[ ] LABORATORY TEST

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

BORING NO.: B-105

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-106**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: N/A
DATE FINISH: N/A
ELEVATION: 125' +/-
SWC REP.: E. WALKER

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

	TYPE	SIZE	HAMMER WT.	HAMMER FALL
CASING:	N/A			
SAMPLER:	N/A			
CORE BARREL:	N/A			

WATER LEVEL INFORMATION
N/A

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	8-12	12-18	18-24	DEPTH	STRATA & TEST DATA
										BORING LOCATION NOT DRILLED DUE TO A CONFLICT WITH AN EXISTING UNDERGROUND UTILITY AND PROXIMITY TO EXISTING BUILDING

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

SOIL CLASSIFIED BY:
DRILLER - VISUALLY
SOIL TECH. - VISUALLY
LABORATORY TEST

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

BORING NO.: **B-106**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-107
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3

ROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

DATE START: 11/2/2010
DATE FINISH: 11/2/2010
ELEVATION: 124' +/-
SWC REP.: E. WALKER

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

WATER LEVEL INFORMATION
SOILS APPEARED SATURATED BELOW 7' +/-

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
									0.1'	2-INCHES ASPHALT PAVEMENT
	1D	24"	18"	2.0'	10	9	8	7		BROWN SAND SOME SILT SOME GRAVEL TRACE BRICK (FILL)
	2D	24"	14"	4.0'	13	13	11	5		...BECOMING SILTY SAND SOME GRAVEL (FILL) ~ MEDIUM DENSE ~
	3D	24"	2"	7.0'	3	3	3	3		[SPOON PUSHED GRAVEL FRAGMENT - POOR RECOVERY] ~ LOOSE ~
									10.5'	
	4D	24"	22"	12.0'	5	9	17	17		GRAY SAND AND SILT SOME GRAVEL WITH OCCASIONAL COBBLES (GLACIAL TILL)
	5D	24"	24"	17.0'	7	8	10	16		~MEDIUM DENSE~
	6D	24"	24"	22.0'	9	13	13	20	22.0'	
										BOTTOM OF EXPLORATION AT 22.0'

AMPLES:
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-107

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-108**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: 11/3/20
DATE FINISH: 11/3/2010
ELEVATION: 122' +/-
SWC REP.: K. GIMPEL

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

	TYPE	SIZE	HAMMER WT.	HAMMER FALL
CASING:	HW	4" I.D.	DRILL AHEAD	
SAMPLER:	SS	1 3/8" I.D.	140-lbs	30"
CORE BARREL:	N/A			

WATER LEVEL INFORMATION
SOILS APPEARED SATURATED BELOW 7' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-16	18-24	DEPTH	STRATA & TEST DATA
SSA									0.2'	3-INCHES ASPHALT PAVEMENT
	1D	24"	19"	2.5'	9	8	6	4	0.8'	BROWN GRAVELLY SAND SOME SILT (FILL)
	2D	24"	4"	4.5'	3	5	6	6		BROWN GRAVELLY SILTY SAND WITH SOME BRICK AND ASH (FILL)
									6.0'	~ LOOSE TO MEDIUM DENSE ~
	3D	24"	17"	7.0'	23	14	7	10	7.0'	BROWN SAND AND SILT SOME GRAVEL (GLACIAL TILL)
7-FEET CASING OPEN HOLE BELOW	4D	24"	24"	12.0'	11	19	22	24		PETROLEUM ODOR NOTED BETWEEN ABOUT 7-10' +/- GRAY SAND AND SILT SOME GRAVEL (GLACIAL TILL) ~DENSE~
	5D	24"	3"	17.0'	12	16	17	32		[POOR RECOVERY GRAVEL FRAGMENT STUCK IN DRIVE SHOE]
	6D	24"	24"	22.0'	7	20	13	17		
	7D	24"	17"	27.0'	15	24	17	21		
	8D	24"	0"	32.0'	19	22	25	35		
									35.0'	[NO SAMPLE ATTEMPT AT 35.0' ROLLER CONE ON SMALL COBBLE]
	9D	18"	2"	41.5'	29	41	60		41.5'	GRAY GRAVELLY SAND AND SILT WITH COBBLES (GLACIAL TILL) ~VERY DENSE~
										BOTTOM OF EXPLORATION AT 41.5' +/-

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-108**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-109**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: 11/2/2010
DATE FINISH: 11/2/2010
ELEVATION: 122' +/-
SWC REP.: E. WALKER

ROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

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

WATER LEVEL INFORMATION
WATER AT 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
									0.1'	2-INCHES +/- ASPHALT PAVEMENT
	1D	24"	12"	2.5'	6	6	8	8		BROWN GRAVELLY SILTY SAND
										WITH TRACES METAL AND ASH (FILL)
	2D	24"	16"	4.5'	2	5	4	5	4.0'	~ LOOSE ~
									5.0'	BROWN SILTY SAND SOME GRAVEL (GLACIAL TILL)
	3D	24"	18"	7.0'	8	35	23	26		GRAY SAND AND SILT SOME GRAVEL (GLACIAL TILL)
	4D	24"	24"	12.0'	7	11	17	13		~DENSE TO MEDIUM DENSE~
	5D	24"	22"	17.0'	9	11	12	15	17.0'	
										BOTTOM OF EXPLORATION AT 17.0'

AMPLES:
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-109**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-110**
SHEET: 1 OF 1
PROJECT NO.: 09-0201.3
DATE START: 11/2/20
DATE FINISH: 11/2/2010
ELEVATION: 122' +/-
SWC REP.: E. WALKER

PROJECT: PROPOSED ADAMS SCHOOL REDEVELOPMENT
CLIENT : AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., MUNJOY ST., PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORING INC. DRILLER: JEFF LEE

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

WATER LEVEL INFORMATION
WATER AT 5' +/-

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
									0.7'	BROWN SILTY SAND TRACE CLAY WITH ORGANICS (FILL/LAWN AREA)
	1D	24"	16"	2.0'	2	3	3	4		BROWN SILTY SAND TRACE GRAVEL WITH ASH, CLINKER AND BRICK (FILL) ~ LOOSE TO MEDIUM DENSE ~
	2D	24"	18"	4.0'	3	14	7	6		
	3D	24"	16"	7.0'	4	8	5	6	6.5'	
	4D	24"	22"	12.0'	16	30	20	25		GRAY SAND AND SILT SOME GRAVEL (GLACIAL TILL) ~DENSE~
	5D	24"	24"	17.0'	3	8	10	16	17.0'	~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 17.0'

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-110**

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED ADAMS SCHOOL REDEVELOPMENT / AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., & MUNJOY ST. PORTLAND MAINE
PROJECT NO. 09-0201.3
TEST PIT MACHINE: TAKEUCHI TB175 WITH A 5-FOOT SMOOTH EDGED BUCKET

TEST PIT TP-1

DATE: 11/9/2010 SURFACE ELEVATION: 123' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.3'	BROWN SILT AND SAND TRACE CLAY WITH ORGANICS (LAWN AREA)	
		5.0'	DARK BROWN SILTY SAND WITH GRAVEL, COBBLES, BRICKS, FRAGMENTS OF MORTARED STONE, OCCASIONAL SMALL BOULDERS (POSSIBLE RELIC WALL STONES) AND POCKETS OF ORGANICS (FILL)	
		7.5'	BROWN SAND AND GRAVEL TRACE SILT WITH COBBLES (FILL)	
		7.6'	GRAY SILT AND SAND SOME GRAVEL WITH COBBLES (TILL)	
			BOTTOM OF EXPLORATION NOTE: TP-1 MADE ADJACENT TO TEST BORING B-105	

COMPLETION DEPTH: 7.6' DEPTH TO WATER: MODERATE SEEPAGE BELOW 5' +/- SOME CAVING BELOW 5' +/-

TEST PIT TP-2

DATE: 11/9/2010 SURFACE ELEVATION: 120' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.4'	BROWN SAND AND SILT TRACE CLAY WITH ORGANICS (LAWN AREA)	
		1.2'	TAN TO BROWN SILTY SAND SOME GRAVEL (FILL)	
		3.5'	ORANGE TO BROWN GRAVELLY SILTY SAND WITH COBBLES TRACE ASH (FILL)	
S-1	3.5-4'	4.2'	ASH AND SILTY SAND (FILL)	
		4.4'	BROWN TO BLACK SILT AND SAND WITH ORGANICS (FILL)	
		7.0'	BROWN SILTY SAND SOME GRAVEL TRACE BRICKS (FILL)	
S-2	7-8'	8.0'	DARK BROWN ORGANICS (FILL)	
		8.1'	GRAY SAND AND SILT SOME GRAVEL OCCASIONAL COBBLES (TILL)	
			BOTTOM OF EXPLORATION NOTE: TP-2 MADE ADJACENT TO TEST BORING B-104	

COMPLETION DEPTH: 8.1' DEPTH TO WATER: MODERATE SEEPAGE BELOW 6' +/- MINOR CAVING BELOW 6' +/-

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED ADAMS SCHOOL REDEVELOPMENT / AVESTA HOUSING
LOCATION: MOODY ST., VESPER ST., WILSON ST., & MUNJOY ST. PORTLAND MAINE
PROJECT NO. 09-0201.3
TEST PIT MACHINE: TAKEUCHI TB175 WITH A 5-FOOT SMOOTH EDGED BUCKET

TEST PIT TP-3

DATE: 11/9/2010 SURFACE ELEVATION: 121' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		0.4'	BROWN SAND AND SILT TRACE CLAY WITH ORGANICS (LAWN AREA)	
		1.5'	BROWN SILTY SAND SOME GRAVEL (FILL)	
S-1	2-2.5'	3.2'	BLACK SILTY SAND AND ASH WITH BRICK TRACE METAL, TRACE WOOD (FILL)	
		4.0'	LIGHT BROWN SAND AND SILT SOME GRAVEL (FILL)	
		7.0'	BROWN GRAVELLY SILTY SAND (FILL)	
		7.1'	BROWN SAND AND SILT SOME GRAVEL WITH COBBLES (TILL)	
			BOTTOM OF EXPLORATION	
			NOTE: TP-3 MADE ADJACENT TO TEST BORING B-103	

COMPLETION DEPTH: 7.1' DEPTH TO WATER: MODERATE SEEPAGE BELOW 5.5'
NO CAVING OBSERVED

TEST PIT TP-4

DATE: 11/9/2010 SURFACE ELEVATION: 122' +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION		TEST RESULTS
		0.5'	BROWN SAND AND SILT TRACE CLAY WITH ORGANICS (LAWN AREA)		
		2.3'	BROWN SILTY SAND SOME GRAVEL (FILL)		
		3.0'	BLACK SILTY SAND AND ASH SOME GRAVEL AND BRICK (FILL)		
		4.0'		MORTARED BRICK WALL	
		7.0'	BROWN SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS	STACKED STONE WITH MORTAR FOUNDATION WALL	
		7.1'	BROWN SAND AND SILT SOME GRAVEL WITH COBBLES (TILL)		
			BOTTOM OF EXPLORATION		
			NOTE: TP-4 MADE ADJACENT TO TEST BORING B-110		

COMPLETION DEPTH: 7.1' DEPTH TO WATER: HEAVY SEEPAGE BELOW 6' +/-
NO CAVING OBSERVED

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

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

Key to Symbols Used:

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

Description of Proportions:

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

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

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

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

S.W.COLE ENGINEERING, INC.

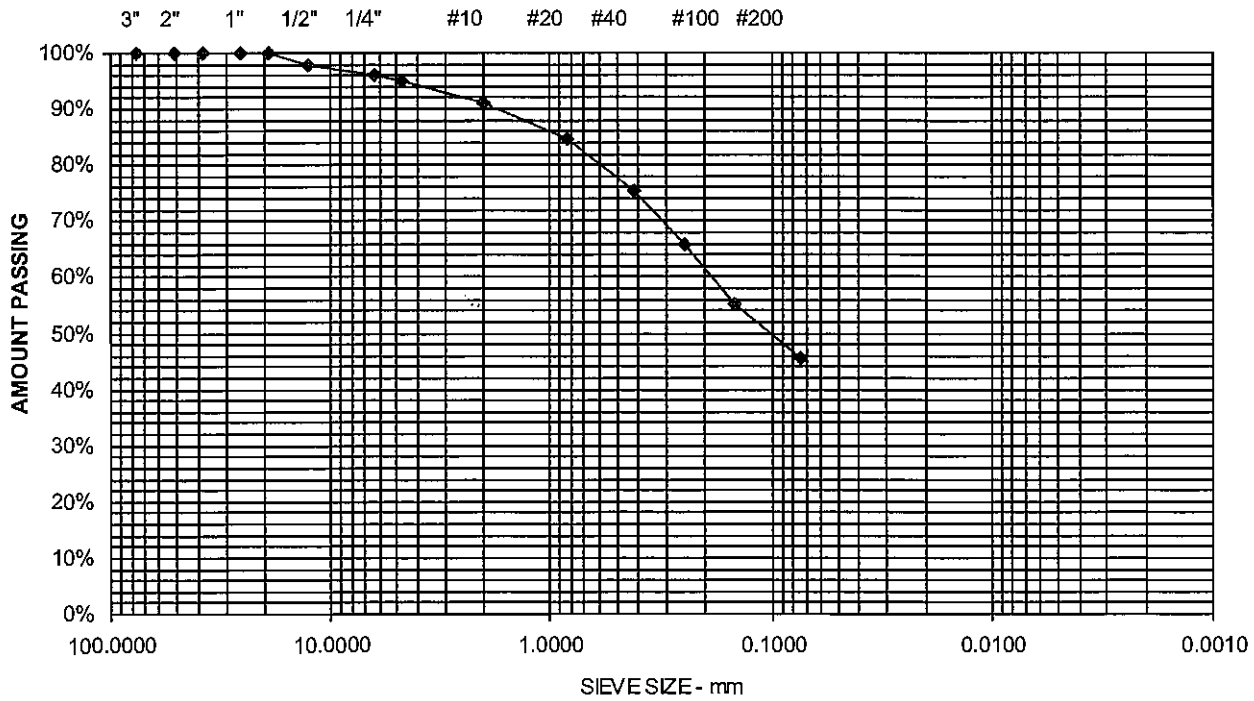
Report of Gradation

ASTM C-117 & C-136

Project Name	PORTLAND, ME - PROPOSED ADAMS SCHOOL REDEVELOPMENT - GEOTECHNICAL SERVICES	Project Number	09-0201.3
		Lab ID	13291G
Client	AVESTA HOUSING	Date Received	11/5/2010
		Date Completed	11/9/2010
Material Source	**B-101, 3D (5-7')**	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"**	**98**	
6.3 mm	**1/4"**	**96**	
4.75 mm	**No. 4**	**95**	4.9% Gravel
2.00 mm	**No. 10**	**91**	
850 um	**No. 20**	**85**	
425 um	**No. 40**	**75**	49.6% Sand
250 um	**No. 60**	**66**	
150 um	**No. 100**	**55**	
75 um	**No. 200**	**45.5**	45.5% Fines

SAND AND SILT TRACE GRAVEL



Comments: w = 10.6%

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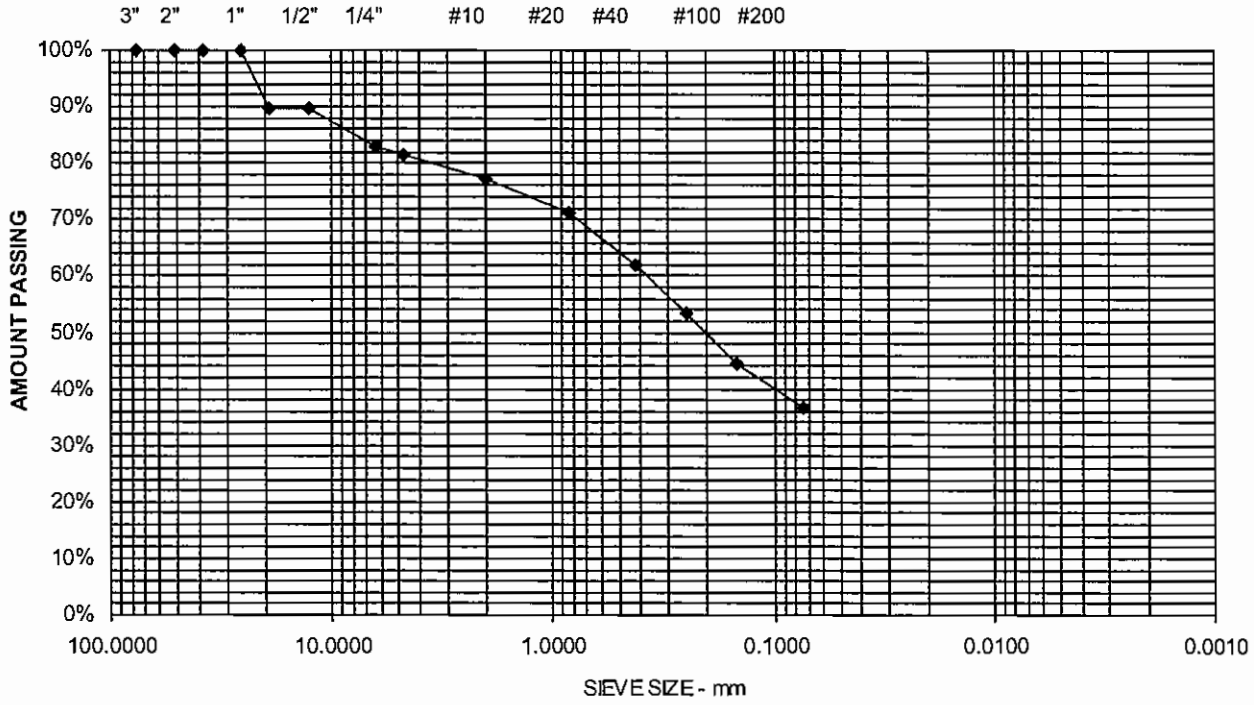
Report of Gradation

ASTM C-117 & C-136

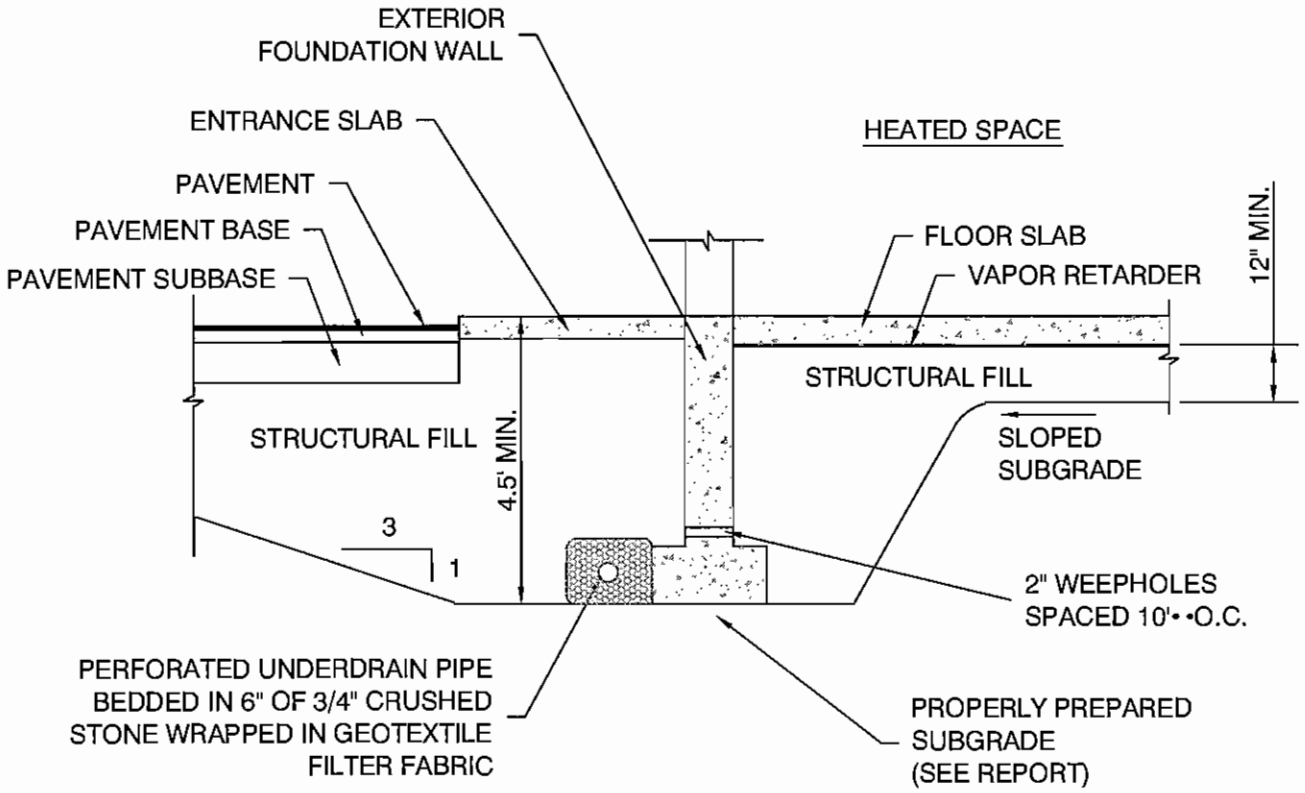
Project Name	PORTLAND, ME - PROPOSED ADAMS SCHOOL REDEVELOPMENT - GEOTECHNICAL SERVICES	Project Number	09-0201.3
Client	AVESTA HOUSING	Lab ID	13292G
		Date Received	11/5/2010
		Date Completed	11/9/2010
Material Source	**B-101, 4D (10-12')**	Tested By	JUSTIN BISSON

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"	90	
12.5 mm	1/2"	90	
6.3 mm	1/4"	83	
4.75 mm	No. 4	82	18.4% Gravel
2.00 mm	No. 10	77	
850 um	No. 20	71	
425 um	No. 40	62	45.1% Sand
250 um	No. 60	53	
150 um	No. 100	44	
75 um	No. 200	36.6	36.6% Fines

GRAVELLY SAND AND SILT



Comments: w = 9.0%



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.

AVESTA HOUSING

UNDERDRAIN DETAIL

PROPOSED ADAMS SCHOOL REDEVELOPMENT
VESPER STREET, WILSON STREET AND MOODY STREET
PORTLAND, MAINE

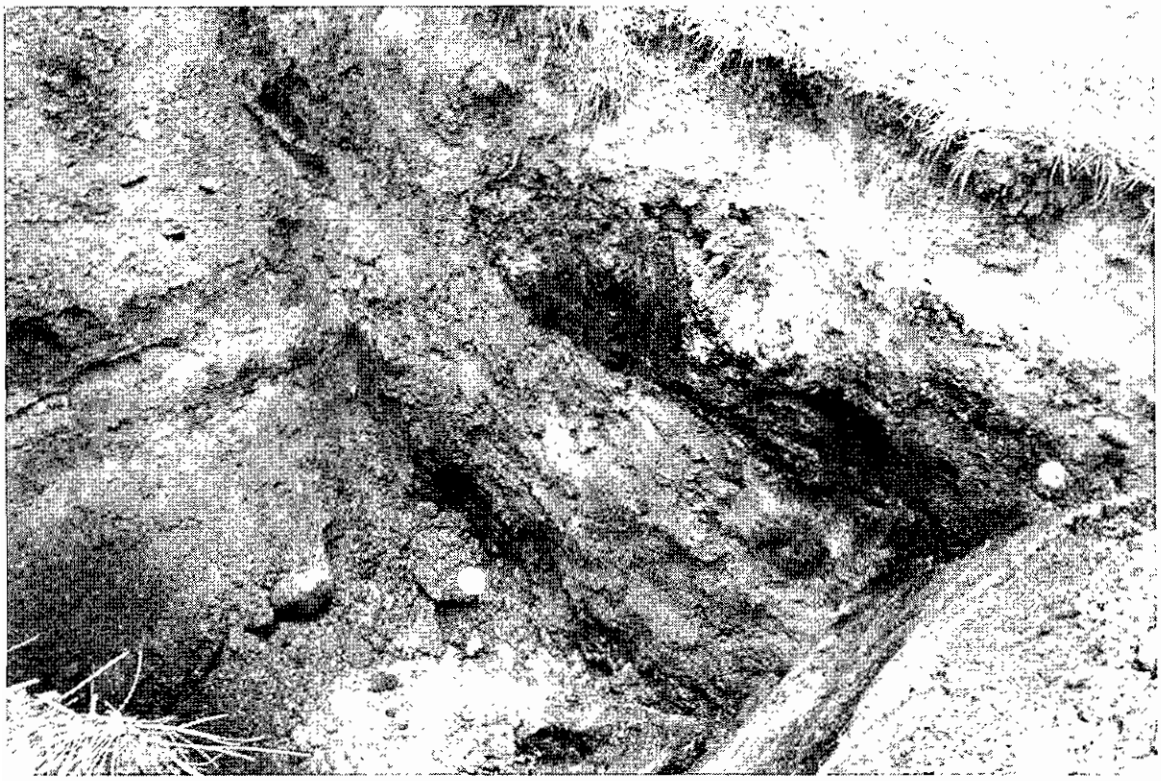
Job No.:	09-0201.3	Scale:	Not to Scale
Date :	03/15/2011	Sheet:	17

R:\2009\09-0201.3\CAD\Drawings\09-0201.3 SHEET 17.dwg

TEST PIT
TP-1

TEST PIT
TP-2

TEST PIT
TP-3



TEST PIT
TP-4