

**GEOTECHNICAL ENGINEERING SERVICES
PEARL PLACE - PROPOSED PHASE II BUILDINGS
184 PEARL STREET
PORTLAND, MAINE**

04-1212.4

March 11, 2011

PREPARED FOR:

AVESTA Housing
Attention: Ethan Boxer-Macomber
307 Cumberland Avenue
Portland, ME 04101

PREPARED BY:



286 Portland Road
Gray, Maine 04039

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
1.1 Scope of Work	1
1.2 Proposed Construction	2
2.0 EXPLORATION AND TESTING.....	2
2.1 Exploration.....	2
2.2 Testing.....	3
3.0 SITE AND SUBSURFACE CONDITIONS.....	4
3.1 Surficial Conditions	4
3.2 Subsurface Conditions.....	4
3.3 Groundwater.....	5
4.0 EVALUATION AND RECOMMENDATIONS.....	6
4.1 General Findings	6
4.2 Site and Subgrade Preparation.....	6
4.3 Excavation Work.....	7
4.4 Environmental Considerations	7
4.5 Pile Foundations	7
4.6 Foundation Retaining Walls.....	10
4.7 Seismic and Frost Conditions	10
4.8 Foundation Drainage	10
4.10 Entrances and Sidewalks	11
4.10 Fill and Compaction	11
4.11 Asphalt Pavement.....	13
4.11.1 Exterior Parking Lots.....	13
4.11.2 Below Building At-Grade Parking	14
4.12 Weather Considerations	14
4.13 Design Review and Construction Testing	15
5.0 CLOSURE.....	15

Attachment A	Limitations
Sheet 1	Exploration Location Plan
Sheets 2 - 23	Exploration Logs
Sheet 24	Key to the Notes and Symbols
Sheets 25 - 30	Grain Size Analyses
Sheet 31	Underdrain Detail
Appendix A	Pertinent Previous Boring Logs
Appendix B	Test Pit Photographs



04-1212.4

March 11, 2011

AVESTA Housing
Attention: Ethan Boxer-Macomber
307 Cumberland Avenue
Portland, ME 04101

Subject: Geotechnical Engineering Services
Pearl Place - Proposed Phase 2 Buildings
184 Pearl Street
Portland, Maine

Dear Ethan:

In accordance with our Agreement Addendum No. 4, dated February 15, 2011, we have made subsurface explorations for the proposed Phase 2A and 2B buildings on the Pearl Place housing project at 184 Pearl Street in Portland, Maine. This report includes additional explorations for the proposed Phase 2B building and supersedes our prior report, dated November 1, 2010, for the Pearl Place Phase 2 development. This report summarizes our findings and recommendations and its contents are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope of Work

The purpose of the work was to obtain subsurface information in order to provide geotechnical recommendations for foundations and earthwork associated with the proposed construction. Our recent work has included the making of eleven test boring explorations, three test pit explorations, geotechnical laboratory soils testing, and a geotechnical evaluation of the findings relative to the proposed construction. S.W.COLE ENGINEERING, INC. (S.W.COLE) coordinated a preliminary geotechnical investigation at the site in February 2005, a design phase investigation for Phase 1 of the project in July 2006, and a design phase investigation for the proposed Phase 2 buildings from September 2010 to March 2011.

1.2 Proposed Construction

The site is located at the corner of Pearl Street and Lancaster Street in the Back Cove area of Portland, Maine. The southern portion of the site along Pearl Street and Oxford Street includes two multi-level housing buildings that were constructed during Phase 1 of the project. Based on project information provided by Becker Structural Engineers, Inc. (Becker), we understand that two new five-level housing buildings are proposed in the northern portion of the site.

The building proposed along Pearl Street will occupy a footprint measuring about 60 by 130 feet in plan dimensions with a ground floor elevation of 12.5 feet (project datum). The building proposed along Lancaster Street will occupy a footprint measuring about 60 by 90 feet in plan dimensions with a ground floor elevation of 12.0 feet. The ground floor of both buildings will consist of bituminous concrete surfaced parking. The upper 4 stories of both buildings will be wood-framed. The buildings will be connected by an elevated connector between the first floor levels. Based on information provided by Becker, we understand that unfactored column loads will generally range from between 150 to 280 kips.

Existing and proposed site features are shown on the “Exploration Location Plan” attached as Sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Exploration

The exploration program for the proposed Phase 2 buildings consisted of eleven test borings and three test pits made between September 2010 to February 2011. Specifically, the explorations for Phase 2 included:

- Test borings B-201 through B-208 were made at locations agreed upon by Becker and S.W.COLE between September 17 and September 21, 2010 and on October 13, 2010. These test borings were made by Great Works Test Boring, Inc. of Rollinsford, New Hampshire working under subcontract to S.W.COLE.

- Test pits TP-101 through TP-103 were made at locations selected by S.W.COLE in October 2010. The test pits were made by Shaw Brothers Construction of Gorham, Maine working under subcontract to S.W.COLE ENGINEERING, INC.
- Test borings B-301 through B-302 were made at locations selected by S.W.COLE based upon a revised building footprint for proposed Building 2B in February 2011. These test borings were made by Northern Test Boring, Inc. of Gorham, Maine working under subcontract to S.W.COLE.

The exploration locations were established in the field based on taped measurements from existing site features. Test borings B-301, B-302 and B-303, as well as B-203 and B-204, were later located with a mapping grade Trimble GPS. The approximate locations of the explorations are shown on the "Exploration Location Plan" attached as Sheet 1. Logs of the explorations are attached as Sheets 2 through 23. A Key to the Notes and Symbols used on the logs is attached as Sheet 24. Photo logs of the test pits are attached as Appendix B.

Test borings B-103 and B-104, previously performed at the site for a preliminary evaluation of the proposed Pearl Place development, are within the proposed Phase 2 project area. The locations of these test borings are shown on Sheet 1 and the logs are attached in Appendix A.

2.2 Testing

The test borings were drilled using a combination of solid-stem auger and cased wash-boring drilling techniques. The soils were generally sampled at 2, 5 and 10 foot intervals using a split spoon sampler and Standard Penetration Test (SPT) methods. Where softer clay soils were encountered, field Vane Shear Tests (VST) were performed to assess in-situ soil strength. Undisturbed Shelby Tube samples were also obtained where softer compressible clay soils were encountered. SPT Blow-Counts and VST test results are noted on the borings logs.

Soil samples obtained from the test borings were returned to our laboratory for further classification and testing. Laboratory testing included moisture content and grain size analyses. Moisture content test results are noted on the test boring logs. The results of six grain size analyses are illustrated on Sheets 25 through 30.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Surficial Conditions

The proposed building sites are currently occupied by grassed lawn and paved parking areas constructed during Phase 1 of the project. Terrain relief in the proposed building footprints slopes gently downward from south to north between 2 to 3 feet.

Available historic mapping shows that the Pearl Place housing project is situated near the former south shore of Portland's Back Cove. Historical information indicates that the site was once located within a tidal shore zone; and in the mid-1800's, miscellaneous fills were placed within Back Cove in order to further develop urban areas along its historic south shoreline. Loose mixed fills and old foundation elements previously encountered during exploration work can be attributed to both the partial filling of the Back Cove as well as the development and demolition of structures that have occupied the site historically.

3.2 Subsurface Conditions

Below a surficial layer of bituminous pavement or topsoil, the explorations generally encountered loose to medium dense miscellaneous fills overlying nearshore deposits of sand and silt overlying glaciomarine clays overlying loose ablation till overlying dense basal till . A refusal surface (probable bedrock) was encountered in boring B-201 at a depth of about 128 feet. The principal strata encountered are summarized below; not all the strata were encountered at each of the explorations. Refer to the attached logs for more detailed descriptions of the subsurface findings at the exploration.

Fill: The surficial fills were found to range from about 9 to 14 feet in thickness and generally consisted of loose to medium dense brown gravelly sand with varying proportions of silt and trace organics (rootlets) and other deleterious materials such as bricks, plastic, wood, cinders and ash. Due to their size, the test pits revealed more significant brick debris than observed at the test borings. The test pits encountered fills consisting of brick, ash, and granite and brick foundation elements, with mortared brick floors at depths of about 4 to 5 feet. Photo logs of the test pits are attached as Appendix B.

Near Shore Deposits and Glaciomarine Clays: With the exceptions of Borings B-201, B-203 and B-208, the test borings generally encountered a 2 to 4 foot thick deposit of silty sand with shells (nearshore deposits) overlying soft gray silty clay with sand seams and loose gray silt with sand and clay (glaciomarine clays) to depths varying from about 18 to 33 feet. The glaciomarine clays appeared thickest along the north side of the site and gradually pinched out toward the south. In-situ shear strength of glaciomarine clays generally ranged from 410 to 550 psf where sand seams did not influence vane shear tests performed in the boreholes.

Glacial Till (Ablation and Basal Tills): Below the nearshore deposits and glaciomarine clays, the test borings encountered a deep deposit of glacial till. The glacial till generally consisted of a relatively thin, loose upper layer of gravelly silt and sand with cobbles and boulders (Ablation Till) overlying a thick, dense deposit of silty gravelly sand to gravelly silt and sand (Basal Till). Frequent cobbles were encountered below a depth of about 100 feet and intermittently at shallower depths. The dense glacial till was encountered at depths varying from 20 to 50 feet at the exploration locations. The top of the dense glacial till generally trends deeper from south to north, likely reaching depths of 65 feet or more along Lancaster Street.

Bedrock: A refusal surface (probable bedrock) was encountered in Boring B-201 at a depth of 128 feet. A roller-cone bit was advanced into the refusal surface about 4 feet. Evident cobbles in the glacial till above the probable bedrock prevented an attempt to obtain a rock core at Boring B-204, which was extended to a depth of 101.2 feet. Borings B-103 and B-104 encountered refusal surfaces at depths of about 115 feet.

3.3 Groundwater

Free water was observed as shallow as 5.5 feet within the test pit explorations and saturated soils were observed as shallow as 5.5 feet within the test boring explorations. A nested groundwater piezometer was installed in test boring B-301. Water level readings obtained on March 11, 2011 indicated depths to groundwater of 5 to 6 feet below the ground surface (see boring log B-301, Sheet 17). However, due to the short period of time the boreholes and test pits were open, this may not be indicative of actual groundwater levels. We expect that water becomes perched seasonally within the fills. It is anticipated that groundwater may be tidally influenced in this area of Portland.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the findings at the exploration locations, it is our opinion that the proposed construction appears feasible from a geotechnical standpoint. However, due to the presence of uncontrolled fills and relatively shallow soft compressible glaciomarine clays extending to depths of 36 feet or more, we recommend the proposed building foundations be pile-supported. On-grade floor slabs in heated spaces on the ground floor, such as stairways, should also be pile supported. The bituminous pavement for the ground floor parking may be soil-supported provided it is underlain with Structural Fill to a depth of 4.5 feet below finished grades. Ash encountered during excavations must be segregated and disposed on-site according to the project VRAP report prepared by S.W.COLE ENGINEERING, INC.

4.2 Site and Subgrade Preparation

Site preparation should begin with construction of an erosion control system to protect drainage ways and areas outside the construction limits. The soils that will be exposed will be subject to erosion. As much existing pavement and vegetation as possible should remain adjacent to the construction site to lessen the potential for erosion.

In general, subgrades will consist of loose to medium dense uncontrolled fill with debris and ash. Groundwater may be encountered, particularly in deeper excavations, such as foundations, elevator pits or site utilities. We recommend that excavation to subgrades be completed with a smooth-edged bucket to lessen disturbance of subgrade soils. We recommend that pile cap and grade beam subgrades be overexcavated by about 6 inches and replaced with a layer of compacted Crushed Stone. The crushed stone will help to provide a stable working mat and a drainage media for dewatering. Excavations must not undermine existing foundations, streets, sidewalks or structures.

We recommend the entire building footprints be overexcavated to a depth of 4.5 feet below the lower level parking elevation to remove frost susceptible fills. The exposed subgrade should be densified and proof-rolled with a vibratory roller compactor weighing at least 10 tons. Any areas that become soft or continue to yield during proof-rolling should be overexcavated and replaced with compacted Granular Borrow or Structural Fill. Backfill above the 4.5 foot depth below finished grade should consist of compacted Structural Fill up to the bottom of pavement base gravel or slab subgrade.

4.3 Excavation Work

Groundwater and wet soil conditions will likely be encountered in the foundation excavations deeper than 5 to 6 feet below existing grades. In our opinion, ditching with sump and pump dewatering techniques should be adequate to control groundwater in shallow foundation excavations. Controlling groundwater to a depth of at least 1 foot below subgrade will help to stabilize subgrades. It should be anticipated, however, that heavy rains will affect groundwater levels and may require significant sumping and pumping or other means of dewatering. We recommend a 6-inch layer of crushed stone be placed over foundation subgrades to act as a drainage medium from which to sump and pump.

Excavations must be properly shored and/or sloped in accordance with OSHA trenching regulations to prevent sloughing and caving of the sidewalls during construction. For temporary excavation above groundwater, we recommend sideslopes of 1.5H:1V.

4.4 Environmental Considerations

S.W.COLE ENGINEERING, INC. prepared the Voluntary Remedial Action Program (VRAP) for the overall project site in 2006. Some of the Phase 2 borings and test pits encountered ash within the fill, with a few explorations encountering an approximate 1 to 2 foot thick layer of ash. Our observations of the subsurface conditions encountered during Phase 2 exploration work are generally in agreement with previous (Phase 1) findings. Therefore, the recommendation in the VRAP should be followed relative to segregation and on-site disposal of ash.

4.5 Pile Foundations

Based on our discussions with Becker, we understand the foundation system has been designed considering a working pile capacity of 80 kips (40 tons). We recommend the selection and design of pile foundations be performed as an engineered design-build submittal by a qualified deep foundation subcontractor. In order to facilitate this process, we have presented allowable pile capacities and anticipated minimum pile lengths along with some pile support options that we have considered. Based on the subsurface findings and our understanding of the proposed construction, we recommend consideration of displacement piles. Specifically, we considered the following displacement pile options for support of the proposed building: 1) closed-end concrete-filled steel pipe piles, 2) grouted aggregate rammed piers, and 3) Class A

treated timber piles. In our opinion, steel H-piles are not economically viable for the subsurface conditions and anticipated column loads at this site, as they are a non-displacement pile that typically derive support from end bearing on bedrock.

- Pipe Piles: Closed-end steel pipe piles will develop skin friction and end bearing when driven into the dense glacial till encountered at depths varying from 20 to 50 feet below the ground surface. We estimate that a 12-inch diameter steel pipe pile would need to be driven at least 20 feet in to the dense glacial tills in order to develop a working capacity of at least 40 tons. This will result in an anticipated minimum pile lengths of 40 to 70 feet with pile lengths generally increasing from south to north across the proposed building pads. Pipe piles must be backfilled with structural concrete following installation.
- Grouted Aggregate Rammed Piers: Grouted aggregate rammed piers derive support from oversized bulbs that densify the soil column from the bottom of foundations to the top of the dense glacial till bearing strata. For the subsurface conditions on this site, it would be necessary to use a low-slump grout from the top of the dense glacial till to the top of compressible glaciomarine clays. Above the glaciomarine clays, dense graded aggregate would be used. For the subsurface conditions encountered, we anticipate grouted aggregate rammed piers would extend to depths of 15 to 45 feet below bottom of pile caps. Based on our preliminary discussions with aggregate rammed pier design-builders, we anticipate a working capacity of 50 to 60 kips is attainable; thus some redesign of the foundation system would likely be needed for this option.
- Timber Piles: Timber piles develop end-bearing in the dense glacial till beneath the site as well as skin friction along the shaft. The tapered section of timber piles helps to densify soils during driving, developing skin friction along the entire shaft and typically resulting in shallower driving depths than circular sections of pipe piles. We estimate that a Class A 9-inch natural taper timber pile would need to be driven at least 10 feet in to the dense glacial tills in order to develop a working capacity of at least 40 tons. This will result in anticipated minimum pile lengths of 30 to 60 feet with pile lengths, generally increasing from south to north across the proposed building pads. Fully embedded, treated timber piles have design life of 100-years.

Regardless of the pile support option that is selected and designed by the design-build contractor, working pile capacities must consider the strength of the materials with adequate factors of safety against yielding, corrosion and damage during driving. Details relative to pile capacity, section type and installation should be developed by the design-build contractor. The mixed fills encountered at the site exhibit a potential for a corrosive environment, and design must consider steel loss due to corrosion. Obstructions are likely to be encountered during pile driving in the fill zone; the contractor must be prepared to pre-auger, or excavate and remove obstructions, as necessary, during pile installation. To assess the variability of depth to bearing strata and to better refine estimates for pile lengths, we recommend that the contractor coordinate several test piles to be driven at different locations at the site prior to ordering production piles. Steel pipe piles have the greatest advantage to variable lengths as they can be readily spliced. Timber piles, however, tend to develop capacity at shallower depth due to the friction developed from their tapered section.

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

Lateral Resistance: We recommend that lateral loads be resisted by passive earth pressures acting on the grade beams and pile caps. Passive lateral resistance acting on grade beams and pile caps backfilled with compacted Structural Fill should consider a total unit weight of granular backfill (γ_t) of 125 pcf, an angle of internal friction of 30 degrees with an ultimate passive lateral earth pressure coefficient (K_p) of 3.0. Additional resistance to lateral loads can be mobilized along the pile shafts, if needed. S. W. COLE ENGINEERING, INC. can assist with lateral pile capacities, as deemed necessary by the structural engineer.

Uplift Resistance: Uplift capacity of the piles will be affected by the pile spacing, pile type, splices and actual depths required to achieve capacity. S. W. COLE ENGINEERING, INC. can assist the design team to help estimate uplift capacities of the piles after a proposed pile type has been selected and again after the test piles have been driven.

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

4.6 Foundation Retaining Walls

We understand that some of the lower level walls will serve as retaining walls. We recommend foundation walls that are integral to the building structures be pile supported. We recommend design an at-rest lateral earth pressure coefficient of 0.5, a unit weight of backfill of 125 pcf and an internal friction angle of 30 degrees for foundation retaining walls that are restrained against rotation.

4.7 Seismic and Frost Conditions

According to the 2009 International Building Code, we interpret subsurface conditions to correspond to a seismic soil Site Class ‘E’. The design freezing index for the Portland area is approximately 1,250 Fahrenheit-Degree-Days, which corresponds to a frost penetration depth on the order of 4.5 feet. Grade beams and pile caps exposed to freezing temperatures should extend a minimum of 4.5 feet below finished grade. Utilities sensitive to frost should also be cover with at least 4.5 feet of backfill or appropriately insulated.

4.8 Foundation Drainage

We recommend that a perimeter underdrain system be provided near pile cap subgrade. The underdrain should be placed adjacent to the exterior edge of the pile caps. We recommend the underdrain consist of 4-inch diameter, slotted foundation drain pipe with filter sock enveloped in at least 6 inches of Underdrain Sand. The underdrains must have positive gravity outlets protected from freezing. Pile cap and grade beam backfill should be sealed with a surficial layer of clayey loam in areas that are not to be paved or occupied by entrance slabs. This is to reduce direct surface water infiltration into the backfill. Ideally, surface grades should slope downward and away from the building for positive drainage.

4.10 Entrances and Sidewalks

The existing fill soils are poorly draining and susceptible to frost heaving. Paved entrances and sidewalks adjacent to building entrances should be designed to reduce the effects of frost action. We recommend paved entrances adjacent to the building be underlain with Structural Fill to a depth of 4.5 feet below finished grade. The zone of Structural Fill should extend outward at least 4.5 feet, the transition up at 3H:1V to the bottom of sidewalk gravel or pavement subbase. 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 areas adjacent to the building where frost heaving would be detrimental.

4.10 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. Although these materials provide advantages during wet and cold weather, severe freezing weather or precipitation may warrant use of alternative materials that have better drainage characteristics and are non-frost susceptible. We recommend that either filling be limited during these times or more applicable materials be used. We recommend the following fill materials:

Granular Borrow: Imported materials consisting of a mixture of sand, gravel and silt or reclaimed asphalt, concrete, brick, crushed rock that is crushed and blended with sand to create a compactable fill meeting the following gradation:

GRANULAR BORROW	
Sieve Size	Percent Finer by Weight
6 inch	100
¼ inch	25 to 90
No. 40	0 to 50
No. 200	0 to 20

Granular Borrow is recommended for use as:

- Fill to raise building area grades up to frost depth (4.5 feet below finish grade)

- Fill to raise exterior parking areas to bottom of subbase materials
- Backfill after removal of relic foundation elements and other deleterious materials outside of the building footprints and up to frost depth within the building footprints

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 pile caps, grade beams, and perimeter foundations
- Backfill within frost transition zone for entrance walks to buildings
- Backfill for repair of soft or yielding areas above water table
- Fill within the frost depth below lower level pavements under the buildings

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:

- Pile cap and grade beam base material
- Backfill for repair of soft or yielding areas below water table

Underdrain Sand: Clean, washed sand meeting the requirements of MaineDOT Standard Specification 703.22 Underdrain Backfill, Type B, Underdrain Sand.

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 also be compacted to at least 95 percent of ASTM D-1557.

4.11 Asphalt Pavement

4.11.1 Exterior Parking Lots

We anticipate that asphalt pavement will be needed for areas; generally outside the building footprint. Proposed traffic loading information was not made available to us at the time of this report; thus, we have provided the following proposed pavement section based on our experience with similar facilities:

EXTERIOR PARKING AND ACCESS DRIVE STANDARD DUTY PAVEMENT		
Pavement Layer	Thickness	Maine DOT Standard Specification
Wearing Course	1 ¼"	9.5mm Hot Mix Asphalt 50 Gyration
Binder Course	2 ¼"	19.0mm Hot Mix Asphalt 50 Gyration
Crushed Base	6"	703.06 Base Aggregate Type A - Crushed Gravel
Granular Subbase	15"	703.06 Subbase Aggregate Type D - Gravel

Granular base and subbase materials should be compacted to at least 95 percent of their maximum dry densities as determined by ASTM D-1557. Bituminous pavement should be compacted to 92 to 97 percent of its theoretical maximum density (TMD) as determined by ASTM D-2041. A tack coat should be used between successive lifts of asphalt pavement.

Since the existing fill soils are frost susceptible, some frost heaving and distress of pavements attributed to freezing temperatures must be anticipated unless all frost susceptible soils are removed to a depth of at least 4.5 feet below the pavement surface and backfilled with non-frost susceptible Structural Fill.

4.11.2 Below Building At-Grade Parking

Protection against frost action below bituminous concrete pavements is particularly critical in situations with limited overhead clearance, such as the parking area beneath the proposed buildings. The proposed pavement areas beneath the buildings is underlain by frost-susceptible fills and would be exposed to freezing temperatures and susceptible to frost heaving. We recommend the ground level parking and connector pavement consist of:

BELOW BUILDING AND CONNECTOR STANDARD DUTY PAVEMENT		
Pavement Layer	Thickness	Maine DOT Standard Specification
Wearing Course	1 ¼"	9.5mm Hot Mix Asphalt 50 Gyration
Binder Course	2 ¼"	19.0mm Hot Mix Asphalt 50 Gyration
Crushed Base	6"	703.06 Base Aggregate Type A - Crushed Gravel
Structural Fill	45"	See Section 4.10

This will require removal of existing fills to a depth of 4.5 feet below finished grade across the entire building footprints and connector, densification of the subgrade with a vibratory roller compactor and backfilling with compacted Structural Fill. It must be understood that even with removal of existing fills to frost depth below interior paved areas, some settlement or pavement distress could occur due to remaining fills. If risk of settlement is deemed unacceptable, use of a structural slab deriving support from deep foundations should be considered.

Granular base and subbase materials should be compacted to at least 95 percent of their maximum dry densities as determined by ASTM D-1557. Bituminous pavement should be compacted to 92 to 97 percent of its theoretical maximum density (TMD) as determined by ASTM D-2041. A tack coat should be used between successive lifts of asphalt pavement.

4.12 Weather Considerations

Subgrades, foundations and floor slabs must be protected from freezing conditions. Fill soils and concrete must not be placed on frozen soil and once placed, the soil beneath the structure must be protected from freezing. Further, the existing uncontrolled fill is moisture sensitive and as such subgrades will be susceptible to disturbance during wet

conditions. Consequently, site work and construction activities should take appropriate measures to protect exposed subgrades, particularly when wet.

4.13 Design Review and Construction Testing

We recommend that S.W.COLE ENGINEERING, INC. be engaged to review the sitework and foundation drawings and specifications prior to bidding to determine that our interpretation of the subsurface conditions and recommendations have been appropriately interpreted and implemented.

We recommend that S. W. COLE ENGINEERING, INC. be retained to provide consultation and testing services for the piling, excavation and foundation phases of construction. This is to observe compliance with the design recommendations, drawings and specifications 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 vibration monitoring, observe pile installation, and testing of soils, concrete, steel, masonry, fireproofing and asphalt 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 as the design progresses and during the construction phase.

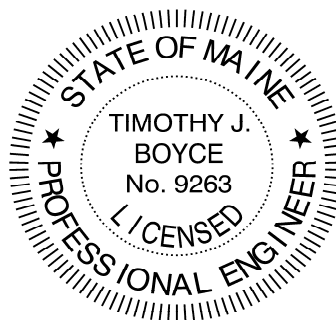
Sincerely,

S. W. COLE ENGINEERING, INC.

Evan M. Walker, E.I.
Geotechnical Engineer



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



TJB:emw

Attachment A - Limitations

This report has been prepared for the exclusive use of Avesta Housing for specific application to the Phase 2 Buildings of the Pearl Place housing project at 184 Pearl Street in Portland, Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

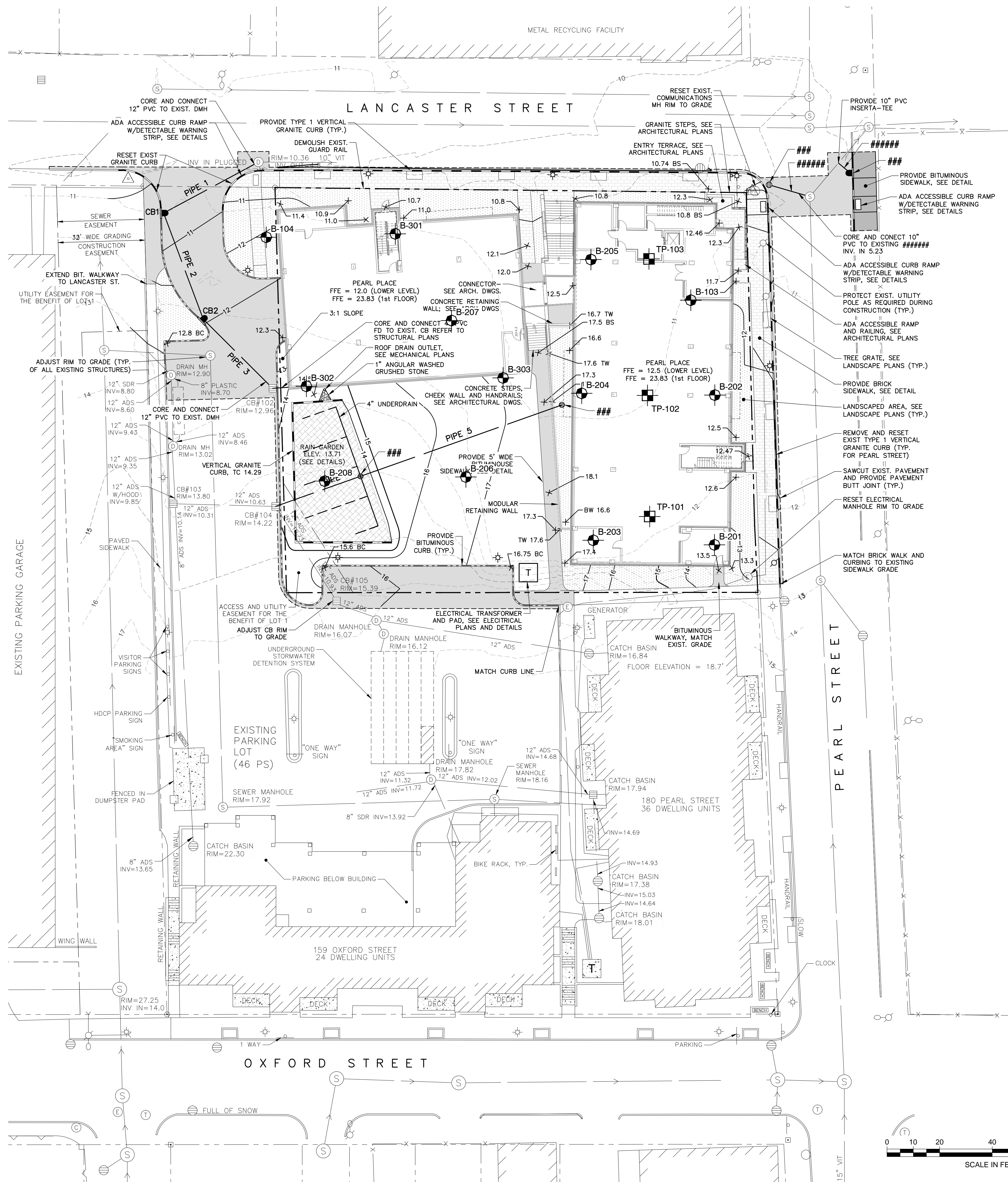
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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

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

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

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



LEGEND:

- APPROXIMATE BORING LOCATION
- APPROXIMATE TEST PIT LOCATION

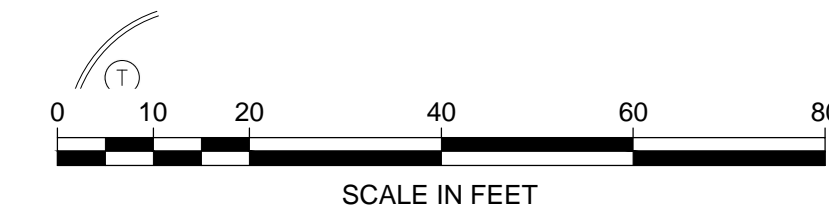
NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=20' SCALE PLAN OF THE SITE ENTITLED "GRADING AND DRAINAGE PLAN," PREPARED BY POT ARCHITECTS, DATED JANUARY 31, 2011.
2. BORINGS B-103, B-104, B-201, B-202, B-206 THROUGH B-208 AND TEST PITS TP-101 THROUGH TP-103 WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. BORINGS B-203 THROUGH B-205 AND B-301 THROUGH B-303 WERE LOCATED IN THE FIELD BY GPS SURVEY USING A MAPPING GRADE TRIMBLE GPS RECEIVER UTILIZING EXISTING SITE FEATURES FOR CONTROL.
4. BORINGS B-103 AND B-104 WERE PERFORMED BY S.W. COLE ENGINEERING, INC. IN DECEMBER 2004.
5. BORINGS B-201 THROUGH B-208 WERE PERFORMED BY S.W. COLE ENGINEERING, INC. IN SEPTEMBER 2010.
6. BORINGS B-301 THROUGH B-303 WERE PERFORMED BY S.W. COLE ENGINEERING, INC. IN FEBRUARY 2011.
7. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
8. 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.

NO.	DATE	DESCRIPTION	BY
1	03/11/2011	ADD 200 AND 300 SERIES BORINGS	CEM
--	11/02/2010	REPORT SUBMISSION	CEM

S.W. COLE ENGINEERING, INC.
 AVESTA HOUSING
EXPLORATION LOCATION PLAN
 PEARL PLACE - PROPOSED PHASE 2 BUILDINGS
 184 PEARL STREET
 PORTLAND, MAINE

Job No.: 04-1212.4 Scale: 1" = 20'
 Date: 11/02/2010 Sheet: 1



R:\2010\04-1212.4\04-1212.4.dwg, 3/11/2011 10:41:10 AM, L1, CEN, S.W. Cole Engineering, Inc.



BORING LOG

BORING NO.: **B-201**
 SHEET: 1 OF 4
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/17/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS DAMP BELOW 8' +/-
 SOILS SATURATED BELOW 8.5' +/-

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		
									0.4'	GRASS AND BROWN SILTY SAND WITH ORGANICS (TOPSOIL/FILL)
	1D	24"	6"	2.0'	5	4	3	3		BROWN GRAVELLY SAND WITH SOME SILT WITH TRACE ORGANICS AND BRICK FRAGMENTS WITH POCKETS OF DARK BROWN SILT AND SAND (FILL) ~ LOOSE TO MEDIUM DENSE ~
	2D	24"	6"	4.0'	3	3	3	4		
	3D	24"	14"	7.0'	2	12	8	5		
	4D	24"	12"	9.0'	9	7	5	5		
									10.3'	GRAY GRAVELLY SILTY SAND WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
	5D	24"	14"	12.0'	3	14	10	4		
	6D	24"	14"	14.0'	3	14	10	8		
										COBBLE
	7D	24"	14"	17.0'	6	14	6	7		
									24.0'	GRAY GRAVELLY SILTY SAND WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
	8D	24"	16"	22.0'	9	11	13	15		
									24.5'	GRAY GRAVELLY SILTY SAND WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
	9D	24"	16"	27.0'	8	11	7	7		
									30.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE TO VERY DENSE ~
	10D	24"	16"	32.0'	8	6	6	8		
	11D	24"	10"	37.0'	16	22	30	30		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 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-201**



BORING LOG

BORING NO.: **B-201**
 SHEET: 2 OF 4
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/17/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION

SOILS DAMP BELOW 8' +/-
 SOILS SATURATED BELOW 8.5' +/-

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		
	12D	24"	16"	42.0'	9	7	21	23	43.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) COBBLE
									43.5'	
	13D	24"	20"	47.0'	6	9	20	19	60.0'	GRAY SANDY SILT WITH SOME GRAVEL WITH OCCASIONAL COBBLES (GLACIAL TILL) ~ MEDIUM DENSE TO DENSE ~
	14D	24"	20"	52.0'	7	9	11	13		
	15D	17"	16"	56.4'	10	24	50-5"			
	16D	24"	20"	62.0'	8	9	12	21	60.0'	GRAY SILTY SAND WITH SOME GRAVEL WITH OCCASIONAL COBBLES (GLACIAL TILL) ~ MEDIUM DENSE TO DENSE ~
	17D	24"	20"	67.0'	15	14	13	14		
	18D	24"	22"	72.0'	15	14	13	14		
	19D	24"	20"	77.0'	10	21	17	18		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 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-201**



BORING LOG

BORING NO.: **B-201**
 SHEET: 3 OF 4
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/17/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT : AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION

SOILS DAMP BELOW 8' +/-
 SOILS SATURATED BELOW 8.5' +/-

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		
	20D	12"	12"	81.0'	11	11	25-0"		105.0'	GRAY SILTY SAND WITH SOME GRAVEL WITH OCCASIONAL COBBLES (GLACIAL TILL) ~ MEDIUM DENSE TO VERY DENSE ~
	21D	24"	22"	87.0'	11	20	21	31		
	22D	24"	22"	97.0'	15	15	29	28		
	23D	24"	16"	107.0'	11	10	16	15	118.0'	GRAY SILT AND SAND WITH SOME GRAVEL WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
	24D	24"	8"	118.0'	7	8	8	8		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

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



BORING LOG

BORING NO.: **B-201**
 SHEET: 4 OF 4
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/17/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS DAMP BELOW 8' +/-
 SOILS SATURATED BELOW 8.5' +/-

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		
										GRAY SILT AND SAND WITH SOME GRAVEL WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE ~
	25D	24"	10"	128.0'	3	9	13	12	128.3'	
									132.0'	PROBABLE BEDROCK ADVANCE BY ROLLER CONE
										BOTTOM OF EXPLORATION @ 132.0'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 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-201**



BORING LOG

BORING NO.: **B-202**
 SHEET: 1 OF 1
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/17/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS DAMP BELOW 7' +/-
 SOILS SATURATED BELOW 7.5' +/-

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		
									0.4'	GRASS AND BROWN SILTY SAND WITH ORGANICS (TOPSOIL/FILL)
	1D	24"	12"	2.0'	7	9	9	8	5.0'	BROWN GRAVELLY SAND WITH SOME SILT WITH TRACE COAL, PLASTIC AND BRICK DEBRIS (FILL) ~ MEDIUM DENSE ~
	2D	24"	10"	4.0'	5	6	6	6		
	3D	24"	8"	7.0'	1	2	5	13	10.0'	BROWN SAND WITH SOME GRAVEL AND SILT WITH FREQUENT BRICK FRAGMENTS (FILL) ~ LOOSE ~
	4D	24"	12"	9.0'	8	3	5	7		
	5D	24"	16"	12.0'	5	11	7	5	11.7'	BROWN GRAVELLY SAND WITH SOME SILT WITH TRACE BRICK FRAGMENTS (FILL) ~ MEDIUM DENSE ~
									18.5'	GRAY SANDY SILT ~ LOOSE ~
	6D	24"	1"	17.0'	2	1	2	3		
									25.0'	GRAY GRAVELLY SILTY SAND (GLACIAL TILL) ~ MEDIUM DENSE ~
	7D	24"	12"	22.0'	4	6	10	8		
									30.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE ~
	8D	24"	12"	27.0'	6	6	8	10		
									31.0'	FREQUENT / NESTED COBBLES
									33.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE ~
	9D	24"	12"	33.0'	6	7	8	6	33.0'	BOTTOM OF EXPLORATION @ 33.0'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 (6)
 BORING NO.: **B-202**



BORING LOG

BORING NO.: **B-203**
 SHEET: 1 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 10/13/2010
 DATE FINISH: 10/13/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 8.0"
 SOILS SATURATED BELOW 8.8'

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		
									1.5"	BITUMINOUS ASPHALT PAVEMENT
									2.2'	BROWN GRAVELLY SAND WITH SOME SILT (FILL) ~ MEDIUM DENSE ~
	1D	24"	14"	2.5'	6	9	8	5	7.0'	BROWN AND DARK BROWN SILTY GRAVELLY SAND WITH FREQUENT COBBLES AND BRICK (FILL) ~ LOOSE TO MEDIUM DENSE ~
	2D	24"	8"	4.5'	3	8	6	3		
	3D	24"	6"	7.0'	6	7	6	7		
	4D	24"	14"	9.0'	5	4	11	11	9.0'	BROWN SILTY SAND WITH SOME GRAVEL (FILL) ~ MEDIUM DENSE ~
	5D	24"	2"	12.0'	3	5	7	8		
	6D	24"	12"	17.0'	7	17	38	12		
	7D	24"	18"	22.0'	15	24	19	21		GRAY GRAVELLY SILTY SAND WITH FREQUENT COBBLES (GLACIAL TILL) ~ MEDIUM DENSE TO VERY DENSE ~
	8D	24"	16"	27.0'	9	11	20	41		
	9D	24"	18"	32.0'	15	19	18	25		
	10D	24"	14"	37.0'	16	15	19	33		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 (7)
 BORING NO.: **B-203**



BORING LOG

BORING NO.: **B-203**
 SHEET: 2 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 10/13/2010
 DATE FINISH: 10/13/2010
 ELEVATION:
 SWC REP.: E. WALKER

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 8.0"
 SOILS SATURATED BELOW 8.8"

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		
	11D	9"	8"	40.2'	28	50-3"			51.4'	GRAY GRAVELLY SILTY SAND WITH FREQUENT COBBLES (GLACIAL TILL) - VERY DENSE -
	12D	23"	18"	47.0'	21	33	39	50-5"		
	13D	17"	16"	51.4'	25	36	50-5"			
										BOTTOM OF EXPLORATION @ 51.4'

SAMPLES: SOIL CLASSIFIED BY: DRILLER - VISUALLY
 C = 3" SHELBY TUBE SOIL TECH. - VISUALLY
 U = 3.5" SHELBY TUBE LABORATORY TEST

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

(8)

BORING NO.: **B-203**



BORING LOG

BORING NO.: **B-204**
 SHEET: 1 OF 3
 PROJECT NO.: 04-1212.4
 DATE START: 9/21/2010
 DATE FINISH: 9/22/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 7' +/-

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		
									0.2'	BITUMINOUS PAVEMENT
	1D	24"	18"	2.0'	10	9	3	4	1.0'	LIGHT BROWN SAND WITH SOME GRAVEL & TRACE SILT (BASE) ~ MED. DENSE ~
									2.0'	DARK BROWN SILTY SAND WITH SOME GRAVEL & CINDERS ~ MED. DENSE ~
	2D	24"	12"	4.0'	11	10	7	7		
	3D	24"	5"	7.0'	9	6	6	4		BROWN SAND WITH SOME GRAVEL AND SILT (FILL) ~ LOOSE TO MEDIUM DENSE ~ w = 3.3%
	4D	24"	4"	9.0'	4	4	3	3	10.0'	w = 11.9%
									14.0'	NO SAMPLING (PROBABLE FILL) (CASING SPINNING DURING BOREHOLE CLEANOUT PREVENTED SAMPLING BETWEEN 10.0' AND 15.0')
	5D	24"	20"	17.0'	5	3	2	15	19.0'	GRAY SILT WITH SOME CLAY AND FINE TO MEDIUM SAND w = 12.2% ~ LOOSE ~
	6D	24"	24"	22.0'	10	15	22	17		
	7D	24"	24"	27.0'	14	22	15	18		GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE TO VERY DENSE ~ SMALL BOULDER / COBBLE AT 29' +/-
	8D	24"	24"	32.0'	16	13	16	27		w = 9.1%
	9D	24"	20"	37.0'	11	12	15	16		w = 8.9%

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

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



BORING LOG

BORING NO.: **B-204**
 SHEET: 2 OF 3
 PROJECT NO.: 04-1212.4
 DATE START: 9/21/2010
 DATE FINISH: 9/22/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 7' +/-

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		
	10D	24"	24"	42.0'	32	27	29	27		w = 10.2%
	11D	24"	22"	47.0'	9	10	13	20		
	12D	24"	24"	52.0'	27	30	32	50-1"		w = 8.9%
	13D	24"	24"	57.0'	19	19	23	47		GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) - MEDIUM DENSE TO VERY DENSE -
	14D	24"	24"	62.0'	19	24	30	50		w = 9.5%
	15D	24"	22"	67.0'	22	19	25	38		w = 9.4%
	16D	24"	22"	72.0'	14	21	24	50-5"		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS:
 STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 10
 BORING NO.: **B-204**



BORING LOG

BORING NO.: **B-204**
 SHEET: 3 OF 3
 PROJECT NO.: 04-1212.4
 DATE START: 9/21/2010
 DATE FINISH: 9/22/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: JEFF LEE
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 7' +/-

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		
	17D	24"	22"	82.0'	12	22	25	30		GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE TO VERY DENSE ~
	18D	24"	20"	92.0'	12	11	7	14		BOTTOM OF EXPLORATION @ 101.2'
	19D	24"	20"	101.2'	12	15	50-2"		101.2'	

SAMPLES: SOIL CLASSIFIED BY: DRILLER - VISUALLY
 C = 3" SHELBY TUBE SOIL TECH. - VISUALLY
 U = 3.5" SHELBY TUBE LABORATORY TEST

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

(11)

BORING NO.: **B-204**



BORING LOG

BORING NO.: **B-205**
 SHEET: 1 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 9/17/2010
 DATE FINISH: 9/20/2010
 ELEVATION:
 SWC REP.: EMW/NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS DAMP BELOW 3' +/-
 SOILS SATURATED BELOW 5.5' +/-

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		
									0.4'	GRASS AND BROWN SILTY SAND WITH ORGANICS (TOPSOIL/FILL)
	1D	24"	14"	2.0'	4	4	6	7	5.0'	BROWN GRAVELLY SAND WITH SOME SILT WITH OCCASIONAL DARK BROWN SANDY SILT LAYERS (FILL) ~ MEDIUM DENSE ~
	2D	24"	16"	4.0'	3	5	8	7		
	3D	24"	16"	7.0'	4	6	3	2	10.5'	BROWN GRAVELLY SAND WITH SOME SILT (FILL) ~ LOOSE ~
	4D	24"	5"	9.0'	1	1	3	1		
	5D	24"	14"	12.0'	3	4	3	1	14.0'	GRAY SILT AND FINE SAND WITH FREQUENT SHELL FRAGMENTS
	6D	24"	18"	17.0'	WOH				19.0'	GRAY SILTY CLAY WITH SOME FINE SAND ~ SOFT ~
	7D	24"	24"	22.0'	WOH				24.5'	GRAY SILT WITH SOME CLAY AND FINE SAND ~ VERY LOOSE ~
	8D	24"	20"	27.0'	7	7	8	8	27.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE TO DENSE ~
	9D	24"	22"	32.0'	5	10	15	14		
	10D	24"	24"	37.0'	3	9	16	15		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 (12)
 BORING NO.: **B-205**



BORING LOG

BORING NO.: **B-205**
 SHEET: **2 OF 2**
 PROJECT NO.: **04-1212.4**
 DATE START: **9/17/2010**
 DATE FINISH: **9/20/2010**
 ELEVATION: _____
 SWC REP.: **EMW/NBS**

PROJECT: **PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT**
 CLIENT: **AVESTA HOUSING**
 LOCATION: **184 PEARL STREET, PORTLAND, MAINE**
 DRILLING FIRM: **GREAT WORKS TEST BORING, INC.** DRILLER: **PETE MICHAUD**
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: **HW 4" 300 LBS 24"**
 SAMPLER: **SS 1 3/8" 140 LBS. 30"**
 CORE BARREL: _____

WATER LEVEL INFORMATION
 SOILS DAMP BELOW 3' +/-
 SOILS SATURATED BELOW 5.5' +/-

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		
	11D	24"	24"	42.0'	8	12	22	25	45.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE TO DENSE ~
	12D	24"	20"	47.0'	6	8	22	50-3"	52.0'	GRAY GRAVELLY SILTY SAND (GLACIAL TILL) ~ DENSE ~
	13D	24"	22"	52.0'	15	15	22	27	52.0'	BOTTOM OF EXPLORATION @ 52.0'

SAMPLES: D = SPLIT SPOON C = 3" SHELBY TUBE U = 3.5" SHELBY TUBE	SOIL CLASSIFIED BY: <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px; text-align: center;">X</td></tr> <tr><td style="width: 20px; height: 20px;"></td></tr> </table> DRILLER - VISUALLY SOIL TECH. - VISUALLY LABORATORY TEST		X		REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.	<table border="1" style="border-radius: 50%; width: 40px; height: 40px; margin: 0 auto;"> <tr><td style="text-align: center;">13</td></tr> </table>	13
X							
13							
		BORING NO.: B-205					



BORING LOG

BORING NO.: **B-206**
 SHEET: 1 OF 1
 PROJECT NO.: 04-1212.4
 DATE START: 9/20/2010
 DATE FINISH: 9/20/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 10' +/-

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		
	1D	24"	16"	2.0'	6	8	6	6	10.0'	BROWN SILTY GRAVELLY SAND WITH TRACE BRICK FRAGMENTS AND ORGANICS (FILL)
	2D	24"	0"	4.0'	12	8	7	7		
	3D	24"	18"	7.0'	3	4	5	6		
	4D	24"	14"	9.0'	6	8	10	8		
	5D	24"	20"	12.0'	2	3	5	7	13.0'	BROWN SILTY GRAVELLY SAND (FILL) ~ LOOSE ~
	6D	24"	22"	14.0'	7	7	2	2	15.0'	GRAY SILTY CLAY WITH SOME FINE SAND ~ MEDIUM STIFF ~
	7D	24"	24"	17.0'	2	3	2	2	19.0'	GRAY SILT WITH SOME CLAY AND FINE SAND ~ LOOSE ~
	8D	24"	24"	22.0'	4	7	13	15	32.0'	GRAY SILTY SAND WITH SOME GRAVEL (GLACIAL TILL) ~ MEDIUM DENSE ~
	9D	24"	24"	27.0'	8	11	17	15		
	10D	24"	24"	32.0'	15	11	15	15		
										BOTTOM OF EXPLORATION @ 32.0'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS:
 STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 14
 BORING NO.: **B-206**



BORING LOG

BORING NO.: **B-207**
 SHEET: 1 OF 1
 PROJECT NO.: 04-1212.4
 DATE START: 9/20/2010
 DATE FINISH: 9/20/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 8' +/-

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		
	1D	24"	16"	2.0'	11	12	10	7	5.0'	DARK BROWN SILTY SAND WITH SOME GRAVEL AND TRACE BRICK AND CINDERS (FILL) ~ MEDIUM DENSE ~
	2D	24"	12"	4.0'	7	8	7	4		
	3D	24"	18"	7.0'	5	3	2	2	7.0'	BROWN GRAVELLY SILTY SAND (FILL) ~ LOOSE ~
	4D	24"	6"	9.0'	1	1	1	1	10.0'	BROWN SILTY GRAVELLY SAND (FILL) ~ VERY LOOSE ~
	5D	24"	14"	12.0'	1	1	1	1	14.0'	GRAY SILT WITH SOME FINE SAND ~ VERY LOOSE ~
	6D	24"	24"	17.0'	WOH				17.0'	GRAY SILTY CLAY WITH SOME FINE SAND ~ SOFT ~
	7D	24"	24"	19.0'	WOH				19.0'	GRAY SILTY CLAY ~ SOFT ~
										BOTTOM OF EXPLORATION @ 19.0'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS:
 STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 (15)
 BORING NO.: **B-207**



BORING LOG

BORING NO.: **B-208**
 SHEET: 1 OF 1
 PROJECT NO.: 04-1212.4
 DATE START: 9/20/2010
 DATE FINISH: 9/20/2010
 ELEVATION:
 SWC REP.: NBS

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 300 LBS 24"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 11' +/-

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		
	1D	24"	14"	2.0'	6	9	11	9	2.0'	DARK BROWN SILTY GRAVELLY SAND WITH TRACE BRICK FRAGMENTS AND ORGANICS (FILL) ~ MEDIUM DENSE ~
	2D	24"	12"	4.0'	15	15	14	14	5.0'	LIGHT BROWN SAND WITH SOME GRAVEL AND SILT (FILL) ~ MEDIUM DENSE ~
	3D	24"	16"	7.0'	5	4	4	10	7.2'	BROWN SILTY SAND WITH TRACE ORGANICS AND GRAVEL (FILL) ~ LOOSE ~
	4D	24"	16"	9.0'	10	10	12	9	10.0'	LIGHT BROWN GRAVELLY SAND WITH SOME SILT ~ MEDIUM DENSE ~
	5D	24"	14"	12.0'	1	3	1	3	13.5'	BROWN SILTY SAND WITH SOME GRAVEL ~ LOOSE ~
	6D	24"	18"	14.0'	4	5	5	6		
	7D	24"	16"	16.0'	2	3	3	2	16.0'	BROWN GRAVELLY SILTY SAND ~ LOOSE ~
										BOTTOM OF EXPLORATION 16.0'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 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-208**



BORING LOG

BORING NO.: **B-301**
 SHEET: 1 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 2/23/2011
 DATE FINISH: 2/24/2011
 ELEVATION:
 SWC REP.: TJB

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 140 LBS. 30"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION

2/23/11: GROUNDWATER @ 9' +/-
 3/11/11: SHALLOW PIEZO WATER @ 5.1'
 3/11/11: DEEP PIEZO WATER @ 6.5'

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		
										BROWN SILTY SAND WITH BRICKS (FILL) ~MEDIUM DENSE TO LOOSE ~ BECOMES BROWN GRAVELLY SAND SOME SILT (FILL)
	1D	24"	4"	7.0'	5	7	5	4		
	2D	24"	15"	12.0'	5	6	7	6	11.8'	
									14.0'	GRAY SILTY SAND TRACE CLAY ~ MEDIUM DENSE ~
	1V	3.5 x 7" VANE		15.8'						S _v = 0.46 / 0.05 ksf S _v = 0.47 / 0.06 ksf GRAY SILTY CLAY WITH SHELLS ~ MEDIUM TO SOFT ~
	1V'	3.5 x 7" VANE		16.6'						
	1U	24"	22.5"	22.0'						S _v = 0.47 / 0.06 ksf S _v = 0.41 / 0.04 ksf WITH OCCASIONAL SAND SEAMS
	2V	3.5 x 7" VANE		22.8'						
	2V'	3.5 x 7" VANE		23.6'						
	3V	3.5 x 7" VANE		25.8'						S _v = 0.68 / 0.02 ksf
	3V'	3.5 x 7" VANE			NO ADVANCE OF VANE					
										GRAY GRAVELLY SILT AND SAND TRACE CLAY (ABLATION TILL) ~ LOOSE ~ WITH COBBLES << BLOWCOUNT OVERSTATED, PUSHED COBBLE >>
	3D	24"	6"	32.0'	2	3	3	4		
	4D	24"	10"	37.0'	5	23	14	10	38.0'	
										GRAY GRAVELLY SILT AND SAND WITH COBBLES (BASAL TILL) (CONTINUED)

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

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



BORING LOG

BORING NO.: **B-301**
 SHEET: 2 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 2/23/2011
 DATE FINISH: 2/24/2011
 ELEVATION: _____
 SWC REP.: TJB

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 140 LBS. 30"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL: _____

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 11' +/-

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		
	5D	24"	19"	42.0'	16	14	17	17	GRAY GRAVELLY SILT AND SAND WITH COBBLES (BASAL TILL) ~ DENSE TO VERY DENSE ~ PULLED CASING TO 27.5 FEET ON 2-23-11 CAVED TO 29 FEET, 2-24-11 DOUBLE-NESTED PIEZOMETER, 2-24-11 <u>BACKFILL</u> <u>DEEP</u> <u>SHALLOW</u> 0-5' SAND 2' STICK-UP 2' STICK-UP 5-7' BENTONITE 0-18' RISER 0-8' RISER 7-14' SAND 18-23' SCREEN 8-13' SCREEN 14-16' BENTONITE 23' END CAP 13' END CAP 16-25' SAND 25-26' BENTONITE 26-29' SAND	
	6D	24"	15"	47.0'	14	19	13	12		
	7D	24"	24"	52.0'	14	21	29	27		
	8D	24"	24"	62.0'	18	19	26	30		
	9D	18"	18"	71.5'	19	27	32	71.5'		
										BOTTOM OF EXPLORATION @ 71.5'

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON DRILLER - VISUALLY
 C = 3" SHELBY TUBE SOIL TECH. - VISUALLY
 U = 3.5" SHELBY TUBE LABORATORY TEST

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

(18)

BORING NO.: **B-301**



BORING LOG

BORING NO.: **B-302**
 SHEET: 1 OF 2
 PROJECT NO.: 04-1212.4
 DATE START: 2/24/2011
 DATE FINISH: 2/24/2011
 ELEVATION:
 SWC REP.: TJB

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 140 LBS. 30"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION

GROUNDWATER @ 10' +/-
 CASING OUT, WATER @ 10', CAVED @ 32'

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		
										BROWN-GRAY SILTY SAND WITH GRAVEL (FILL) ~MEDIUM DENSE ~ << BLOWCOUNT OVERSTATED, PUSHED GRAVEL >> BECOMES BROWN-GRAY SAND SOME SILT (FILL) << BLOWCOUNT OVERSTATED, PUSHED GRAVEL >>
	1D	24"	2"	7.0'	18	22	18	19		
	2D	24"	11"	12.0'	10	9	11	12		
									14.5'	
	3D	24"	24"	17.0'	1 / 12"		1 / 12"			
	1V	3.5 x 7" VANE		17.8'						
	1V	3.5 x 7" VANE		18.6'						
	2V	3.5 x 7" VANE		20.8'						
	2V	3.5 x 7" VANE		21.6'						
									25.0'	
	4D	24"	14"	27.0'	1	2	2	4		
	5D	24"	15"	32.0'	7	16	14	8		
									32.0'	
	6D	24"	9"	37.0'	12	14	15	16		

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

REMARKS:
 STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
 (CONTINUED)
 19
 BORING NO.: **B-302**



BORING LOG

BORING NO.: **B-302**
 SHEET: **2 OF 2**
 PROJECT NO.: **04-1212.4**
 DATE START: **2/24/2011**
 DATE FINISH: **2/24/2011**
 ELEVATION: _____
 SWC REP.: **TJB**

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 140 LBS. 30"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL: _____

WATER LEVEL INFORMATION
 SOILS SATURATED BELOW 11' +/-

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		
	7D	24"	14"	42.0'	12	13	9	8	47.0'	GRAY GRAVELLY SILTY SAND WITH COBBLES (BASAL TILL) ~ DENSE TO VERY DENSE ~
	8D	24"	24"	47.0'	17	16	22	21		
										BOTTOM OF EXPLORATION @ 47.0'

SAMPLES: _____ SOIL CLASSIFIED BY: _____ REMARKS: _____

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

DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

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

(20)

BORING NO.: **B-302**



BORING LOG

BORING NO.: **B-303**
 SHEET: 1 OF 1
 PROJECT NO.: 04-1212.4
 DATE START: 2/23/2011
 DATE FINISH: 2/24/2011
 ELEVATION:
 SWC REP.: TJB

PROJECT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT
 CLIENT: AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND, MAINE
 DRILLING FIRM: NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4" 140 LBS. 30"
 SAMPLER: SS 1 3/8" 140 LBS. 30"
 CORE BARREL:

WATER LEVEL INFORMATION
 GROUNDWATER @ 10' +/-
 CASING OUT, WATER @ 6.7', CAVED @ 11.2'

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		
									2.5"	ASPHALT PAVING
									0.9'	TAN SAND SOME GRAVEL SOME SILT (PAVEMENT GRAVEL)
										BROWN SILTY GRAVELLY SAND (FILL)
										~ LOOSE ~
	1D	24"	5"	6.0'	6	4	4	3	10.2'	
	2D	24"	9"	11.0'	3	3	4	6	14.0'	GRAY FINE SAND SOME SILT WITH SHELLS
										~ LOOSE ~
	3D	24"	12"	16.0'	6	5	6	6	18.0'	GRAY MEDIUM TO COARSE SAND TRACE SILT
										~ LOOSE TO MEDIUM DENSE ~
	4D	24"	24"	24"	3	2	2	4	23.0'	GRAY GRAVELLY SILT AND SAND TRACE CLAY (ABLATION TILL)
	5D	24"	14"	26.0'	15	12	15	15		GRAY GRAVELLY SILT AND SAND WITH COBBLES (BASAL TILL)
										~ DENSE TO VERY DENSE ~
	6D	24"	17"	31.0'	10	14	17	22		
									41.0'	
	7D	24"	15"	41.0'	12	19	36	28		BOTTOM OF EXPLORATION @ 41.0'

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

	DRILLER - VISUALLY
X	SOIL TECH. - VISUALLY
	LABORATORY TEST

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

(21)

BORING NO.: **B-303**



TEST PIT LOGS

PROJECT/CLIENT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT / AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND MAINE
 TEST PIT MACHINE: TAKEUCHI TB 175 WITH TOOTHED DIGGING BUCKET

PROJECT NO. 04-1212.4
 SWCE REP: K. GIMPEL

TEST PIT TP-101				
DATE: <u>10/4/2010</u>		SURFACE ELEVATION: <u>NO SURVEY</u>		
		LOCATION: <u>SEE SHEET 1</u>		
SAMPLE NO.	DEPTH	STRATUM DESCRIPTION	TEST RESULTS	
	0.2'	3-INCHES DARK BROWN SILT SAND AND ORGANICS (LAWN AREA)		
		LIGHT BROWN SAND AND GRAVEL SOME SILT (FILL)		
	1.2'	BRICK FILL WITH SOME SILTY SAND, ASH, GRANITE AND MISC DEBRIS (FILL)		
	5.0'			
	5.5'	RELIC MORTAR AND BRICK SLAB		
		BROWN GRAVELLY SILTY SAND (FILL)		
S-1	8.5-9'	9.0'		
		BOTTOM OF EXPLORATION AT 9.0' +/-		
COMPLETION DEPTH: <u>9.0' +/-</u>		SEEPAGE: SOILS APPEARED SATURATED BELOW 6.5' +/- WATER: <u>FREE WATER OBSERVED AT 7.5' +/-</u> CAVING: MODERATE CAVING BELOW 5.5' +/-		

TEST PIT TP-102				
DATE: <u>10/4/2010</u>		SURFACE ELEVATION: <u>NO SURVEY</u>		
		LOCATION: <u>SEE SHEET 1</u>		
SAMPLE NO.	DEPTH	STRATUM DESCRIPTION	TEST RESULTS	
	0.2'	3-INCHES DARK BROWN SILT SAND AND ORGANICS (LAWN AREA)		
		LIGHT BROWN SAND AND GRAVEL SOME SILT (FILL)		
	1.3'	ASH WITH SILTY SAND AND BRICK FRAGMENTS (FILL)		
	2.8'			
		COBBLES AND SMALL BOULDERS WITH GRAVEL AND SILTY SAND (FILL)		
	8.5'			
		BOTTOM OF EXPLORATION AT 8.5' +/-		
COMPLETION DEPTH: <u>8.5' +/-</u>		SEEPAGE: SOILS APPEARED SATURATED BELOW 6' +/- WATER: <u>FREE WATER OBSERVED AT 7' +/-</u> CAVING: HEAVY CAVING BELOW 3' +/-		



TEST PIT LOGS

PROJECT/CLIENT: PROPOSED PEARL PLACE PHASE 2 DEVELOPMENT / AVESTA HOUSING
 LOCATION: 184 PEARL STREET, PORTLAND MAINE
 TEST PIT MACHINE: TAKEUCHI TB 175 WITH 24" TOOTHED DIGGING BUCKET

PROJECT NO. 04-1212.4
 SWCE REP: K. GIMPEL

TEST PIT <u>TP-103</u>				
DATE: <u>10/4/2010</u>		SURFACE ELEVATION: <u>NO SURVEY</u>	LOCATION: <u>SEE SHEET 1</u>	
SAMPLE NO.	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS	
	0.2'	3-INCHES DARK BROWN SILT SAND AND ORGANICS (LAWN AREA)		
		LIGHT BROWN SAND AND GRAVEL SOME SILT (FILL)		
	1.5'	RELIC BRICK FOUNDATION (TOP OF WALL AT 1.5'+/-) INFILLED WITH SILTY SAND, BRICK, ASH AND TRACE MISC DEBRIS (FILL)		
	4.2'	MORTARED BRICK SLAB		
	5.0'	BROWN SILTY GRAVELLY SAND WITH TRACES OF BRICK, AND MISC DEBRIS (FILL)		
		(POSSIBLE NATIVE SOILS AT 9' +/-)		
S-1	8.5-9'	GRAY SILTY SAND WITH GRAVEL ON BUCKET TEETH)		
	9.5'	BOTTOM OF EXPLORATION AT 9.5' +/-		
COMPLETION DEPTH: <u>9.5' +/-</u>		SEEPAGE: <u>SOILS APPEARED SATURATED BELOW 5.5'+/-</u> WATER: <u>FREE WATER OBSERVED AT 7' +/-</u> CAVING: <u>MODERATE CAVING BELOW 4.5'+/-</u>		



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.

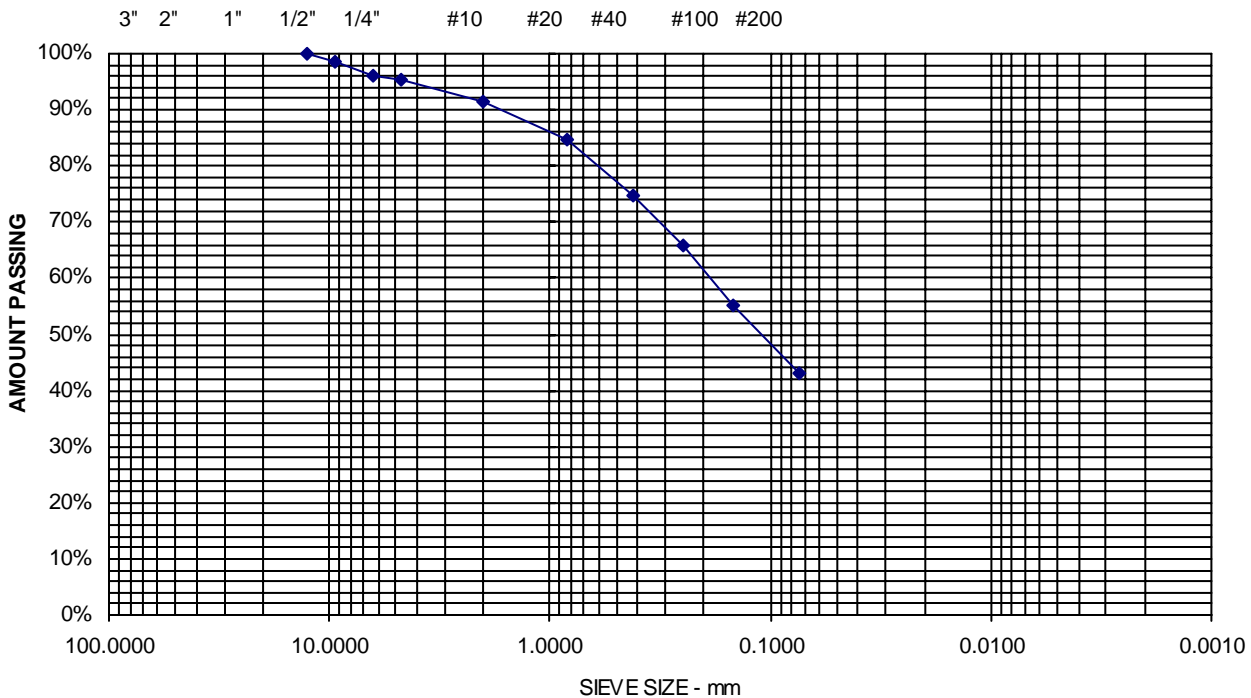
Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through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

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-204 6D**
Material Source **B-204 6D 20'-22'**

Project Number 04-1212.4
Lab ID 7859S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By JASON REDMOND

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
12.5 mm	1/2"	100	
9.5 mm	3/8"	99	
6.3 mm	1/4"	96	
4.75 mm	No. 4	95	4.5% Gravel
2.00 mm	No. 10	91	
850 μm	No. 20	85	
425 μm	No. 40	75	52.4% Sand
250 μm	No. 60	66	
150 μm	No. 100	55	
75 μm	No. 200	43.0	43% Fines

SILT AND SAND TRACE GRAVEL



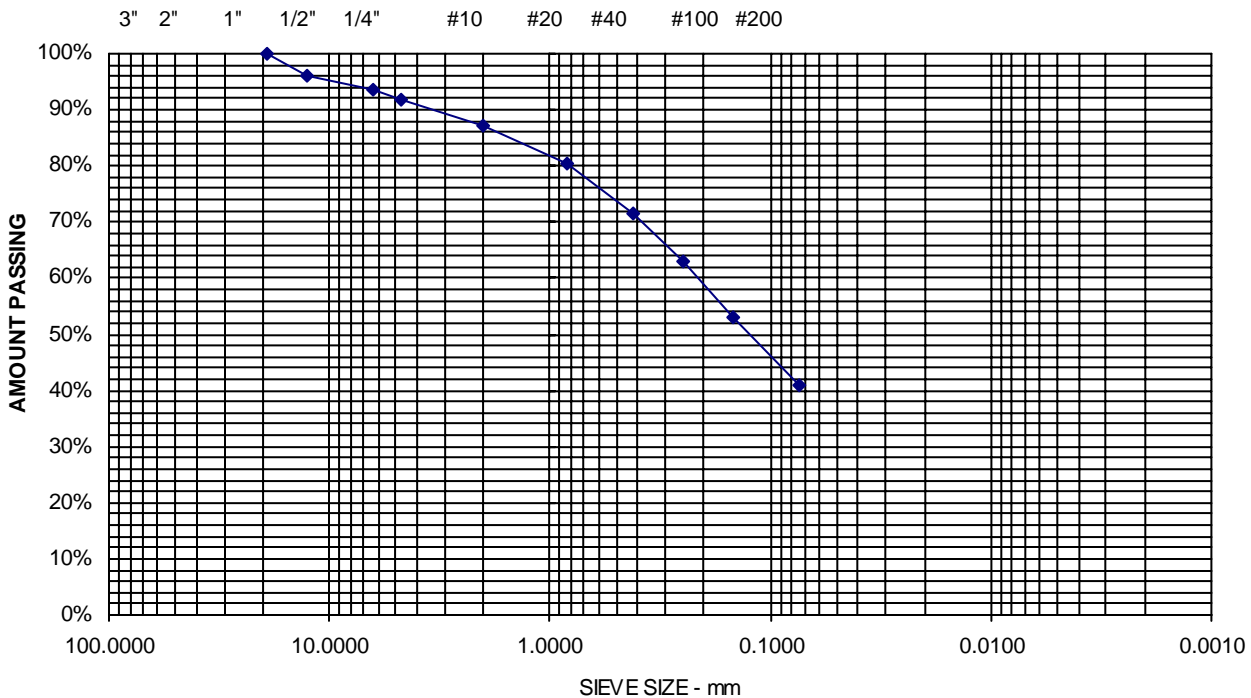
Comments: w = 8.0%

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-204 7D**
Material Source **B-204 7D 25'-27'**

Project Number 04-1212.4
Lab ID 7860S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By RYAN LABONTE

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
19.0 mm	3/4"	100	
12.5 mm	1/2"	96	
6.3 mm	1/4"	93	
4.75 mm	No. 4	92	8.2% Gravel
2.00 mm	No. 10	87	
850 μm	No. 20	81	
425 μm	No. 40	72	50.8% Sand
250 μm	No. 60	63	
150 μm	No. 100	53	
75 μm	No. 200	41.1	41.1% Fines

SILT AND SAND SOME GRAVEL



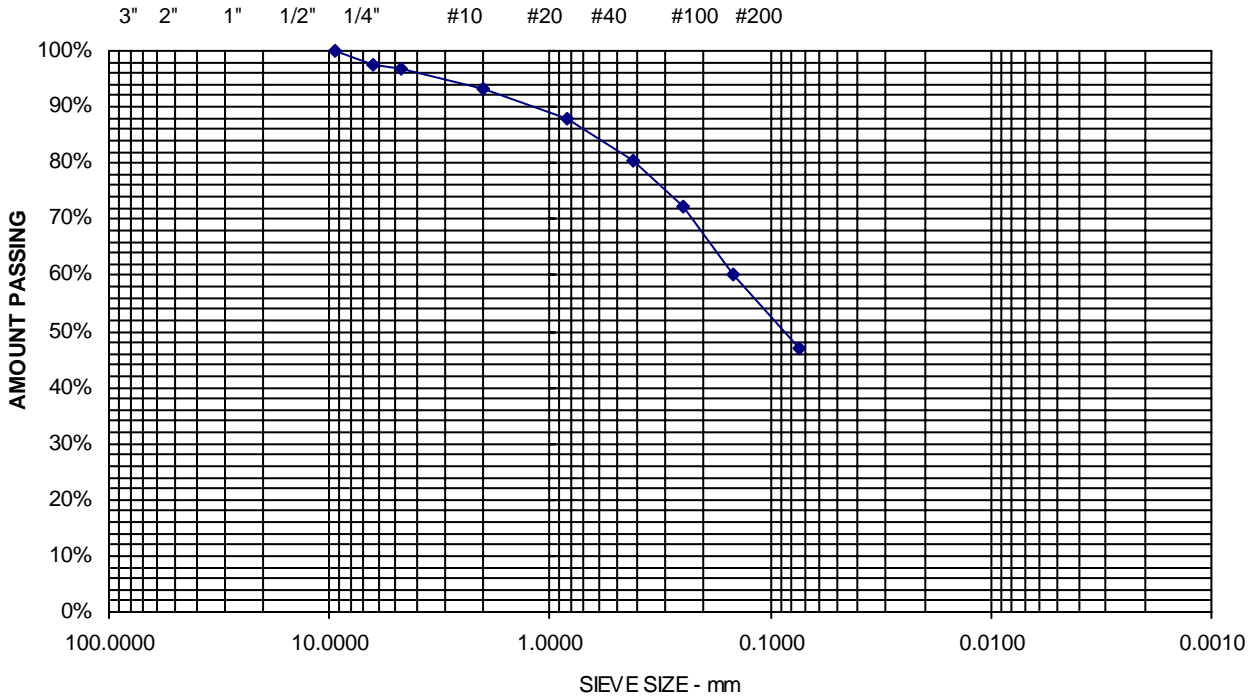
Comments: w = 9.0%

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-204 11D**
Material Source **B-204 11D 45'-47'**

Project Number 04-1212.4
Lab ID 7864S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By JASON REDMOND

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
9.5 mm	3/8"	100	
6.3 mm	1/4"	98	
4.75 mm	No. 4	97	3.2% Gravel
2.00 mm	No. 10	93	
850 μm	No. 20	88	
425 μm	No. 40	80	50% Sand
250 μm	No. 60	72	
150 μm	No. 100	60	
75 μm	No. 200	46.8	46.8% Fines

SILT AND SAND TRACE GRAVEL



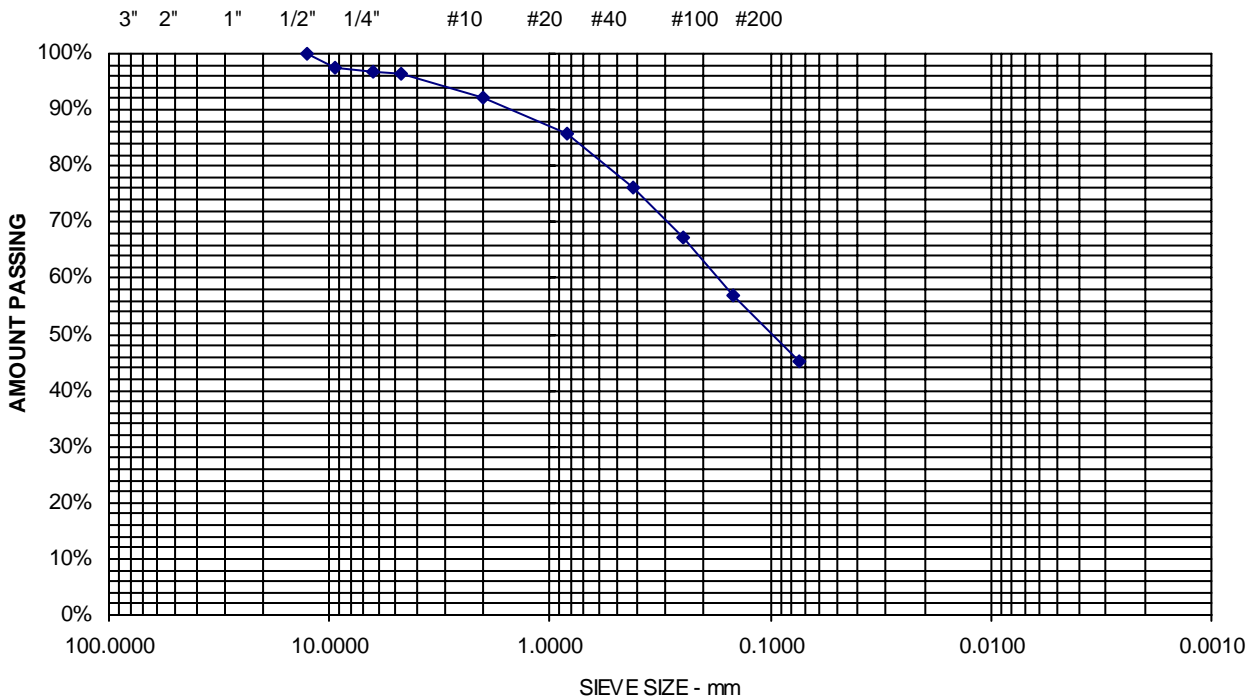
Comments: w = 10.6%

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-204 13D**
Material Source **B-204 13D 55'-57'**

Project Number 04-1212.4
Lab ID 7866S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By JASON REDMOND

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
12.5 mm	1/2"	100	
9.5 mm	3/8"	97	
6.3 mm	1/4"	97	
4.75 mm	No. 4	96	3.7% Gravel
2.00 mm	No. 10	92	
850 μm	No. 20	86	
425 μm	No. 40	76	51.1% Sand
250 μm	No. 60	67	
150 μm	No. 100	57	
75 μm	No. 200	45.2	45.2% Fines

SILT AND SAND TRACE GRAVEL



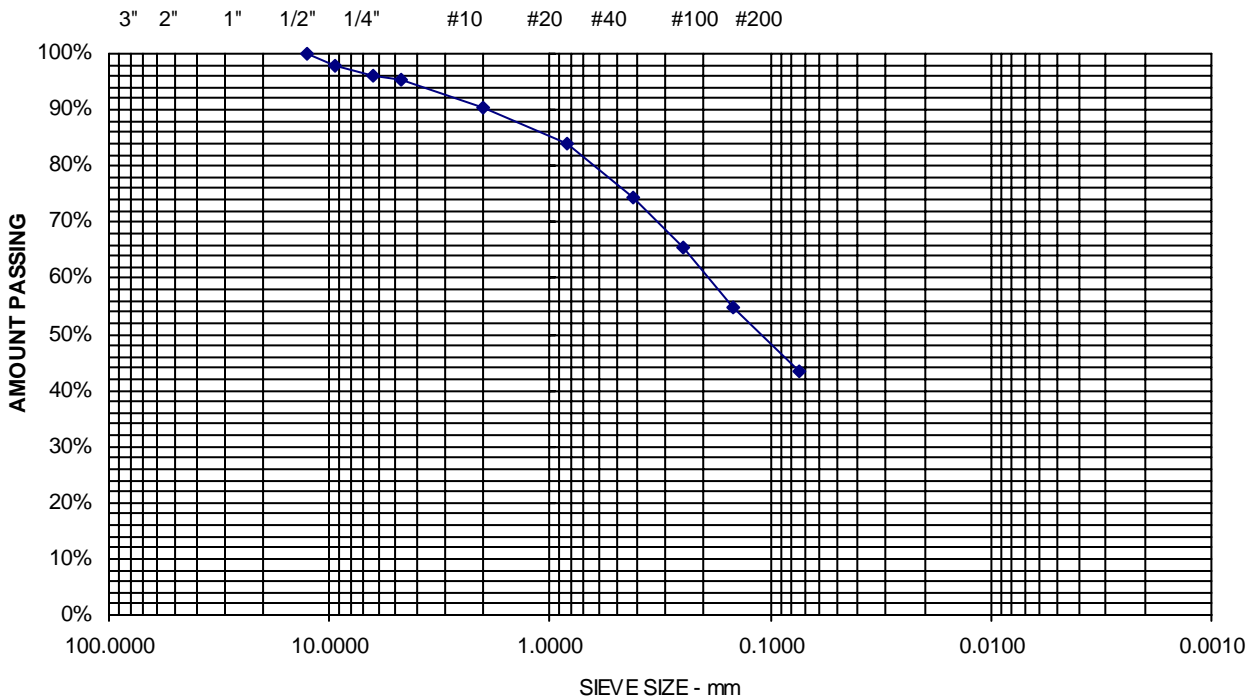
Comments: w = 9.0%

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-204 16D**
Material Source **B-204 16D 70'-72'**

Project Number 04-1212.4
Lab ID 7869S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By JASON REDMOND

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
12.5 mm	1/2"	100	
9.5 mm	3/8"	98	
6.3 mm	1/4"	96	
4.75 mm	No. 4	95	4.7% Gravel
2.00 mm	No. 10	91	
850 μm	No. 20	84	
425 μm	No. 40	74	52% Sand
250 μm	No. 60	65	
150 μm	No. 100	55	
75 μm	No. 200	43.2	43.2% Fines

SILT AND SAND TRACE GRAVEL



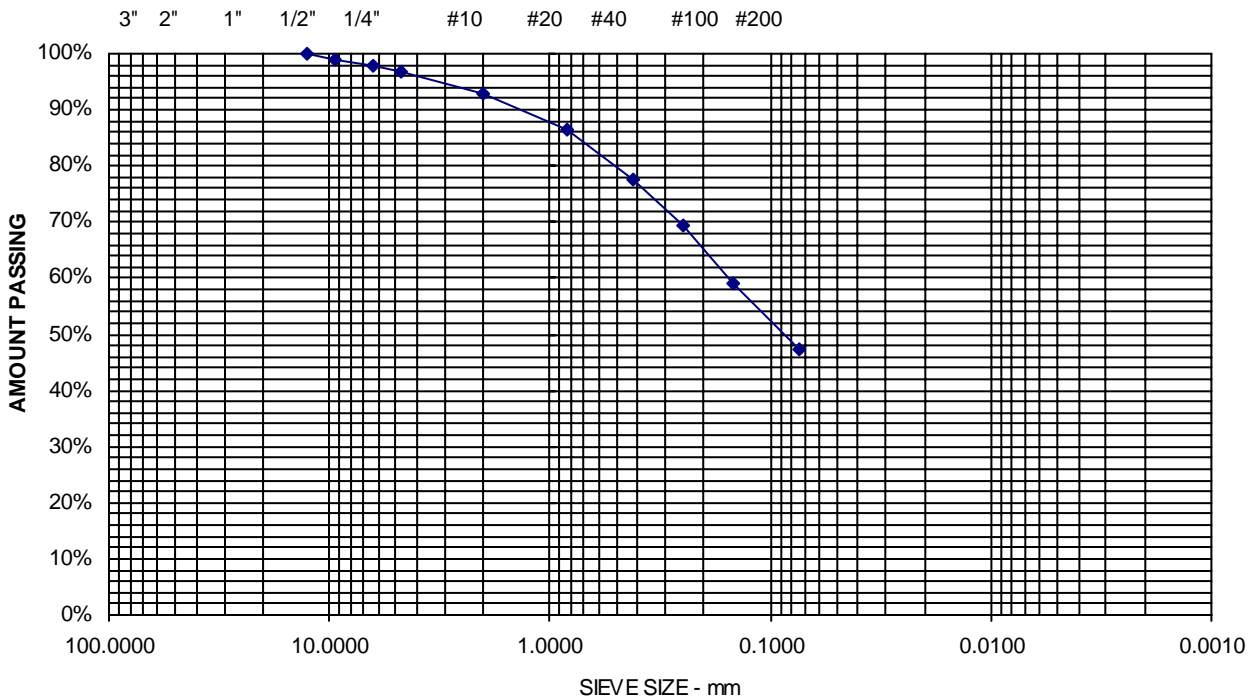
Comments: w = 9.2%

Project Name PORTLAND, ME - PROPOSED 184 PEARL STREET HOUSING -
GEOTECHNICAL ENGINEERING SERVICES
Client AVESTA HOUSING
Exploration **B-205 7D**
Material Source **B-205 7D 20'-22'**

Project Number 04-1212.4
Lab ID 7870S
Date Received 10/14/2010
Date Completed 10/18/2010
Tested By JASON REDMOND

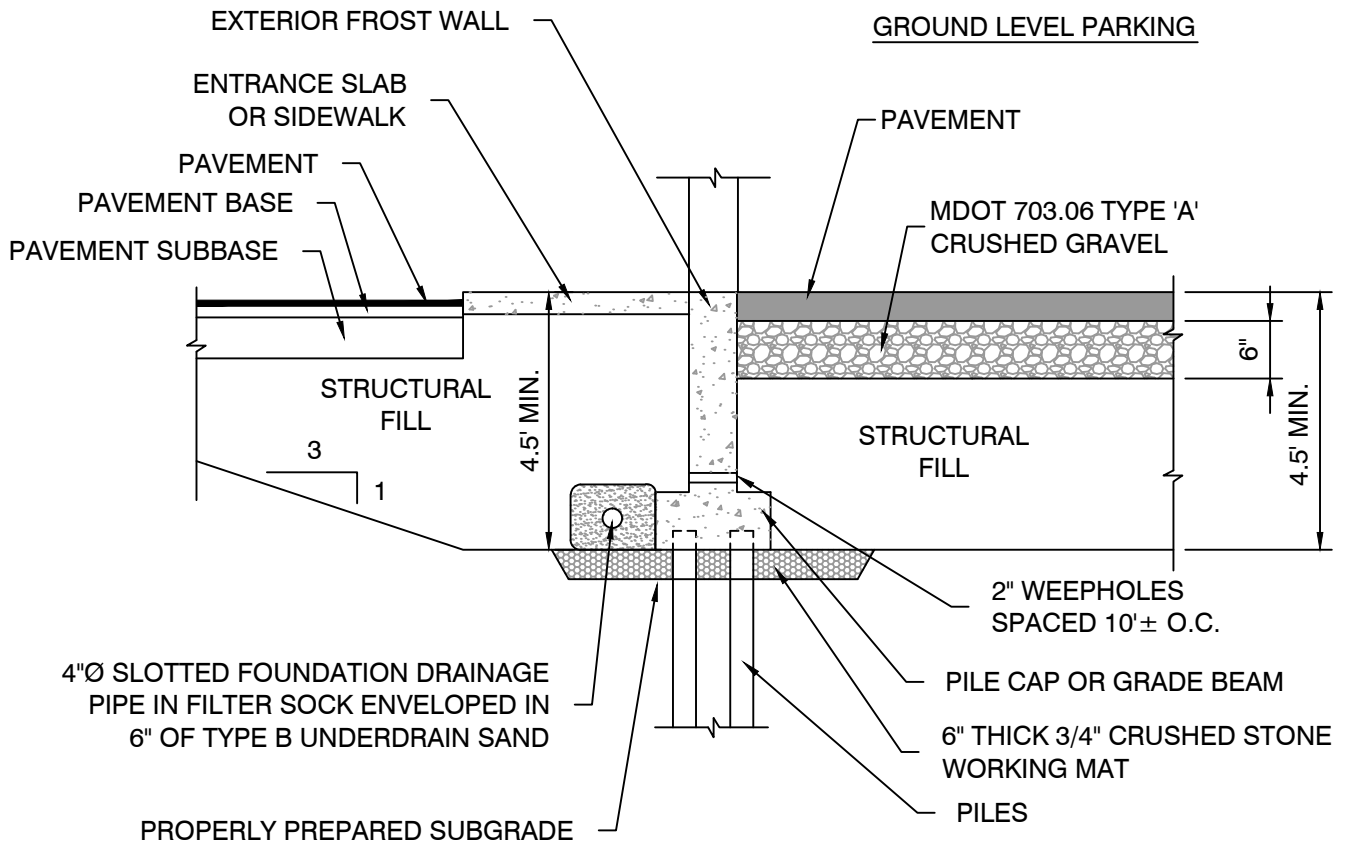
<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
12.5 mm	1/2"	100	
9.5 mm	3/8"	99	
6.3 mm	1/4"	98	
4.75 mm	No. 4	97	3.1% Gravel
2.00 mm	No. 10	93	
850 μm	No. 20	86	
425 μm	No. 40	78	49.6% Sand
250 μm	No. 60	69	
150 μm	No. 100	59	
75 μm	No. 200	47.2	47.2% Fines

SILT AND SAND TRACE GRAVEL



Comments: w = 14.6%

R:\2004\04-12\2.4\CAD\Drawings\04-12\2.4-Sheet 31 UD_Rev1.dwg, 3/11/2011 8:48:27 AM, 1:1, CEM, S.W. Cole Engineering, Inc.



NOTE:

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



AVESTA HOUSING
UNDERDRAIN DETAIL

PEARL PLACE - PROPOSED PHASE 2 BUILDINGS
184 PEARL STREET
PORTLAND, MAINE

Job No.	04-1212.4	Scale	Not to Scale
Date :	03/11/2011	Sheet	31

Appendix A

Pertinent Previous Boring Logs



BORING LOG

BORING NO.: **B-103**
 SHEET: 1 OF 3
 PROJECT NO.: 04-1212
 DATE START: 12/27/2004
 DATE FINISH: 12/27/2004
 ELEVATION:
 SWC REP.: A. SIMMONS
 WATER LEVEL INFORMATION
 SOILS APPEARED SATURATED @ 6.5 FEET

PROJECT / CLIENT: PROPOSED PEARL PLACE DEVELOPMENT / AVESTA HOUSING
 LOCATION: 210 PEARL STREET PORTLAND, MAINE
 DRILLING CO.: GREAT WORKS TEST BORINGS, INC. DRILLER: JEFF LEE
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4.0 IN. 300 LB. 30 IN.
 SAMPLER: SS 1 3/8 IN. 140 LB. 30 IN.
 CORE BARREL:

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			
									3"	BITUMINOUS ASPHALT PAVEMENT	
										BROWN SAND SOME SILT SOME GRAVEL (FILL)	
										~ LOOSE ~ w = 13.2 %	
	1D	24"	12"	7.0'	3	2	1	3			
									11.0'		
	2D	24"	10"	12.0'	6	6	5	3		GRAY SILT AND FINE SAND SOME CLAY TRANSITIONING TO . . .	
										~ LOOSE ~ w = 11.0%	
									18.0'	GRAY SILT AND CLAY SOME SAND SOME GRAVEL	
	3D	24"	24"	17.0'	1/24"						
										GRAY SILTY SAND AND GRAVEL SOME CLAY (GLACIAL TILL) TRANSITIONING TO . . .	
										~ MEDIUM DENSE ~	
	4D	24"	10"	22.0'	2	5	7	7			
										w = 10.3%	
	5D	24"	10"	27.0'	3	3	7	8		GRAY SILTY SAND AND GRAVEL (GLACIAL TILL)	
										~ LOOSE ~	
	6D	24"	10"	32.0'	2	3	6	12			

(CONTINUED)

SAMPLES: SOIL CLASSIFIED BY:
 D = SPLIT SPOON
 C = 3" SHELBY TUBE
 U = 3.5" SHELBY TUBE
 DRILLER - VISUALLY
 SOIL TECH. - VISUALLY
 LABORATORY TEST

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

A1

BORING NO.: **B-103**



BORING LOG

BORING NO.: **B-103**
 SHEET: **2 OF 3**
 PROJECT NO.: **04-1212**
 DATE START: **12/27/2004**
 DATE FINISH: **12/27/2004**
 ELEVATION: _____
 SWC REP.: **A. SIMMONS**
 WATER LEVEL INFORMATION
 SOILS APPEARED SATURATED @ 6.5 FEET

PROJECT / CLIENT: **PROPOSED PEARL PLACE DEVELOPMENT / AVESTA HOUSING**
 LOCATION: **210 PEARL STREET PORTLAND, MAINE**
 DRILLING CO.: **GREAT WORKS TEST BORINGS, INC.** DRILLER: **JEFF LEE**
 CASING: TYPE **HW** SIZE I.D. **4.0 IN.** HAMMER WT. **300 LB.** HAMMER FALL **30 IN.**
 SAMPLER: **SS** SIZE **1 3/8 IN.** WEIGHT **140 LB.** FALL **30 IN.**
 CORE BARREL: _____

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		
	7D	24"	9"	42.0'	2	4	5	5	50.0'	GRAY SILTY SAND AND GRAVEL (GLACIAL TILL) ~ LOOSE ~
	8D	23"	4"	52.0'	20	31	44	50/5"	50.0'	GRAY SILTY SAND AND GRAVEL (GLACIAL TILL) WITH COBBLES AND BOULDERS ~ VERY DENSE ~
	9D	24"	12"	62.0'	12	28	36	50	50.0'	w = 8.7% ~ DENSE ~
	10D	24"	24"	72.0'	11	14	22	43	50.0'	(CONTINUED)

SAMPLES: _____ SOIL CLASSIFIED BY: _____ REMARKS: _____
 D = SPLIT SPOON DRILLER - VISUALLY
 C = 3" SHELBY TUBE SOIL TECH. - VISUALLY
 U = 3.5" SHELBY TUBE LABORATORY TEST

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

A2

BORING NO.: **B-103**



BORING LOG

BORING NO.: **B-104**
 SHEET: 1 OF 3
 PROJECT NO.: 04-1212
 DATE START: 12/29/2004
 DATE FINISH: 12/29/2004
 ELEVATION:
 SWC REP.: A. SIMMONS
 WATER LEVEL INFORMATION
 SOILS APPEARED SATURATED @ 6.5 FEET

PROJECT / CLIENT: PROPOSED PEARL PLACE DEVELOPMENT / AVESTA HOUSING
 LOCATION: 210 PEARL STREET PORTLAND, MAINE
 DRILLING CO.: GREAT WORKS TEST BORINGS, INC. DRILLER: JEFF LEE
 TYPE SIZE I.D. HAMMER WT. HAMMER FALL
 CASING: HW 4.0 IN. 300 LB. 30 IN.
 SAMPLER: SS 1 3/8 IN. 140 LB. 30 IN.
 CORE BARREL:

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			
									2"	BITUMINOUS ASPHALT PAVEMENT	
	1D	24"	14"	3.0'	9	9	6	4		w = 3.9% BROWN GRAVELLY SAND SOME SILT (FILL) WITH BRICKS ~ LOOSE TO MEDIUM DENSE ~	
	2D	24"	12"	7.0'	3	2	3	2			
	3D	24"	14"	12.0'	6	7	7	5	11.5'		
									14.5'	GRAY SILT AND FINE SAND ~ MEDIUM DENSE ~	
	4D	24"	24"	17.0'	WOR						GRAY SILTY CLAY q _p = 0.5 KSF ~ SOFT TO MEDIUM ~ q _u = 0.57 KSF
	1C	24"	24"	22.0'	HYD. SAMPLE						
				22.7'	52/8					Sv = 0.56/0.09 KSF	
				23.4'	51/9					Sv = 0.55/0.10 KSF	
				25.7'	44/6					Sv = 0.48/0.07 KSF	
				26.4'	50/5					Sv = 0.54/0.05 KSF	
	5D	24"	24"	32.0'	1	1	1	4	31.5'		
									33.0'	GRAY SANDY SILTY CLAY SOME GRAVEL ~ MEDIUM ~	
	6D	24"	11"	37.0'	4	4	8	11		GRAY GRAVELLY SAND AND SILT (GLACIAL TILL) ~ MEDIUM DENSE ~	
(CONTINUED)											

SAMPLES: SOIL CLASSIFIED BY: DRILLER - VISUALLY
 C = 3" SHELBY TUBE SOIL TECH. - VISUALLY
 U = 3.5" SHELBY TUBE LABORATORY TEST

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

(A4)

BORING NO.: **B-104**



BORING LOG

BORING NO.: **B-104**
 SHEET: 2 OF 3
 PROJECT NO.: 04-1212
 DATE START: 12/29/2004
 DATE FINISH: 12/29/2004
 ELEVATION:
 SWC REP.: A. SIMMONS
 WATER LEVEL INFORMATION
 SOILS APPEARED SATURATED @ 6.5 FEET

PROJECT / CLIENT: PROPOSED PEARL PLACE DEVELOPMENT / AVESTA HOUSING
 LOCATION: 210 PEARL STREET PORTLAND, MAINE
 DRILLING CO.: GREAT WORKS TEST BORINGS, INC. DRILLER: JEFF LEE
 CASING: TYPE HW SIZE I.D. 4.0 IN. HAMMER WT. 300 LB. HAMMER FALL 30 IN.
 SAMPLER: SS 1 3/8 IN. 140 LB. 30 IN.
 CORE BARREL:

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		
	7D	24"	10"	42.0'	11	22	25	31		w = 8.2%
										GRAY SILTY GRAVELLY SAND (GLACIAL TILL) WITH COBBLES
										~ DENSE ~
	8D	24"	16"	52.0'	9	23	25	27		
	9D	24"	6"	72.0'	25	38	48	50		~ VERY DENSE ~
										(CONTINUED)

SAMPLES: SOIL CLASSIFIED BY: REMARKS:

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

		DRILLER - VISUALLY
X		SOIL TECH. - VISUALLY
X		LABORATORY TEST

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

(A5)

BORING NO.: **B-104**



BORING LOG

BORING NO.: **B-104**

SHEET: 3 OF 3

PROJECT NO.: 04-1212

DATE START: 12/29/2004

DATE FINISH: 12/29/2004

ELEVATION:

SWC REP.: A. SIMMONS

WATER LEVEL INFORMATION

SOILS APPEARED SATURATED @ 6.5 FEET

PROJECT / CLIENT: PROPOSED PEARL PLACE DEVELOPMENT / AVESTA HOUSING

LOCATION: 210 PEARL STREET PORTLAND, MAINE

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

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4.0 IN.	300 LB.	30 IN.
SAMPLER:	SS	1 3/8 IN.	140 LB.	30 IN.
CORE BARREL:				

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		
										<p style="text-align: center;">GRAY SILTY GRAVELLY SAND (GLACIAL TILL) WITH COBBLES</p> <p style="text-align: center;">~ DENSE TO VERY DENSE ~</p> <p style="text-align: center;">NOTE: A SPLIT SPOON SAMPLE WAS ATTEMPTED AT A DEPTH OF 90 TO 92 FEET, HOWEVER, THE EXPLORATION HAD CAVED AT A DEPTH OF 87 FEET. THE DRILLING TOOLS WERE ADVANCED TO REFUSAL (PROBABLE BEDROCK) WITHOUT FURTHER SAMPLING.</p> <p style="text-align: center;">GRAY SILTY GRAVELLY SAND (GLACIAL TILL) WITH COBBLES</p>
										115'
										116'
										PROBABLE WEATHERED BEDROCK
										REFUSAL @ 116 FEET (PROBABLE BEDROCK)

SAMPLES: D = SPLIT SPOON C = 3" SHELBY TUBE U = 3.5" SHELBY TUBE	SOIL CLASSIFIED BY: <table border="1" style="border-collapse: collapse;"> <tr><td style="width: 20px; height: 15px;"></td><td style="width: 60px;"></td></tr> <tr><td style="text-align: center;">X</td><td style="width: 60px;"></td></tr> <tr><td style="text-align: center;">X</td><td style="width: 60px;"></td></tr> </table>			X		X		DRILLER - VISUALLY SOIL TECH. - VISUALLY LABORATORY TEST	REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.
X									
X									
			BORING NO.: B-104						



Appendix B

Test Pit Photographs



Test Pit TP-1



Test Pit TP-1



Test Pit TP-2



Test Pit TP-2



Test Pit TP-3



Test Pit TP-3