REPORT ON SUBSURFACE EXPLORATIONS AND FOUNDATION DESIGN RECOMMENDATIONS EASTERN WATERFRONT DEVELOPMENT PROPOSED PARKING GARAGE AND OFFICE BUILDING PORTLAND, MAINE

by

Haley & Aldrich, Inc.
Portland, Maine

for

Riverwalk, LLC
Portland, Maine

File No. 30322-000
8 November 2005

HALEY & ALDRICH

Haley & Aldrich, Inc.
75 Washington Avenue
Suite 203
Portland, ME 04101-2617

Tel: 207.482.4 600
Fax: 207.775.7666
HaleyAldrich.com

HALEY&
ALDRICH

8 November 2005
File No. 30322-000

Riverwalk, LLC
2 Market Street, Suite 500
Portland, Maine 04101

Attention: Mr. Drew Swenson
Manager

Subject: Report on Subsurface Explorations and Foundation Design Recommendations
Eastern Waterfront Development
Proposed Parking Garage and Office Building
Portland, Maine

Ladies and Gentlemen:

This report presents the results of our subsurface explorations for the proposed Parking Garage and Office Building, which are part of the Eastern Waterfront Development project in Portland, Maine. This report also provides foundation design recommendations for the proposed Parking Garage. Design loading information for the Office Building was not available at the time this report was prepared. Specific foundation and other geotechnical recommendations for the Office Building will be provided under separate cover once this information is available.

This work was performed in accordance with our proposal dated 23 September 2005 and your subsequent authorization.

SUMMARY

We recommend that the proposed garage structure be supported using high-capacity, steel H-piles, driven to bearing in the underlying bedrock. We recommend that an earth-supported bituminous concrete pavement be used for the lower level parking area and an earth-supported, concrete slab-on-grade be used for the garage entrance area in the lower level. We recommend that an underslab and perimeter foundation drainage system be installed beneath the bituminous concrete pavement section, and adjacent to the north, east and west foundation walls, respectively.

To insure the recommendations stated herein are incorporated into the design as intended, we recommend that Haley & Aldrich be involved in preparing the geotechnical Contract

Documents, reviewing geotechnical related submittals, and performing on-site monitoring of the geotechnical construction activities in the field on behalf of the Owner. Specific recommendations for foundation design and construction are presented below.

ELEVATION DATUM

The project elevation datum and elevations referenced herein are in feet and reference Portland City Datum (PCD). Portland City Datum relates to the National Geodetic Vertical Datum of 1929 (NGVD 29) as follows:

Elevation in feet (PCD) = Elevation in ft (NGVD 29) + 0.02 ft

SITE LOCATION & EXISTING SITE CONDITIONS

The general location of the project site is shown on Figure 1, Project Locus. The site is generally bound by Middle Street to the north, the Breakaway Tavern and India Street to the west, Fore Street to the south the Shipyard Brewing Company to the east. The majority of the site is either gravel covered or paved. The site is currently used as a surface parking lot. A single story, prefabricated metal building is present in the northwest corner of the site, and a three-story brick building is present in the western portion of the site adjacent to India Street. Existing site grades range from El. 15 along Fore Street to El. 27 along Middle Street.

The project site is shown on Figure 2, Site and Subsurface Exploration Location Plan.

PROPOSED DEVELOPMENT

Based on the preliminary site development plans provided by you, we understand that the site development will include the following elements:

- A six-story above-grade parking garage (approximately 700-vehicle capacity) situated on the southern half of the site. The structure will be approximately 250 ft by 120 ft in plan. The finished floor elevation (FFE) of the lowest level floor slab will vary from approximately El. 16.5 in the southern portion of the garage to El. 20.5 along the northern edge of the garage. An elevator pit (base at El. 11) is planned in the southeast corner of the footprint. Vehicular access into the garage is planned at two locations: the primary access will be off of Middle Street from the north; and the secondary access will be off of Fore Street, in the southwest corner of the garage. It is not certain at this time whether the Middle Street ramp will enter into the lowest parking level or the first floor level. Bay spacing is planned at approximately 25 ft by 60 ft. Design column loads (dead plus factored live) provided by Simon Design Engineering, LLC (SDE) range from 600 kips at the exterior corner columns, to 1,100 kips at the southern and northern exterior columns, and to as much as 2,150 kips for

the interior columns. Axial uplift and lateral foundation loading information were not provided by SDE.

- A six-story office building situated between the proposed parking garage and India Street on the western portion of the site (i.e., the current location of the Breakaway Tavern building). Design information (e.g., design loads, FFE of the lowest level floor slab and column configuration) were not available at the time this report was prepared.

- An approximately 200 ft, long, 30-ft wide public roadway extending Hancock Street from Middle Street down to Fore Street

A plan showing the proposed site grading adjacent to the garage and office buildings, along the proposed ramps into the garage, and for Hancock Street Extension was also not available at the time this report was prepared.

SUBSURFACE EXPLORATIONS

Two separate subsurface exploration programs were undertaken in order to assess subsurface soil, rock and groundwater conditions at the site. All test borings were drilled by Maine Test Borings, Inc. (MTB) of Brewer, Maine. Haley & Aldrich personnel were present on site to monitor the explorations and prepare logs detailing the subsurface conditions encountered at each test boring location.

Previous Explorations

A preliminary phase subsurface exploration program was undertaken in 2004. The primary purpose of this program was to define the general subsurface conditions in sufficient detail to allow for a preliminary assessment of the type and the approximate length of pile foundations required to support the proposed structures. Six explorations, designated HA04-1 through HA04-6, were advanced to depths ranging from 30 to 60 ft below ground surface (BGS) on 6 February 2004. Due to time constraints and the preliminary nature of the program, the majority of the explorations were advanced by driving a solid-stem, 2-in. diameter rod probe (with a 300-lb hammer dropping 18 in.), through the soil overburden to refusal at depth. Please note that only a few soil samples were collected (and SPT "N-values" recorded) during this program.

Approximate exploration locations are shown on Figure 2. Exploration locations were estimated by taping distances from existing site features. Test boring logs are provided in Appendix A. Ground surface elevations at exploration locations shown on the boring logs are approximate, and were estimated using site topographic information provided by Woodard & Curran.

Recent Explorations

The design-phase subsurface exploration program was undertaken in September and October 2005. The primary purpose of this program was to collect subsurface soil, rock and groundwater data for use in design-level environmental and geotechnical studies. Please note that Woodard & Curran was responsible for collecting, transporting and testing soil and water samples for environmental evaluations. Ten test borings, designated HA05-1 through HA05-10, were drilled from depths ranging from 6.7 to 67.0 ft BGS. All explorations were monitored full-time by a Haley & Aldrich geologist/engineer. Typically the shallow test borings were used for environmental sampling and determination of near surface soil conditions for reuse purposes. Deeper test borings were primarily drilled to obtain information for use in geotechnical/foundation evaluations.

Test borings were advanced using either steel casing or hollow stem augers, depending on the depth and purpose of each boring. Soil samples were typically obtained at 3- to 5-ft intervals by driving a 1 3/8-in. I.D. split-spoon sampler with a 140-lb weight dropped 30 in., as indicated on the test boring logs. The number of hammer blows required to advance the sampler for each 6-in. interval was recorded and is provided on the test boring logs. The SPT N-value is the total number of the hammer blows required to advance the sampler through the middle 12 in. of the 24-in. sampling interval. The soil samples were collected and preserved in glass jars.

Field vane shear tests were conducted in selected borings to provide information on the undrained shear strength characteristics of the marine clay deposit at the site. Results of the vane shear tests are provided on the boring logs in Appendix B.

Borings HA05-1, HA05-3 and HA05-5 penetrated between 3.8 and 5.5 ft into bedrock using a diamond tipped core barrel.

An observation well was installed in one of the completed boreholes (HA05-2) to facilitate groundwater monitoring and sampling at the site. The well installation and monitoring reports are provided in Appendix C.

The test borings were typically backfilled with the drill spoils at the completion of the exploration program. The soil and rock samples were returned to our office and reviewed by a Haley & Aldrich geologist to confirm field classifications, and the samples were reviewed to determine whether laboratory testing was appropriate.

Boring locations shown on Figure 2 are approximate and were determined by taping distances from existing site features. Ground surface elevations at boring locations shown on the boring logs are approximate, and were estimated using site topographic information provided by

Woodard & Curran.

Explorations by Others

We have obtained information from a test boring drilled approximately 80 ft west of the project site. We understand that this boring, located northwest of the intersection of Fore and India Streets, encountered refusal on possible bedrock at a depth of 44 ft BGS (approximately El. -23).

SUBSURFACE SOIL, BEDROCK AND GROUNDWATER CONDITIONS

Generally, the subsurface conditions encountered at the site consisted of the following geologic units, presented in order of increasing depth BGS:

- Bituminous Concrete/Concrete
- Man-placed fill
- Marine Deposit (primarily clay with some sand and silt lenses)
- Glacial Till
- Bedrock

Refer to the previous test boring logs (Appendix A), recent test boring logs (Appendix B), Table I and Figures 3 and 4 (subsurface profiles) for a more detailed description and summary of soil conditions encountered. A brief description of each of the deposits encountered is provided below.

Bituminous Concrete/Concrete: A relatively thin layer of bituminous concrete (asphalt pavement; 4 to 8 in. thick) and concrete (11 to 23 in.) was encountered generally at boring locations along Fore Street and in the north and west portions of the site. Gravel surfaced areas were found in the central and southern portions of the site.

Fill: Fill was encountered in all but one (HA05-8) boring location at the site. The fill generally ranged in thickness from 2.5 to 10 ft within the limits of the proposed garage footprint. The material generally consisted of brown or black, poorly graded SAND with gravel. Brick fragments and organic matter were present at several boring locations. The deposit was typically medium dense to dense with SPT N-values ranging from 10 to 50 blows per foot (bpf). A 4-ft thick layer of fill consisting of CLAY was encountered in boring HA05-5.

Marine Deposit: A 20 to 40-ft thick marine deposit was encountered in all of the borings located within the garage footprint. The upper 5 to 10 ft of the deposit typically consisted of gray, medium stiff to very stiff lean CLAY (CL) and is referred to herein as the clay crust. The remainder of the deposit generally consisted of gray, soft to medium stiff, lean CLAY

(CL). The SPT N-values in the crust ranged from 5 to 20 bpf while N-values in the remainder of the deposit ranged from weight of hammer (WOH) to 2 bpf. The undrained shear strength of the marine clay deposit as measured by the in-situ vane shear test typically ranged from 800 to 1,300 psf in the clay crust, and from 400 to 700 psf in the softer clay below the crust. In general, the deposit became thicker (i.e., 20 to 40 ft) from west to east (toward Hancock Street Extension), and from north to south (i.e., from 15 to 35 ft; toward Fore Street).

A thin layer (2 to 3.5 ft thick) of marine SAND was encountered above the marine CLAY at two of the test borings within the garage footprint (HA05-1 and HA05-3). The top of the marine deposit was typically encountered between 3 and 8 ft BGS (El. 12 to El. 19) within the garage footprint.

A thin layer (2.5 ft thick) of organic silt was encountered above the marine deposit in HA05-5 at a depth of 7 ft BGS. This deposit consisted of soft sandy SILT with wood fibers.

Glacial Till: A 15 to 30-ft thick deposit of glacial till was encountered in all the of the test borings drilled with in the garage footprint. This deposit generally consisted of silty SAND with varying amounts of silt and gravel. The encountered soils are typically medium dense to dense with N-values typically ranging between 10 and 40 blows per foot (bpf). The top of the till within the garage footprint varied significantly and was encountered at depths ranging between 20 and 40 ft BGS. In general, the deposit became thicker (i.e., 15 to 35 ft) from south to north (toward Middle Street).

Bedrock: Bedrock was cored at three of the recent test boring locations (HA05-1, HA05-3 and HA05-5). In general the cored bedrock is described as hard to moderately hard, fresh to slightly weathered SCHIST/ PHYLITTE. A 4-ft thick highly weathered zone was encountered at El. 51.5 in boring HA05-1. The top of rock surface is generally consistent across the site and varies between El. -35 (northwest corner of the garage footprint) and El. -45 (central and southeast portion of the garage footprint). Measured core recovery (REC) values ranged between 75 and 100 percent. Calculated rock quality designation (RQD) values ranged between 0 (at HA05-1) and 85 percent. REC and RQD values are provided on the test boring logs.

Groundwater levels measured in the observation well installed in HA05-2(OW) in October 2005 ranged from 2.5 to 3 ft BGS (El. 18.5 to El. 19). Multiple water level readings were taken during the past month (including several in one day) to determine the affect that the tides have on static groundwater levels within the garage footprint. During the monitoring period, the groundwater level did not appear to be affected by tidal fluctuations. Observation well installation and groundwater monitoring reports are included in Appendix C.

LABORATORY TESTING

A laboratory testing program was undertaken to classify the in-situ fill soils, to help assess the potential for soil reuse during site development. The laboratory testing program consisted of one grain size analyses. The results are summarized in the table below.

Test Boring (Sample No.)	Sample Depth	Soil Type	Percent Gravel	Percent Sand (coarse/med./fine)	Percent Fines	USCS Classification
HA05-1 (S1/S2)	0 to 4.0 ft	Fill	43.0	42.0 (11.0/17.0/14.0)	15.0	Silty gravel with sand (GM)

Please note that this soil sample contained approximately 15 percent asphalt pieces. Results of the laboratory testing are included in Appendix D. The potential for reusing these soils as common and structural fill at the site is discussed in the Construction Considerations section of this report.

GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Geotechnical design recommendations provided below were formulated in accordance with the requirements of the 2003 International Building Code (IBC).

Please note that the recommendations provided below relate to the proposed garage structure only. Specific loading information for the office building was not available at the time this report was prepared. Foundation recommendations for the office building will be provided under separate cover once design information (i.e., FFE, column design loads, column spacing, site grading, etc.) is available.

Foundation Design Recommendations

Based on the magnitude of the axial compression design loads provided by SDE and the nature/density of the marine and glacial soils above the rock, it is our opinion that supporting the building in the marine and glacial till soils is not feasible, both in terms of allowable bearing capacity and tolerable building settlements. We therefore recommend that the proposed garage structure be supported on pile foundations penetrating through the overburden soils and driven to end bearing in the underlying rock.

As part of our analyses, we considered supporting the garage structure using both closed-ended, concrete filled steel pipe piles driven to refusal in the glacial till (displacement piles), and steel H-piles driven to refusal in bedrock. It is our opinion, based on the subsurface conditions and the magnitude of design loads, that the use of steel H-piles is technically feasible and the more cost effective foundation system. We estimate that the total cost (and total pile linear footage) of the longer, higher capacity H-piles driven into rock is approximately 40

percent less than the shorter, lower-capacity pipe piles.

We also considered supporting the structure on drilled shafts socketed into bedrock but the preliminary estimated costs of this foundation system was significantly greater than that estimated for end-bearing piles.

Static pile capacity analyses were performed to determine the geotechnical capacity of several different sizes of H-piles. Based on the condition of the bedrock, the magnitude of the design loads, and pile availability, we recommend that HP14x89 piles with an axial design capacity equal to 300 kips be used to support the garage. This design capacity value does not take into account a reduction in pile cross sectional area for steel degradation since the soils and groundwater at the site are not considered to be corrosive/saline.

Piles should be fabricated from Grade 50 (50 ksi) steel and should be outfitted with steel driving shoes/points in order to protect the pile tips from damage during driving in the rock. The piles should be installed to a minimum ultimate geotechnical capacity equal to the design capacity multiplied by 2.25 (675 kips). Per the requirements of IBC, three or more piles should be installed at discrete pile cap locations to provide lateral stability in all directions.

We anticipate that piles will advance 5 to 10 ft into the bedrock prior to achieving end bearing. Based on this and an average, assumed pile cut-off level equal to El. 16, pile lengths should vary between 55 and 70 ft. Based on these anticipated pile lengths, pile splices will be needed. Piles should be spaced at least 3.5 ft on center when groups are required. The bottoms of pile caps should be founded a minimum of 4.5 ft below the lowest surface exposed to freezing.

The installation/driving criterion for the piles is a function of pile hammer selected by the Contractor to install the piles. This criterion should the determined by the Contractor's engineer (using wave equation analysis; WEAP) and reviewed/approved by Haley & Aldrich prior to construction. The requirements of this analysis should be outlined in the pile specification. The installation/driving criterion provided by the Contractor will determine the number of hammer blows required to drive the pile over the final 6 in. of driving, which will result in the pile achieving the required minimum ultimate geotechnical capacity (2.25 x pile design capacity). If abrupt refusal is encountered, driving should be terminated when the pile penetration is less than ½-in. for 10 consecutive hammer blows.

Prior to installation, one of the H-piles could be statically load tested to twice the pile design capacity. However, it is our opinion, that dynamic pile testing could be used in lieu of a static pile load test. Dynamic testing is more cost effective than static load testing, provides reliable pile capacity information and is accepted by the IBC Code. We recommend that the Contractor monitor the installation of a minimum of ten production piles (i.e., indicator piles) using the Case-Goble Pile Driving Analyzer (PDA) equipment. The dynamic testing will: 1.) verify that the pile ultimate capacity is achieved; 2.) confirm the bearing capacity value for rock used in

the pile design; and 3.) confirm that the stresses in the pile do not exceed allowable limits during driving (i.e., $0.90f_y$, or 45 ksi for grade 50 steel piles). CAPWAP analysis should be performed on at least two of the indicator piles installed during the PDA testing program. Use of dynamic testing alone will likely require approval from the City of Portland building official.

Please note that installation of driven piles is a vibration and noise producing activity. If the potential vibration and noise caused by driving piles is not acceptable to City of Portland officials, then the use of drilled shafts could become a more feasible option, since shaft installation is a relatively low vibration and low-noise producing activity.

Ground Floor Slab

We recommend that a bituminous concrete surface be constructed for the floor slab in the lowest level parking area. We recommend that the bituminous surface bear directly on subbase and base course material placed on top of the in-situ fill materials or marine deposit (likely present in the northwest corner of the footprint). Details of the recommended pavement section and recommended subgrade preparation procedures are provided below. Please note that it is possible that bituminous concrete placed within a partially enclosed space inside a building footprint may be considered a potential fire hazard and may not be allowed by the building official.

We recommend that the ground floor slab in the garage entrance area at the lower level be designed as an earth-supported, concrete slab-on-grade bearing on a minimum of 6 in. of compacted granular fill (CGF).

All previous construction debris (e.g., foundation walls, slabs, footings and underground utilities) should be removed from within the building limits prior to construction.

Resistance of Lateral Design Building Loads

We recommend that structure lateral loads be resisted by passive earth pressures acting against pile caps and grade beams. The net passive resistance (passive minus active) provided by the fill surrounding grade beams and pile caps can be calculated using an equivalent fluid weight (triangular distribution) of 300 pounds per cubic foot (pcf). The soil within 1 ft of ground surface should be ignored unless it is confined by a slab or bituminous concrete. If the horizontal distance between adjacent grade beams or walls is less than twice the height of the subject structural element (measured from bottom of element to bottom of slab/ground surface), the passive pressure must be discounted proportionately to the distance (full pressure at twice the height away) to accommodate for interaction of the elements.

If passive earth pressures are not enough to provide adequate lateral resistance, we will need to

conduct more detailed analyses of the lateral load carrying capacity of the piles at the site. Installation of battered piles may also be considered. A minimum factor of safety for sliding equal to 2.0 should be achieved for resistance of permanent lateral loads.

Sidewalks

Concrete sidewalks provided around the exterior of the buildings should be supported on a minimum of 1.5 ft of CGF or subbase gravel. The soils at the site are considered to be frost-susceptible and the purpose of placing free-draining granular soil below the sidewalks is to help control the potential for post-construction differential heaving and cracking.

Foundation Drainage System

Due to the proximity of the water table to the proposed lower level, we recommend that a permanent foundation drainage system be installed to protect the below grade portions of the building and the bituminous concrete slab from hydrostatic pressures and infiltration of surface water or groundwater. The foundation drainage system for the building should discharge by gravity where practicable into an appropriate receptor (possibly the local storm drain system).

The system should consist of perimeter foundation drains along the backfilled side of below-grade building foundation walls where the interior floor level is below the exterior finished grades (likely along the east, north and west sides of the garage). The drain should consist of a 4-in. diameter continuous perforated PVC or corrugated HDPE drainpipe, surrounded by a minimum of 6-in. of ¾-in. crushed stone and a non-woven, 4-oz. filter/separation fabric, placed outside of the foundation wall. Pipe perforations should be oriented downward. The invert of the drain pipe should be positioned above the bearing level of pile caps/grade beams, and at least 12 in. below the adjacent floor slab surface.

The system should also include underslab drains installed beneath the bituminous concrete slab in the interior portion of the garage. We recommend that the underdrain system consist of a network of 4-in. diameter perforated PVC or corrugated HDPE drain pipes, oriented north-south (perpendicular to the long axis of the garage). We recommend that one pipe be installed in each column bay (seven pipe sections total). Each pipe section should be surrounded by a minimum of 4-in. of ¾-in. crushed stone and a non-woven, 4-oz. filter/separation fabric, and should be placed below the base and subbase material for pavement sections. The underslab drain pipes should be conveyed outside the garage footprint by making "box-out" penetrations in the southern foundation wall (adjacent to Fore Street).

Pipe cleanouts should be provided at system corners (for both perimeter and underslab drain piping) to allow for future maintenance. See Figure 5 for a schematic plan and details of the recommended foundation drainage system.

As an additional measure, surface runoff should be directed away from the building. In

general, the finished ground surface immediately around the building should be sloped downward away from the structure to divert surface runoff. To limit surface water infiltration into the drainage system, it is recommended that the upper 8 in. of backfill within 10 ft of the building, in unpaved areas, consist of topsoil or other soil having low permeability.

We can provide a foundation drainage plan along with the appropriate drain system details for inclusion in the contract documents once the location and elevations of the grade beams, pile caps, below slab utilities and sump (if required) are finalized.

Dampproofing/Waterproofing

In general, we recommend that dampproofing be placed on the outside face of foundation walls where the adjacent interior space is below the level of the exterior ground surface.

The base slab for the elevator pit (bearing at approximately El. 11) should either be designed to resist hydrostatic uplift loads based on a groundwater level at El. 16, or should be permanently drained. If the slab is designed to resist uplift loads, we recommend that the walls and slab for the elevator pit be waterproofed up to El. 16 and dampproofed above El. 16. If the slab is not designed to resist uplift loads, an underslab drainage system should be constructed beneath the pit slab. The system should consist of a minimum of 6 in. of crushed stone placed over a separation geotextile fabric (e.g., Mirafi 140N). The drain system should provide a discharge outlet for the water collected in the system (e.g., connection to the storm drain system or a sump inside/outside the building).

The need for vapor barriers beneath the floor slab in the garage entrance area should be evaluated based on building design consideration/requirements. If vapor barriers are used in this area, the floor slab design should be coordinated with the vapor barrier installation, as it may impact concrete curing and curling.

Seismic Design Considerations

We recommend that the parking garage be designed in accordance with the seismic requirements of the latest edition of the IBC Code as outlined below. Due to the nature and thickness of overburden soils and the depth to bedrock, the site is considered to be "Site Class C". We recommend the following values be used by the project structural engineer to determine the design spectral response acceleration parameters (S_{DS} and S_{D1}) and to calculate the base shear for purposes of seismic design.

- Mapped Spectral Response Accelerations for Short Periods: S_S = 0.37 g
- Mapped Spectral Response Accelerations for 1-second Periods: S_1 = 0.10 g
- Site Coefficient for Short Periods: F_a = 1.2
- Site Coefficient for 1-second Periods: F_V = 1.7

Please note that "g" refers to acceleration due to gravity.

We do not consider the soils present at this site to be liquefaction susceptible.

Lateral Earth Pressures on Below-Grade Foundation Walls/Retaining Walls

We recommend that any exterior below-grade foundation walls retaining soil on one side and restrained at the top should be designed for static lateral earth pressures using an equivalent fluid unit weight of 60 lbs. per cubic foot (pcf). Cantilever walls (i.e., walls that are free to rotate at the top) should be designed using an equivalent fluid unit weight of 40 pcf. These fluid weights assume a free-draining granular backfill is placed adjacent to the wall (with moist unit weight equal to 120 pcf) and that a perimeter foundation drain system is installed recommended herein (i.e., no unbalanced hydrostatic pressures exist; "drained condition").

In particular, we anticipate that the northern garage wall, specifically adjacent to the Micucci property will need to be designed to permanently resist lateral earth pressures up to approximately El. 26.

Recommended Pavement Sections

The near surface soils (marine deposits) are considered to be frost-susceptible. Consequently, there is some risk that newly paved areas could experience some frost heaving and vertical misalignment where they are directly underlain by these soils within the depth of frost penetration. To avoid risk of any frost-induced heaving, full-depth (4.5 ft frost depth potential) non-frost susceptible pavement sections would be required, which is not common practice in this area. The recommendations provided below assume some risk of such misalignment is tolerable, as is normal local practice.

Recommendations for bituminous pavement sections for auto traffic for the parking garage and garage ramps and for Hancock Street Extension are provided below based upon the Maine DOT Standard Specification, Highways and Bridges (December 2002):

Standard-Duty Flexible Pavement (parking garage and garage ramps):

Pavement:	3 in. bituminous concrete, placed in two 1-1/2-in. thick layers
Base:	3 in. screened or crushed gravel
Subbase:	12 in. sand or gravel subbase course

Heavy-Duty Flexible Pavement (Hancock Street Extension and loading docks):

Pavement:	4 in. bituminous concrete, placed in two 2-in. thick layers
Base:	6 in. screened or crushed gravel

Subbase: 14 in. sand or gravel subbase course

Base and subbase course materials should conform to the following gradations:

Screened or Crushed Gravel - Maine DOT Standard Specification, Highways and Bridges; Section 703.06a, Type A.

Sand or Gravel Subbase - Maine DOT Standard Specification, Highways and Bridges; Section 703.06b, Type D. Type D aggregate should be modified to a maximum 4-in. size. CGF may be substituted for the subbase course material, but the maximum particle size should be reduced to 4 in.

Debris and organic matter found in the fill soils encountered at roadway subgrade level should be removed from within the limits of the proposed parking area and site roadways.

Subbase materials should be placed and compacted in maximum 8-in. thick loose lifts to at least 95 percent of the maximum dry density as determined by ASTM D1557. Base course material should be placed in one lift and compacted with a minimum of two passes with self-propelled vibratory compaction equipment. Procedures and equipment for compaction of base and subbase materials should be as recommended in this report for CGF.

The pavement recommendations also assume that a stable, firm subgrade is achieved beneath the base and subbase courses, and that subgrades are prepared as recommended in the Construction Considerations section of this report.

Hancock Street Extension

Please note that the proposed site grading plan for Hancock Street Extension was not available at the time this report was prepared. The following table summarizes the estimated amounts of cut/fill that will likely be required to construct Hancock Street Extension, based on the anticipated site grading. Also provided is the subgrade materials that are anticipated to be found during roadway construction.

Please note that prior to placement of construction of roadway embankments, all topsoil, debris and organic matter encountered at roadway subgrade level should be removed from within the limits of the roadway.

Hancock Street Extension Location	Estimated Cut Depth/Fill Height [1]	Anticipated Subgrade Soils
within 20 ft of Fore Street	2 to 3 ft cut	Marine Clay
20 to 110 ft from Fore Street	0 to 2 ft cut	Fill
110 to 160 ft from Fore Street	0 to 3 ft fill	Fill or Marine Clay
within 25 ft of Middle Street	minimal cut/fill required	Fill

Note 1. Cut depths shown are measured relative to existing site grades. Additional excavation for installation of the roadway pavement section (approximately 2 ft) will be required and is not included in the estimates shown in this table.

CONSTRUCTION CONSIDERATIONS

The primary purpose of this section is to comment on items related to excavation, earthwork, pile driving, dewatering and related geotechnical aspects of proposed construction. It is written primarily for the geotechnical engineer having responsibility for preparation of geotechnical related plans and specifications. Since it identifies potential construction problems related to foundations and earthwork, it will also aid personnel who monitor the construction activity. Prospective contractors for this project must evaluate the construction problems on the basis of their own knowledge and experience in the Portland, Maine area, and on the basis of similar projects in other localities, taking into account their proposed construction methods, procedures, equipment and personnel.

Please note that the construction considerations provided below relate to the proposed garage structure only. Specific loading information for the office building was not available at the time this report was prepared. Construction considerations for the office building will be provided under separate cover once design information (i.e., FFE, column design loads, column spacing, site grading, etc.) is available.

Pile Load Testing Program

A static pile load test would normally be performed for piles with the design capacities required for this project if they were being driven to bearing in soil. However, we anticipate that the piles will be driven to practicable refusal in the bedrock. Therefore, we do not believe that a static load test is needed. Additionally, we have pile installation records from another recent project in the vicinity of the site which confirms that similar pile capacities were achieved with the same size pile in similar subsurface and pile bearing conditions.

We do however recommend that a dynamic load testing program be implemented. A minimum of ten pre-selected piles should be monitored during installation with a pile driving analyzer (PDA) to evaluate hammer system efficiencies, driving stresses in the pile and pile capacities. The selected piles should be allowed to stand a minimum of 24 hours after completion of initial driving and should then be re-driven (restrike) while being monitored with the PDA to assess the set-up/relaxation characteristics of the rock. If the results of a PDA/CAPWAP analysis show that the minimum safety factor of 2.25 has been achieved using the driving criteria established by the WEAP analysis, then this driving criteria would be used for the remainder of the production piles without the use of PDA, and would be considered sufficient "evidence" that the piles have developed the required design capacity.

Pile Installation

Some cuts (up to 7 ft in the northwest corner of the garage) and fills (up to 3 ft in the southeastern portion of the garage) will be required to reach the proposed garage FFE. We recommend that the site be graded to a level corresponding to a few feet below the design pile cut off elevation prior to mobilizing the pile driving equipment to the site. In particular, we recommend that the fill required to raise the grade in the vicinity of column lines F-4 and G-4 be placed as soon as possible to initiate any settlement that may occur in this area as a result of fill placement. We also recommend that the piles driven at column lines F-4 and G-4 be installed last to minimize the amount of vertical soil "downdrag" load on the piles. Downdrag results when the soil adjacent to an installed pile (typically the soft, compressible marine clay soils) moves downward relative to the pile (in this case, caused by recompression of the soft marine clay/silt soils under the weight of the fill material). This relative movement of the soils induces a downdrag load on the pile. By allowing the soil to settle prior to pile installation, the downdrag loads on the piles will be minimized/eliminated.

Obstructions (i.e., concrete foundation walls, footings, slabs and boulders in the naturally deposited soils) could be encountered during pile installation. If encountered, obstructions will likely be located at shallow depths within the in-situ fill soils near existing ground surface and should be removed by the Contractor at no additional cost to the Owner.

As previously stated, pile driving is a noise and vibration inducing activity. We recommend that seismographs be used to monitor vibrations and noise levels during pile driving and other vibration inducing activities (e.g., hoe-ramming, if needed). We also recommend that an existing conditions video survey of structures and buildings of concern adjacent to the site be conducted prior to the start of construction. A complete record of the condition of both the interior and exterior walls/facades of adjacent structures can be useful to help mitigate potential damage claims (from abutters) that may arise during construction activities.

Excavation

Excavation will be required for general site grading, and for construction of the garage building foundations, the elevator pit, garage ramp from Middle Street, underground utilities and the southern portion of Hancock Street Extension. We anticipate that excavation of as much as 7 ft BGS will be required to reach the proposed FFE in the northwest portion of the garage footprint. An additional 3 to 4 ft of excavation will be required in this area to allow construction of the pile caps and grade beams (specifically in the vicinity of column lines A-2, A-1, B-1, C-1 and D-1).

We recommend that all topsoil, debris and organic matter encountered within the limits of the proposed garage, garage ramps and Hancock Street Extension be stripped and removed from the site, prior to placing fill.

We expect that excavation of the in-situ soils (mostly fill and marine deposits) can be accomplished using normal earth-moving equipment. We do not anticipate that bedrock will be encountered during excavation for this site development. Obstructions will likely be encountered during excavation in the in-situ fill soils. We recommend that the contract documents require the contractor to include provisions for obstruction removal in their earthwork bid.

Temporary Excavation Support System

Based on the anticipated elevation of the bottom of pile cap/grade beam in the northwestern portion of the garage footprint (approx. El. 13) and the proximity of the garage wall to the Micucci parcel (less than 5 ft), an excavation support system will be required along the property line from column line A-1 to column line D-1 (approximately 110 lf). We anticipate that this system will need to retain between 7 and 12 ft of soil during construction of the garage.

The excavation support system should be designed and detailed by the Contractor's engineer as part of the submittal process in the project specifications. We anticipate that either a soldier pile and lagging or interlocking steel sheet pile system will be the most cost effective and technically feasible excavation support systems for the soil conditions at the site and for the relatively small range of wall heights. We anticipate that the system could be a cantilevered (i.e., not braced) system.

A sloped open-cut excavation could be made in this area; however, this would require obtaining a temporary construction easement from the adjacent property owner (Micucci).

Construction Dewatering

Based on recently measured groundwater levels at the site, we anticipate that construction dewatering during construction of the pile caps, grade beams and elevator pit will be required. Due the relatively shallow excavation depths and the low permeability of the underlying marine soils, we expect that the required dewatering could be performed using open sumps and temporary ditches within the excavations. Sumps should be provided with filters suitable to prevent pumping of fine grained soil particles. Rainwater or snowmelt should be directed away from exposed soil bearing surfaces.

Dewatering and discharge of dewatering effluent should be performed in accordance with all applicable local, state and federal regulations. Dewatering discharge should be recharged on site if possible. However, due to the size of the site and the relatively shallow depth to water,

we anticipate that on-site recharge will not be feasible and that dewatering discharge will need to be directed to the local storm drain system. Sedimentation tanks and other treatment methods may be required for legal disposal of the effluent.

Preparation and Protection of Bearing Surfaces

Pile Caps/Grade Beams

We recommend that the excavation work be conducted in a manner that minimizes disturbance to the natural soils when excavating to bearing level for pile caps and grade beams. It may be necessary to over-excavate and replace locally weak, disturbed or otherwise unacceptable foundation bearing soils using crushed stone or concrete mudmats.

Slabs-on-Grade

All topsoil, debris and organic matter (if encountered) should be removed from beneath concrete slabs-on-grade (in the garage entrance area). We recommend that the soils within a minimum of 6 in. of the bottom of the slab be removed and replaced with CGF. Based on the proposed grading, we anticipate that in-situ fill soils will be present at subgrade level beneath the garage entrance area. We recommend that fill subgrade surfaces in this area be proofrolled with a minimum four passes of a self-propelled static roller or heavy hand-guided vibratory compactor until firm prior to placement of fill.

Pavement Areas

All topsoil, debris and organic matter within 3 ft of finished pavement grade should be removed from within the limits of garage footprint and ramps, and within Hancock Street Extension. To minimize disturbance, we recommend that marine soils (particularly clay) exposed at subgrade level not be proofrolled. If fill material is encountered at subgrade level, we recommend that these surfaces be proofrolled with a minimum four passes of a self-propelled static roller or heavy hand-guided vibratory compactor until firm. Prior to placing subbase and base course material, the pavement subgrade should be prepared in the manner stated above and should be approved by a geotechnical engineer.

Filling and Backfilling

Up to 3 ft of site filling will be required in southeast portion of the garage footprint to reach FFE. In general, we recommend that CGF be used within the garage footprint beneath the slab, parking areas and adjacent to footings, pile caps and grade beams.

We anticipate that 2 to 3 ft of filling will be required to construct the portion of Hancock Street Extension in the northwest corner of the site (near the intersection of Middle and Hancock Streets). CGF should be used beneath the roadway subbase and base material in this area.

Placement of compacted fills should not be conducted when air temperatures are low enough (approximately 30 degrees F., or below) to cause freezing of the moisture in the fill during or before placement. Fill materials should not be placed on snow, ice or uncompacted frozen soil. Compacted fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of uncompacted soil.

Compacted Granular Fill

Compacted granular fill (CGF) placed beneath building slabs, adjacent to pile caps/grade beams, beneath sidewalks, adjacent to foundation/retaining walls, and beneath garage ramps/parking areas should consist of a mineral bank-run sand and gravel, free of organic material, snow, ice, or other unsuitable materials and should be well-graded within the following limits:

Sieve Size	Percent Finer by Weight
6 in. (1)	100
No. 4	30 - 80
No. 40	10 - 50
No. 200	0 – 8

(1) Cobbles or boulders having a size exceeding 2/3 of the loose lift thickness should be removed prior to compaction.

Other materials could be acceptable for CGF beneath footings, and should be evaluated by the geotechnical engineer on a case-by-case basis if proposed by the Contractor.

CGF should be placed in lift thicknesses not exceeding 12 in. loose measure. Compaction equipment in open areas should consist of self-propelled vibratory rollers such as a BoMag BW-60S. In confined areas, hand-guided equipment such as a large vibratory plate compactor should be used and the loose lift thickness should not exceed 9 in.

A minimum of four systematic passes of the compaction equipment should be used to compact each lift. Cobbles or boulders having a size exceeding 2/3 of the loose lift thickness should be removed prior to compaction.

Common Fill

The existing in-situ fill material and the marine soils are acceptable for use as common fill, if any is needed. Common fill should consist of mineral sandy soil, free from organic matter, plastic, metal, wood, ice, snow or other deleterious material and should have the characteristic

that it can be readily placed and compacted. Common fill imported to the site should have a maximum of 80 percent passing the No. 40 sieve and a maximum of 30 percent finer than the No. 200 sieve. The largest particle size for common fill should not exceed 2/3 of the loose lift thickness. Silty common fill soils may require moisture control during placement and compaction. Common fill should be placed in maximum 12 in. thick loose lifts using compaction equipment as described above for CGF.

Compaction Requirements

A summary of recommended compaction requirements is as follows:

Location	Minimum Compaction Requirements
Adjacent to pile caps/grade beams, beneath building slabs and adjacent to foundation walls	95 percent
Beneath parking areas, roadways and sidewalks	92 percent up to 3 ft below finished grade 95 percent in the upper 3 ft
Landscaped areas	90 percent nominal compaction

Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557.

Reuse of Excavated On-Site Soils for Backfill

In-Situ Fill Material

Based on visual inspection of the fill samples and the results of the grain size test performed on one fill sample, we believe that the fill materials could be suitable for reuse as CGF to raise site grades beneath pavement sections for parking areas and roadways. We do not recommend that fill be used as base/subbase for pavement sections. Approved fill soils should be free of oversize material, organic material, refuse and debris, and should be able to achieve the minimum compaction requirements outlined above. These materials may also be used as common fill in landscaped areas.

Confirmation on the suitability of the excavated fill material for reuse as CGF should be made in the field based on the following information: 1.) visual inspection of the soils once they are excavated and stockpiled; and 2.) the results of additional laboratory testing on the stockpiled soil (grain size and compaction). It is possible that some of the excavated in-situ fill material may not be acceptable for reuse as CGF.

Marine Soils

Marine clay soils excavated during construction are not considered suitable for reuse as CGF.

These materials may be used as common fill in landscaped areas if they can be placed and compacted adequately as stated herein.

Preparation of Contract Documents and Submittal Reviews

The contract drawings and specifications should be written so that the requirements of the documents are consistent with the design intent of the geotechnical recommendations outlined herein. Therefore, we recommend that Haley & Aldrich be retained to prepare the specifications and contract drawings related to the following topics:

- Earthwork
- Construction Dewatering
- Temporary Lateral Support of Excavation
- Pile Installation and Testing
- Foundation Drainage System Plan and Details

The contract specifications will require the Contractor and the Contractor's engineer to perform analyses and submit results to the designers for review. We recommend that Haley & Aldrich be allowed to review the geotechnical-related submittals to ensure that the Contractor's analyses/submittals are in accordance with the intent of the design.

Construction Monitoring

The foundation and earthwork recommendations contained herein are based on the known and predictable behavior of a properly engineered and constructed foundation. Monitoring of the foundation construction is required to enable the geotechnical engineer to keep in contact with procedures and techniques used in construction, and to comply with Section 1808.2.10 of the IBC Code. Therefore, it is recommended that an individual representing the Owner (Owner's Rep.), qualified by geotechnical training and experience be present at the site to provide full-time monitoring during the earthwork and foundation construction activities listed below.

- Installation of the excavation support system.
- Excavation to subgrade levels and subgrade inspection prior to construction of grade beams/footings.
- Placement and compaction testing of CGF.
- Dynamic testing of the indicator piles and review of the PDA results.
- Installation of the production piles.
- Installation of the foundation drainage system.
- Backfilling adjacent to foundation walls and beneath the building slab.
- Inspection of the slab and pavement subgrade prior to slab construction/pavement installation.

We plan on providing these services.

LIMITATIONS OF RECOMMENDATIONS

This report is prepared for the exclusive use of Riverwalk, LLC relative to the proposed Parking Garage/Office Building development in Portland, Maine. There are no intended beneficiaries other than Riverwalk, LLC. Haley & Aldrich shall owe no duty whatsoever to any other person or entity on account of the Agreement or the report. Use of this report by any person or entity other than Riverwalk, LLC for any purpose whatsoever is expressly forbidden unless such other person or entity obtains written authorization from Riverwalk LLC. and from Haley & Aldrich. Use of this report by such other person or entity without the written authorization of Riverwalk LLC and Haley & Aldrich shall be at such other person's or entities sole risk, and shall be without legal exposure or liability to Haley & Aldrich.

Use of this Report by any person or entity, including by Riverwalk, LLC, for a purpose other than relative to the proposed Parking Garage/Office Building project in Portland, Maine is expressly prohibited unless such person or entity obtains written authorization from Haley & Aldrich indicating that the Report is adequate for such other use. Use of this Report by any other person or entity for such other purpose without written authorization by Haley & Aldrich shall be at such person's or entities sole risk, and shall be without legal exposure or liability to Haley & Aldrich.

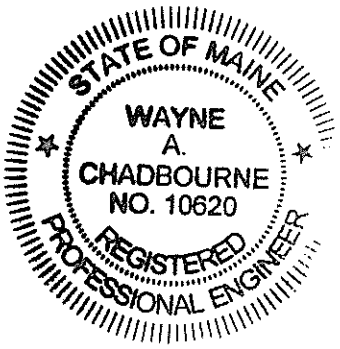
The analyses and recommendations are based, in part, upon the data obtained from the referenced subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations then appear, it may be necessary to reevaluate the recommendations of this report.

The planned construction will be supported on or in the soil at the site and below grade structures may be close to or penetrate the design groundwater level for the project. Recommendations for foundation and/or floor drainage, moisture protection, and/or waterproofing have been included herein, when appropriate. These recommendations address the conventional geotechnical engineering-related aspects of design and construction and are not intended to provide an environment that would prohibit infestation of mold or other biological pollutants. Our work scope did not include the development of criteria or procedures to minimize the risk of mold or other biological pollutant infestations in or near any structure.

We appreciate the opportunity to provide geotechnical engineering consulting services on this project. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

Wayne A. Chadbourne, P.E.
Senior Engineer



James W. Weaver, P.E.
Vice President

Enclosures:

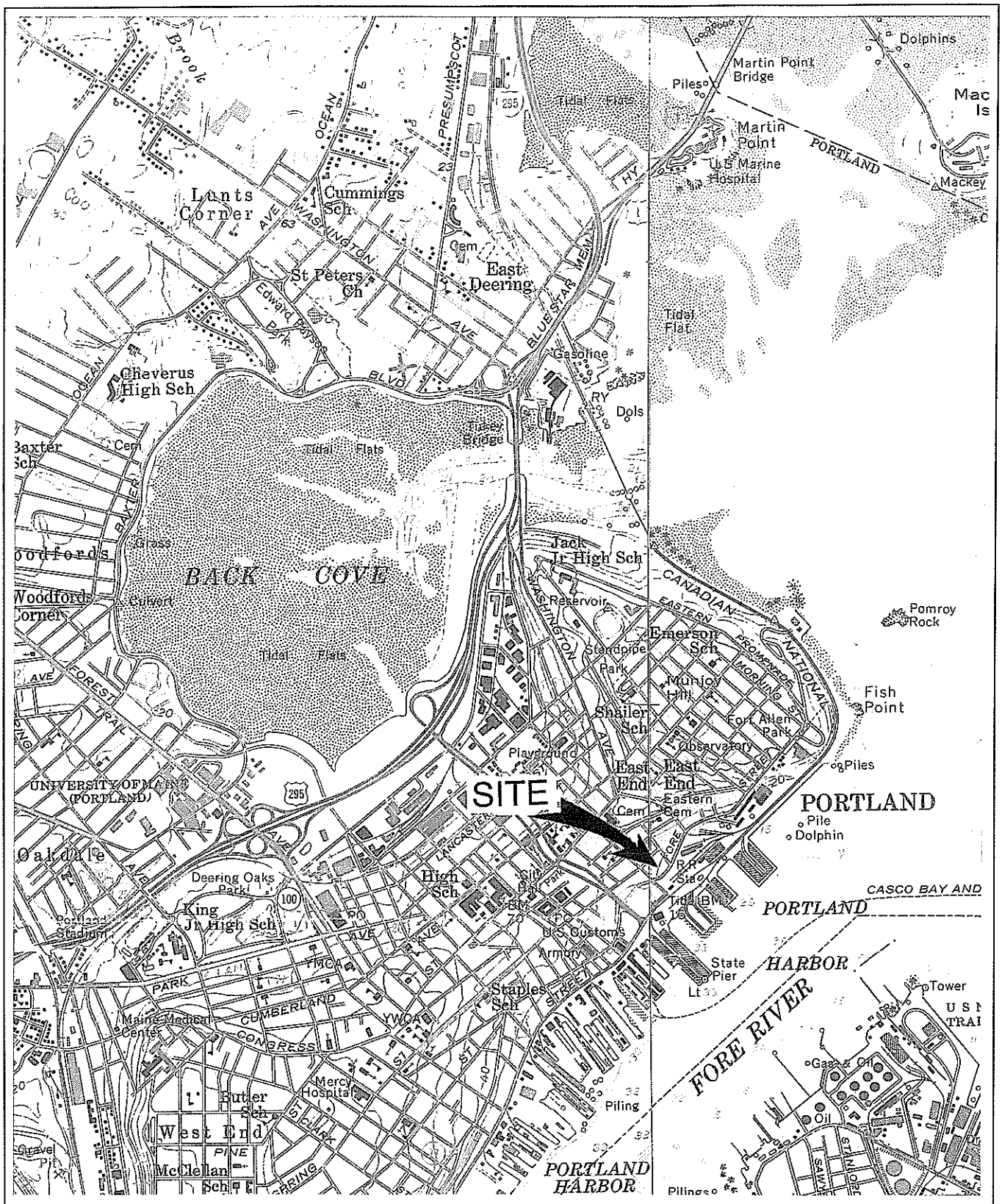
Table 1:	Subsurface Explorations
Figure 1:	Project Locus
Figure 2:	Site & Subsurface Exploration Location Plan
Figure 3:	Subsurface Profile A-A
Figure 4:	Subsurface Profile B-B
Figure 5:	Proposed Foundation Drainage System - Schematic Plan and Details
Appendix A:	Logs of Previous Test Borings
Appendix B:	Logs of Recent Test Borings
Appendix C:	Observation Well Installation & Groundwater Monitoring Reports
Appendix D:	Laboratory Test Results

G:\PROJECTS\30322\prkggaragereport.doc

TABLE I
Subsurface Explorations
Eastern Waterfront Development
Proposed Fore Street Parking Garage
Portland, Maine

Test Boring No.	Estimated Ground Surface Elevation[1,2]	Thickness of Strata (ft)					Elevation of Top of Bedrock[1]	Elevation of Bottom of Exploration[1]
		Bituminous Concrete/ Concrete	Fill	Organic Deposit	Marine Deposit	Glacial Till		
HA04-1	20.0	0.4	7.6	NE	11.8	11.7	-11.5	-11.5
HA04-2	21.0	1.2	2.3	NE	15.2	33.2	-30.9	-30.9
HA04-3	21.0	NE	7.0	NE	16.7	29.3	-32.0	-32.0
HA04-4	20.0	NE	7.0	NE	30.9	20.9	-38.8	-38.8
HA04-5	18.5	0.2	5.3	NE	27.0	19.5	-33.5	-33.5
HA04-6	16.0	0.3	10.2	NE	23.9	9.6	-28.0	-28.0
HA05-1	23.0	NE	4.0	NE	18.5	33.2	-32.7	-37.3
HA05-2(OW)	21.5	0.9	6.1	NE	33.0	NE	-18.5	-18.5
HA05-3	18.5	NE	3.5	NE	40.3	12.3	-37.6	-42.8
HA05-4	20.0	0.3	2.3	NE	35.4	>29.0	-	-47.0
HA05-5	15.5	0.7	6.8	2.5	31.0	14.7	-40.2	-44.0
HA05-6	20.0	0.3	7.2	NE	>3.0	NE	-	9.5
HA05-7	20.5	NE	7.5	NE	>4.5	NE	-	8.5
HA05-8	22.0	1.9	NE	NE	>5.1	NE	-	15.0
HA05-9	22.0	NE	4.9	NE	>2.0	NE	-	15.1
HA05-10	19.0	0.6	2.6	NE	>3.5	NE	-	12.3

Notes:
1. Ground surface elevations reference Portland City Datum.
2. Ground surface elevations are approximate and were determined by interpolating between existing elevation contours.



SITE COORDINATES: N 43° 37' 0" W 70° 15' 33"

N

MAINE

QUADRANGLE LOCATION

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

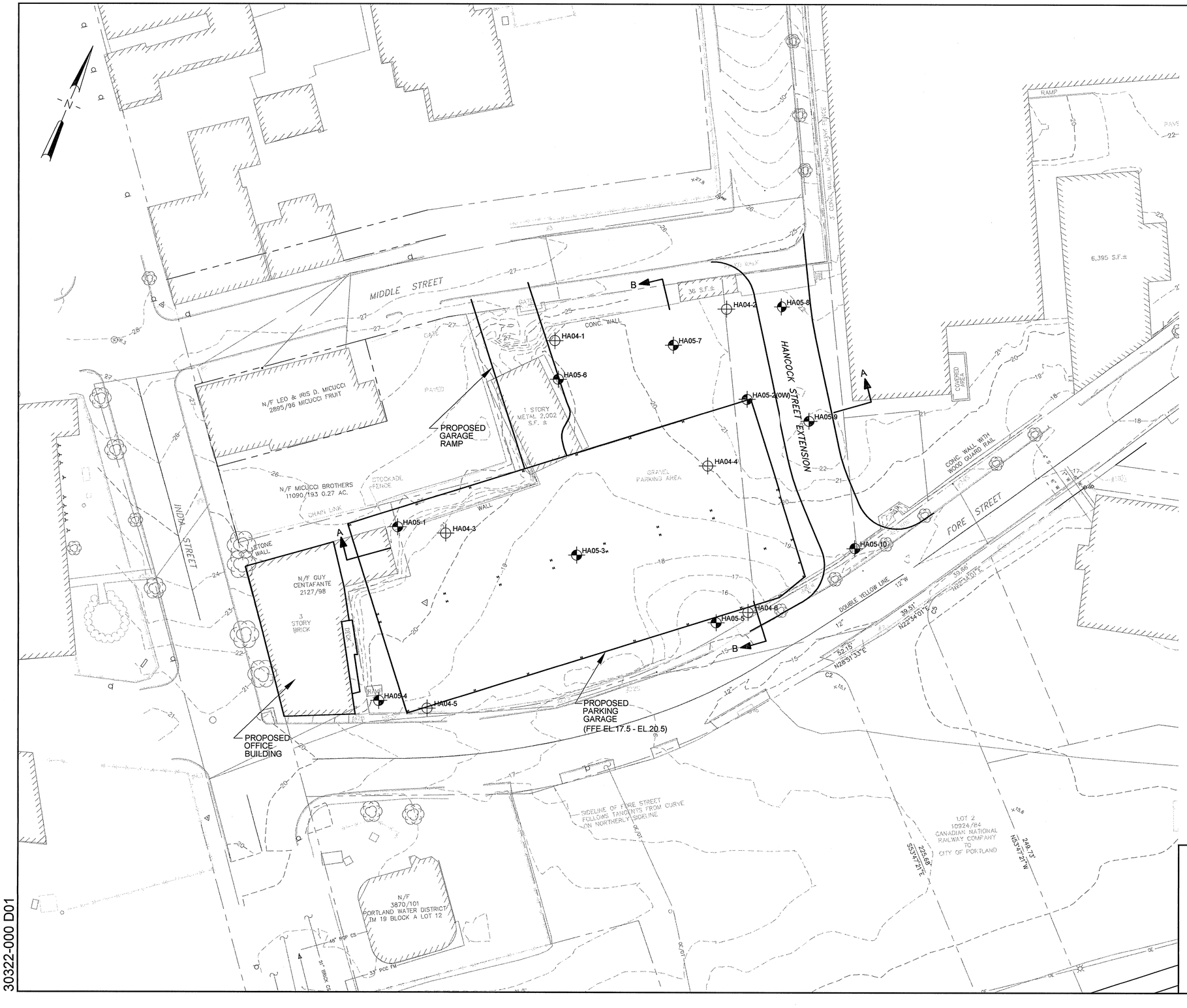
EASTERN WATERFRONT DEVELOPMENT
FORE STREET
PORTLAND, MAINE

PROJECT LOCUS

SCALE:1:24000

OCTOBER 2005

FIGURE 1



NOTES:

1. EXISTING SITE FEATURES, CONTOURS OF EXISTING GROUND SURFACE ELEVATION AND THE LOCATION AND ORIENTATION OF EXISTING STRUCTURES, UTILITIES AND ROADWAYS ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE 203555-X00C.DWG", PREPARED BY WOODARD & CURRAN, NEW YORK, RECEIVED ON 28 OCTOBER 2005.
2. LOCATION AND ORIENTATION OF PROPOSED STRUCTURES AND ROADWAYS ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE "SITE PLAN_10.27.05_2000.DWG", PROVIDED BY WOODARD & CURRAN, RECEIVED ON 28 OCTOBER 2005.
3. LOCATION OF THE "HA04" AND "HA05" SERIES OF TEST BORINGS ARE APPROXIMATE AND WERE DETERMINED IN THE FIELD BY TAPING DISTANCES FROM EXISTING SITE FEATURES.
4. THE "HA04" AND "HA05" SERIES OF TEST BORINGS WERE MONITORED IN THE FIELD BY HALEY & ALDRICH, INC. PERSONNEL
5. ELEVATIONS ARE IN FEET AND REFERENCE PORTLAND CITY DATUM.
6. REFER THE REPORT APPENDICES FOR LOGS OF THE "HA04" AND "HA05" SERIES OF TEST BORINGS.
7. REFER TO FIGURES 3 AND 4 FOR SUBSURFACE PROFILE A-A AND B-B, RESPECTIVELY.

LEGEND:

- HA05-1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE BETWEEN 26 SEPTEMBER AND 6 OCTOBER 2005
- HA04-1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE ON 6 FEBRUARY 2004
- (OW) — DENOTES OBSERVATION WELL INSTALLED IN COMPLETED TEST BORING
- 21 — ELEVATION CONTOUR OF EXISTING GROUND SURFACE
- A A — DESIGNATION, LOCATION AND ORIENTATION OF SUBSURFACE PROFILE

0 30 60 90 120

SCALE IN FEET

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

EASTERN WATERFRONT DEVELOPMENT
PROPOSED PARKING GARAGE AND OFFICE BUILDING
PORTLAND, MAINE

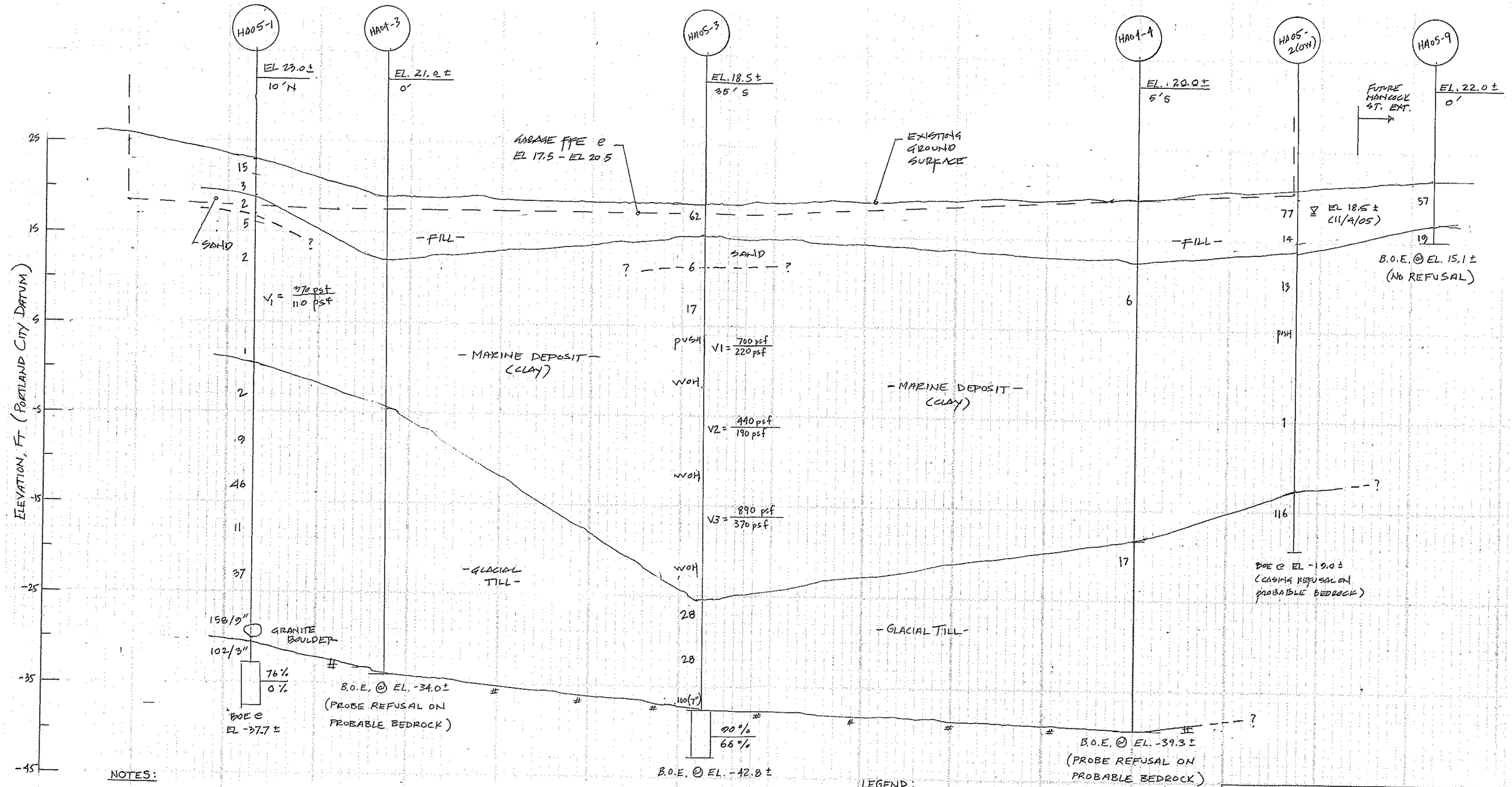
SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN

NOVEMBER 2005

30322-000 D01

FIGURE 2



NOTES:

1. EXPLORATION LOCATIONS ARE APPROXIMATE AND WERE DETERMINED IN THE FIELD BY TAPING DISTANCES FROM EXISTING SITE FEATURES.
2. GROUND SURFACE ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY USING TOPOGRAPHIC INFORMATION PROVIDED BY WOODARD & CURRAN.

LEGEND:

20 - SPT "N-VALUE" (blows/ft)

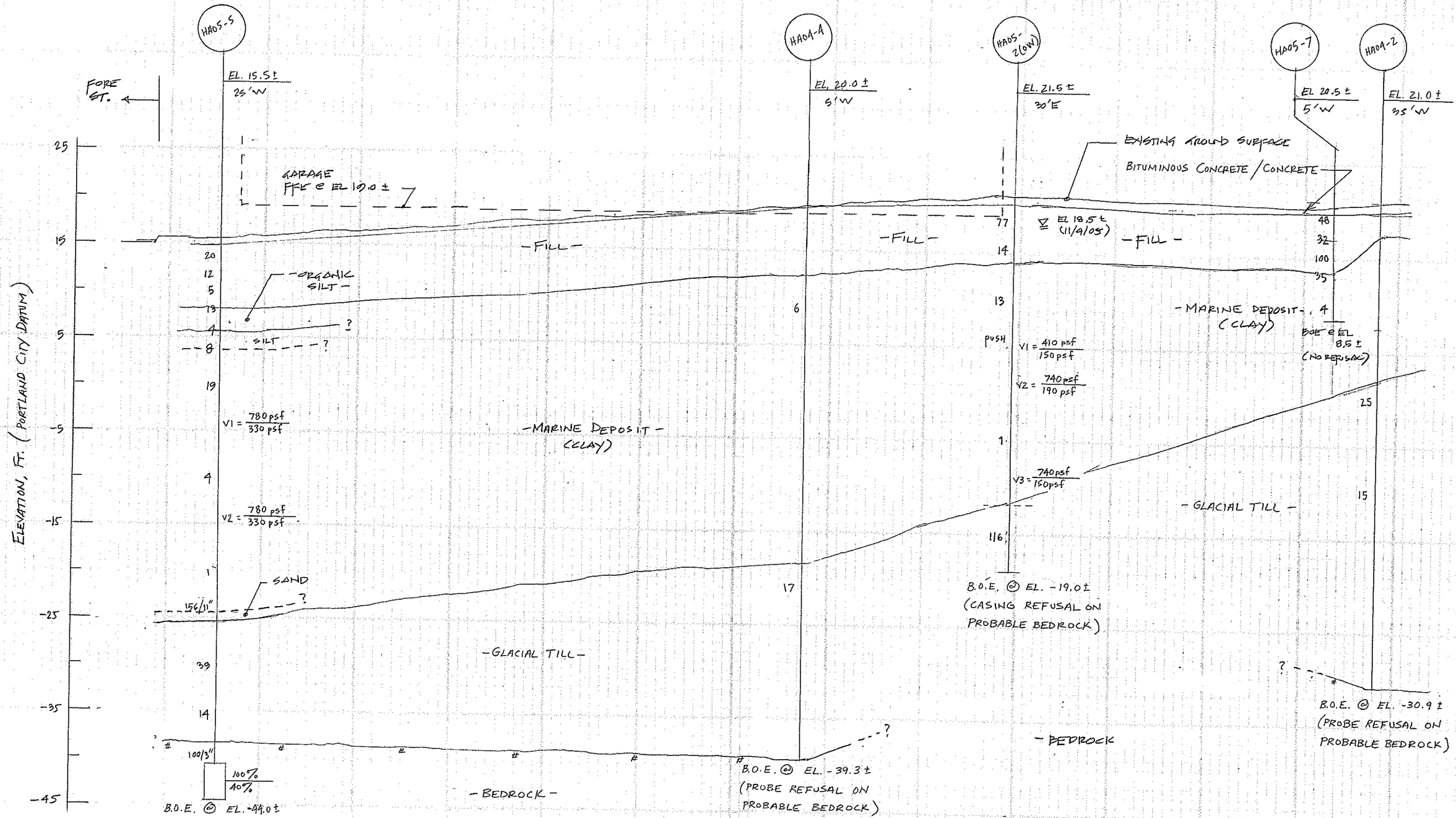
V1 = 890 psf / 370 psf — DENOTES IN-SITU VANE SHEAR TEST PERFORMED UNDRAINED STRENGTH/REMOLDED STRENGTH

76% / 0% — DENOTES PERCENT RECOVERY/ PERCENT RQD FOR ROCK CORE RUN

HALEY & ALDRICH, INC.
EASTERN WATERFRONT DEVELOPMENT
PROPOSED FORE ST. PARKING GARAGE
PORTLAND, MAINE
JOB NO. 30322-000

SUBSURFACE PROFILE A-A
SCALE: H: 1" = 20'
V: 1" = 10'

FIGURE 3



NOTES:

1. EXPLORATION LOCATIONS ARE APPROXIMATE AND WERE DETERMINED IN THE FIELD BY TAPING DISTANCES FROM EXISTING SITE FEATURES.
2. GROUND SURFACE ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY USING TOPOGRAPHIC INFORMATION PROVIDED BY WOODARD & CURRAN.

LEGEND:

20 - SPT "N-VALUE" (blows/ft)

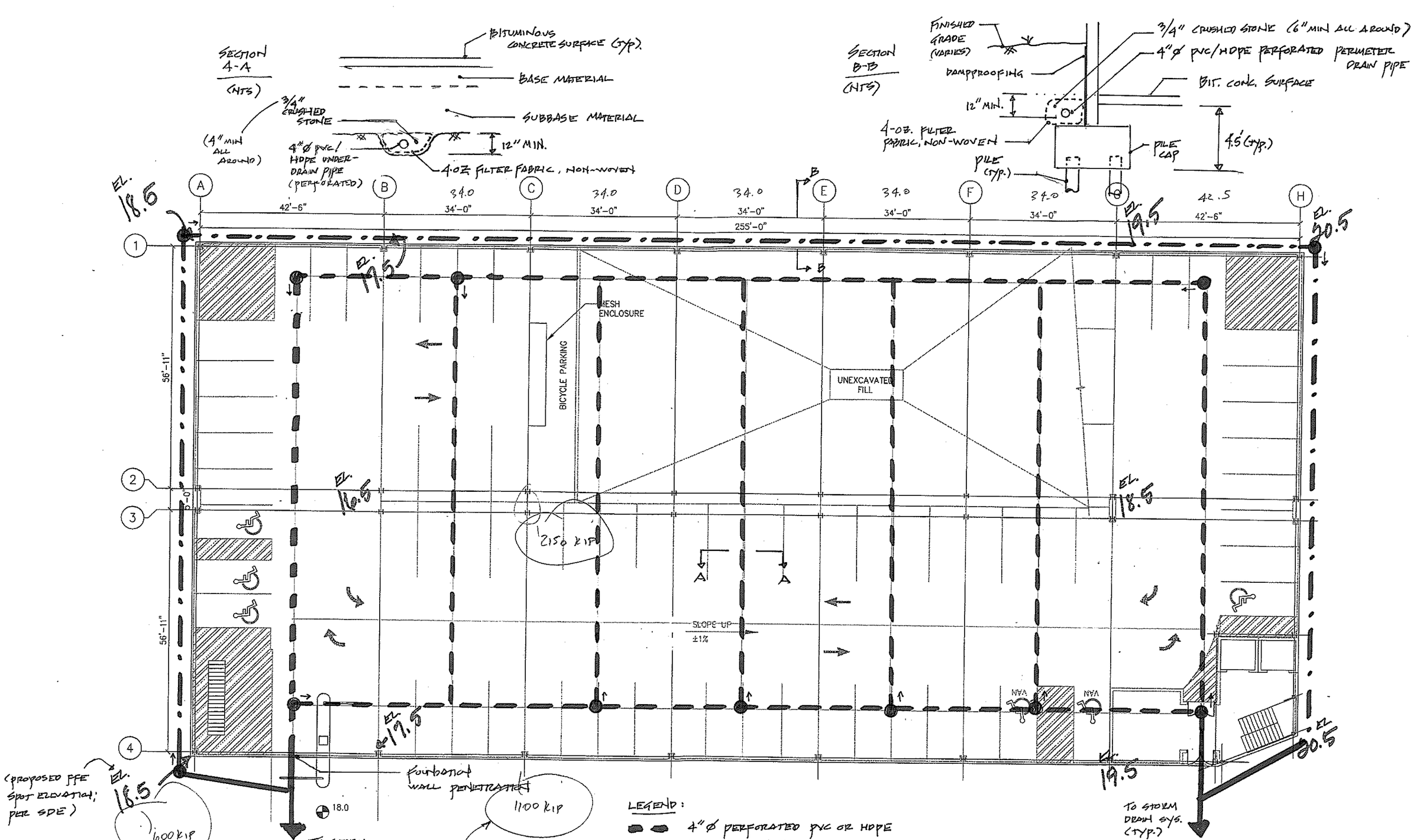
V1 = 780 psf / 330 psf - DENOTES IN-SITU VANE SHEAR TEST PERFORMED, UNDRAINED STRENGTH / REMOLDED STRENGTH

100% / 40% - DENOTES PERCENT RECOVER / PERCENT RQD FOR ROCK CORE RUN

HALEY & ALDRICH, INC.
EASTERN WATERFRONT DEVELOPMENT
PROPOSED FORE ST. PARKING GARAGE
PORTLAND, MAINE
JOB NO. 30322-000

SUBSURFACE PROFILE B-B
SCALE: H: 1" = 15'
V: 1" = 10'

FIGURE 4



HALEY & ALDRICH	PROPOSED FOUNDATION DRAINAGE SYSTEM SCHEMATIC PLAN AND DETAILS NOV 2005

FIGURE 5

APPENDIX A

Logs of Previous Test Borings

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-1

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 2
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 20.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	3.0	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							-CONCRETE-										
					0.4		NOTE: Fill from 0.4-8.0 ft. as indicated by auger spoils. NOTE: Fill changes at 3 ft. from dark brown to light-brown with similarstructure of sand and gravel, some brick and slag present from 0.4-2.0 ft.										
5				NO WELL INSTALLED			-FILL- NOTE: Probable strata change to lean clay at 8 ft. as indicated by auger spoils pile.										
					8.0		NOTE: Rod probes starting at 10 ft. due to time constraints: no samples taken (see page 2 of log) NOTE: Probable marine deposit, lean clay from 8-19.8 ft. Probable change to glacial till at 19.8 ft. -MARINE DEPOSIT-										
10																	
15																	
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	13:40	0.2	0	4.8	DRY

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 31.5
Rock Cored (lin. ft.) -
Samples

Boring No. HA04-1

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\970\30322-970.GPJ Nov 4, 05

TEST BORING REPORT

HALEY & ALDRICH

Boring No. HA04-1
File No. 30322-000
Sheet No. 2 of 2

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20					19.8												
							-GLACIAL TILL-										
25																	
30							NOTE: Probe refusal at 31.5 ft.										
					31.5		-BOTTOM OF EXPLORATION-										

Probe Information: AW Rod Probe (300 lb. hammer/18 in. fall)

Depth	Probe Advancement
10-19'	Push
19-20'	6 blows/ft.
20-21'	10 blows/ft.
21-22'	13 blows/ft.
22-23'	13 blows/ft.
23-24'	17 blows/ft.
24-25'	9 blows/ft.
25-26'	5 blows/ft.
26-27'	3 blows/ft.
27-28'	2 blows/ft.
28-29'	3 blows/ft.
29-30'	5 blows/ft.
30-31'	2 blows/ft.
31-31.5	100 blows/6 in.

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-2

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 21.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	-	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	-	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							-CONCRETE-										
							NOTE: Reinforced with rebar from 1-1.2 ft.										
					1.2		NOTE: Frozen subbase (gravel) from 1.2-2.4 ft.										
							-FILL-										
							NOTE: Drill cuttings indicate a probable strata change at 3.5 ft. to a gray-brown, lean CLAY with some sand.										
					3.5		-MARINE DEPOSIT-										
5																	
					7.0		NOTE: Lean clay turns from gray-brown to gray at 7 ft. and is highly plastic.										
				NO WELL INSTALLED			-MARINE DEPOSIT-										
10																	
15							NOTE: Probable strata change at 18.7 ft. due to change in drill action.										
					18.7												
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	13:00	0.2	0	16	9

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 51.9
Rock Cored (lin. ft.) -
Samples 2S

Boring No. HA04-2

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\970\30322-970.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-2
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	2 20 5 6	S1 18	20.0 22.0			SM	Medium dense, light gray, silty, clayey SAND (SM), mps= 0.75 in., very loosely bonded, no odor, wet. -GLACIAL TILL-	5	20	20	20	15	20				
30	8 10 5 5	S2 24	30.0 32.0			SP-SM	Medium dense, light gray, poorly graded SAND with silt and gravel (SP-SM), mps=0.75 in., loosely bonded, no odor, wet. -GLACIAL TILL- NOTE: Rod probes starting ay 32 ft. due to time restraints: no samples taken (see page 3 of log)	5	10	20	35	20	10				
35																	
40																	
45																	

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-2
File No. 30322-000
Sheet No. 3 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50						SM	NOTE: Probe refusal at 51.9 ft.										
					51.9		-BOTTOM OF EXPLORATION-										

Probe Information: AW Rod Probe (300 lb. hammer/18 in. fall)

Depth	Probe Advancement
32-33'	2 blows/ft.
33-34'	2 blows/ft.
34-35'	WOH
35-36'	WOH
36-37'	15 blows/ft.
37-38'	23 blows/ft.
38-39'	26 blows/ft.
39-40'	8 blows/ft.
40-41'	6 blows/ft.
41-42'	6 blows/ft.
42-43'	4 blows/ft.
43-44'	8 blows/ft.
44-45'	4 blows/ft.
45-46'	18 blows/ft.
46-47'	18 blows/ft.
47-48'	15 blows/ft.
48-49'	23 blows/ft.
49-50'	12 blows/ft.
50-51'	19 blows/ft.
51-51.9'	100 blows/6 in.

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-3

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 21.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	3.0	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED			NOTE: Auger spoils indicates sandy GRAVEL from 0.0-4.0 ft. (frozen from 0.0-2.5 ft.) -FILL-										
					4.0		NOTE: Ash, wood, brick and cinders present from 4-7 ft. -FILL-										
5					7.0		NOTE: Gray-brown, lean CLAY from 7-9 ft. -MARINE DEPOSIT-										
					9.0		NOTE: Gray, lean clay starting at 7 ft. -MARINE DEPOSIT- NOTE: HSA used from 0.0-10.0 ft. Rod probes starting at 10.0 ft. due to time constraints; no samples taken (see page 3 of log).										
10																	
15																	
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	14:25	0.1	0	9	DRY

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 53.0
Rock Cored (lin. ft.) -
Samples -

Boring No. HA04-3

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\970\30322-970.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-3
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20																	
					23.7		NOTE: Probe action indicates probable strata change at 23.7 ft.										
25							-GLACIAL TILL-										
30																	
35																	
40																	
45																	

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-3
File No. 30322-000
Sheet No. 3 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50							-GLACIAL TILL-										
					53.0		NOTE: Probe refusal at 53 ft. -BOTTOM OF EXPLORATION-										

Probe Information: AW Rod Probe (300 lb. hammer/18 in. fall)

Depth	Probe Advancement
10-22'	Push
23-24'	5 blows/ft.
24-25'	6 blows/ft.
25-26'	7 blows/ft.
26-27'	6 blows/ft.
27-28'	8 blows/ft.
28-29'	5 blows/ft.
29-30'	9 blows/ft.
30-31'	16 blows/ft.
31-32'	12 blows/ft.
32-33'	18 blows/ft.
33-34'	32 blows/ft.
34-35'	14 blows/ft.
35-36'	33 blows/ft.
36-37'	19 blows/ft.
37-38'	18 blows/ft.
38-39'	17 blows/ft.
39-40'	13 blows/ft.
40-41'	22 blows/ft.
41-42'	22 blows/ft.
42-43'	19 blows/ft.
43-44'	23 blows/ft.
44-45'	30 blows/ft.
45-46'	30 blows/ft.
46-47'	36 blows/ft.
47-48'	33 blows/ft.
48-49'	26 blows/ft.
49-50'	41 blows/ft.
50-51'	28 blows/ft.
51-52'	58 blows/ft.
52-53'	85 blows/ft.

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA04-4

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 20.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	3.0	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							NOTE: Very dense sand and gravel from 0.0-4.5 ft. -FILL-										
5					7.0		NOTE: Drill cuttings indicate a probable strata change at 7 ft.										
10	3 3 3 5	S1 21	10.0 12.0	NO WELL INSTALLED		CL	Medium stiff, olive-brown, lean CLAY (CL), mps=2.0 mm., infrequent sand seams from 10-10.6 ft, laminated, no odor, moist. -MARINE DEPOSIT-				5	5	90	S	L	L	
15																	
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	11:05	0.3	0	18.5	12

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 58.8
Rock Cored (lin. ft.) -
Samples 2S

Boring No. HA04-4

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-4
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20																	
25																	
30																	
35							NOTE: Drill action indicates a probable strata change at 37.9 ft.										
					37.9												
40	9 8 9 12	S2 20	40.0 42.0				Medium dense, light-gray, poorly graded GRAVEL with sand (GP), mps=1.25 in., no structure, no odor, wet. -GLACIAL TILL- NOTE: Rod probes starting at 42 ft. due to time constraints: no samples taken (see page 3 of log)	20	55	5	10	5	5				
45																	

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-4
File No. 30322-000
Sheet No. 3 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50																	
							-GLACIAL TILL-										
55							NOTE: Probe refusal at 58.8 ft.										
					58.8		-BOTTOM OF EXPLORATION-										

Probe Information: AW Rod Probe (300 lb. hammer/18 in. fall)

Depth	Probe Advancement
42-43'	42 blows/ft.
43-44'	35 blows/ft.
44-45'	10 blows/ft.
45-46'	18 blows/ft.
46-47'	10 blows/ft.
47-48'	15 blows/ft.
48-49'	9 blows/ft.
49-50'	8 blows/ft.
50-51'	14 blows/ft.
51-52'	17 blows/ft.
52-53'	12 blows/ft.
53-54'	15 blows/ft.
54-55'	17 blows/ft.
55-56'	65 blows/ft.
56-57'	23 blows/ft.
57-58'	21 blows/ft.
58-58.8'	100 blows/9 in.

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA04-5

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 18.5 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	3.0	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED	0.2		-BITUMINOUS CONCRETE- NOTE: Auger spoils pile indicates brown and red-brown, gravelly SAND with 20-50% brick fragments. -FILL-										
5					5.5		NOTE: Probable change to brown and gray-brown, lean CLAY at 5.5 ft. -MARINE DEPOSIT-										
10					9.5		NOTE: Probable change to gray, lean CLAY at 9.5 ft. -MARINE DEPOSIT- NOTE: Probe auger strating at 10 ft. due to time constraints: no samples taken.										
15																	
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	15:30	0.2	0	8.5	DRY

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 52
Rock Cored (lin. ft.) -
Samples -

Boring No. HA04-5

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\970\30322-970.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-5
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20							-MARINE DEPOSIT-										
25																	
30							NOTE: Probable strata change to glacial till at 32.5										
					32.5												
35							-GLACIAL TILL-										
40																	
45																	

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-5
File No. 30322-000
Sheet No. 3 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50							-GLACIAL TILL-										
					52.0		NOTE: Probe auger refusal at 52 ft. -BOTTOM OF EXPLORATION-										

Probe Information: AW Rod Probe (300 lb. hammer/18 in. fall)

Depth	Probe Advancement
10-32'	Push
32-33'	9 blows/ft.
33-34'	13 blows/ft.
34-35'	11 blows/ft.
35-36'	17 blows/ft.
36-37'	13 blows/ft.
37-38'	19 blows/ft.
38-39'	20 blows/ft.
39-40'	26 blows/ft.
40-41'	16 blows/ft.
41-42'	18 blows/ft.
42-43'	25 blows/ft.
43-44'	31 blows/ft.
44-45'	30 blows/ft.
45-46'	46 blows/ft.
46-47'	65 blows/ft.
47-48'	65 blows/ft.
48-49'	60 blows/ft.
49-50'	71 blows/ft.
50-51'	72 blows/ft.
51-52'	75 blows/ft.

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-6

Project Eastern Waterfront Development, Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 2
Start February 6, 2004
Finish February 6, 2004
Driller G. Rudnicki
H&A Rep. T. Erickson
Elevation 16.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B47 ATV Rig
Inside Diameter (in.)	3.0	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED	0.3		-BITUMINOUS CONCRETE-										
							NOTE: Samples will only be taken at perceived strata changes.										
5	2 2 7 12	S1 4	5.0 7.0			ML	Stiff, dark-gray sandy SILT (ML), mps=1.25 in., no structure, strong fuel odor, wet, sheen seen in sample (petroleum), 70% brick and brick fragments. -FILL-	5			5	25	65	R	-	-	-
10	9 6 6 12	S2 1	10.0 12.0		10.5	ML	Stiff, dark gray-brown, sandy SILT (ML), mps=4.0 mm., no structure, fuel odor, wet, petroleum sheen visible, poor recovery. -FILL- NOTE: When auger plug was removed at 10 ft., lean clay was seen on tip, probable strata change near 10-10.5 ft.			5	5	20	70	R	-	-	-
15	5 2 2 2	S3 22	15.0 17.0			CL	Soft, olive-brown, lean CLAY with sand (CL), mps=2.0 mm., frequent sand partings laminated, no odor, moist. -MARINE DEPOSIT-				5	15 -	80	S	L	L	-
					16.6		NOTE: Lean clay becomes gray and highly plastic at 16.6 ft.					5	95	N	L	H	-
20							-MARINE DEPOSIT-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
02-06-04	09:00	0.2	0	17	4.5

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 44
Rock Cored (lin. ft.) -
Samples 6S

Boring No. HA04-6

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\970\30322-970.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA04-6
File No. 30322-000
Sheet No. 2 of 2

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20																	
25							-MARINE DEPOSIT-										
30							NOTE: Drill action indicates a probable strata change at 34.4 ft.										
					34.4												
35	3 8 10 12	S4 24	35.0 37.0			SM	Medium dense light gray, silty SAND with gravel (SM), mps=0.75 in., no structure, no odor, wet.	10	10	15	30	15	20				
							-GLACIAL TILL-										
40	9 11 17 15	S5 17	40.0 42.0			SM	Medium dense, light gray, silty SAND with gravel (SM), mps=0.25 in., loosely bonded, no odor, wet.		15	15	35	20	15				
							-GLACIAL TILL-										
	2 5 7 9	S6 22	42.0 44.0		42.0	SP	Medium dense, light gray, poorly graded SAND (SP), mps=4.0 mm., no structure, no odor, wet, appears to be a sand layer within glacial till.										
							-GLACIAL TILL-										
					44.0		-BOTTOM OF EXPLORATION-										

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

APPENDIX B

Logs of Recent Test Borings

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-1

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start September 28, 2005
Finish September 29, 2005
Driller B. Enos
H&A Rep. B. Steinert
Elevation 23.0+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	3.0	1 3/8	1.9	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	4 8 7 6	S1 8	0.0 2.0			SW	Medium dense, dark-brown to black, well graded SAND (SW), mps=25 mm., no odor, moist, roots and brick fragments present.		10	15	25	40	10				
	7 2 1 4	S2 7	2.0 4.0			SW	-FILL- Very loose, dark-brown to black, well graded SAND (SW), mps=25 mm., no odor, wet, roots and brick fragments present.		10	15	30	15	30				
	1 1 1 2	S3 4	4.0 6.0		4.0	SM	-FILL- Very loose, gray, silty SAND (SM), mps=0.25 mm., no odor, wet.				10	70	20				
5							-MARINE DEPOSIT-										
	1 2 3 5	S4 21	6.0 8.0		6.0	SC	Loose, gray, clayey SAND (SC), mps=0.42 mm.					60	40				
					6.5	CL	Medium stiff, gray lean CLAY (CL), mps=0.075mm., no odor, wet, mottled.						100				
							-MARINE DEPOSIT-										
10	WOH 1 1 WOH	S5 24	10.0 12.0	NO WELL INSTALLED		CL	Very soft, gray, lean CLAY (CL), mps=0.075 mm., no odor, wet.						100				
							-MARINE DEPOSIT-										
15							shear strength. V1 = 15.0-15.6 ft. Su = 370 psf/ 110 psf (remolded)										
					17.5												
20	WOH 1 WOH 1	S6 8	20.0 22.0			CL	Very soft, gray, lean CLAY (CL), mps=25 mm., no odor, wet, 25 mm. piece of gravel in top of spoon. -MARINE DEPOSIT-						100				
					22.5		NOTE: Advance casing and wash out to 25 ft. Coarse sand and gravel observed in wash water.										
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-29-05	07:28	-	55	60.3	14.2

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 55.7
Rock Cored (lin. ft.) 4.6
Samples 13S, 2C

Boring No. HA05-1

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-1
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	4 2 WOH 4	S7 15	25.0 27.0			SM	Very loose, gray silty SAND (SM), mps=19 mm., no odor, very wet. -GLACIAL TILL- NOTE: Advanced casing and wash out to 30 ft. Coarse sand and gravel observed in wash water.		5	10	30	35	20				
30	21 4 5 8	S8 12	30.0 32.0			SM	Loose, gray silty SAND (SM), mps=19 mm., no odor, very wet. -GLACIAL TILL-			10	30	40	20				
35	8 15 31 9	S9 14	35.0 37.0			SM	Dense, gray silty SAND (SM), mps=38 mm. in tip of spoon, no odor, very wet. -GLACIAL TILL-			10	30	40	20				
40	15 6 5 5	S10 14	40.0 42.0			SM	Medium dense, gray silty SAND (SM), mps=38 mm., slightly bonded, no odor, very wet. -GLACIAL TILL-			10	30	40	20				
45	10 16 21 31	S11 16	45.0 47.0			SM	Dense, gray silty SAND (SM), mps=38 mm., slightly bonded, no odor, very wet. -GLACIAL TILL-			10	30	40	20				
50	21 58 100(3 in.)	S12	50.0 52.0			SM	Very dense, gray silty SAND (SM), mps=38 mm., slightly bonded, no odor, very wet. -GLACIAL TILL-			10	30	40	20				
					51.5		NOTE: Advance casing to 51.3 ft., wash out to 51.1 ft.										
					52.9		Cored through granite boulder at 51.5-52.9 ft. (C1). -WEATHERED ROCK-										
55	22 102(3 in.)	S13 9	55.0 55.7				Split spoon refusal at 55.7 ft.										
					55.7		Begin NQ rock core (55.7 ft). See Core Boring Report HA05-1 for details.										

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

CORE BORING REPORT

Boring No. HA05-1
File No. 30322-000
Sheet No. 3 of 3

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weath-ering	Well Dia-gram	Elev./ Depth (ft)	Visual Description and Remarks
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
50									
55									Top of bedrock at 55.7 ft. Begin NQ rock core.
	8	C2	55.7	42/0	76/0		NO WELL INSTALLED	55.7	
	6		60.3						
	6								Moderately hard, fresh, gray to green, fine grained SCHIST. Primary joints dipping at horizontal to low angles, extremely close to very close, undulating, very tight to moderately wide, some soil infilling in joints.
	3								
60	4							60.3	-BOTTOM OF EXPLORATION-
									NOTE: Hole open to 57.4 ft. after pulling core barrel. Water measured at 14.2 ft.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-2(OW)

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 2
Start September 28, 2005
Finish September 28, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 21.5+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	3.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel %	Sand %	Fines %	Field Test
								Coarse / Fine	Coarse / Medium / Fine		Dilatancy, Toughness, Plasticity, Strength
0							-CONCRETE-				
	50(3 in.)	S1	1.1		0.9	SP	Concrete dust in spoon. Drilled to 1.5 ft. and sampled.	5 / 10	10 / 10 / 65		
	21	3	1.3								
	38	S2	1.5				NOTE: NW casing pushed from 0.9 to 4.5 ft.				
	39	14	3.5				Very dense, brown to gray, poorly graded SAND with gravel (SP), mps=25 mm., no odor, dry.				
	33										
	50(5 in.)	S3	3.5				Spoon refusal at 3.9 ft. Drilled through obstruction and sampled at 4.5 ft.				
		5	3.9								
5	13	S4	4.5		4.5	SM	Medium dense, dark-brown to brown, silty SAND (SM), mps=2.0 mm., no odor, moist.		10 / 65	25	
	10	11	6.5				-FILL-				
	4										
	7				7.0						
10	9	S5	10.0			CL	Very stiff to stiff, olive-brown to gray, lean CLAY (CL), mps=0.075 mm., no odor, wet.			100	
	8	18	12.0								
	5						-MARINE DEPOSIT-				
	4										
15	PUSH	S6	15.0			CL	Very soft, gray, lean CLAY (CL), mps=0.43 mm., frequent shells present, occasional sand partings, no odor, wet.			100	
	PUSH	24	17.0								
	PUSH						-MARINE DEPOSIT-				
	PUSH										
							V1=15.3-16 ft., Su=410 psf/ 150 psf (remolded)				
20							V2=20.3-21 ft. Su=740 psf/ 190 psf (remolded)				
25											

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-28-05	16:45	0.25	35.0	37.5	5.8
9-28-05	17:00	0.5	15	35.9	5

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 40.0
Rock Cored (lin. ft.) -
Samples 8S

Boring No. HA05-2(OW)

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT5\PROJECTS\30322\30322-000.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-2(OW)
File No. 30322-000
Sheet No. 2 of 2

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	WOR WOR 1 2	S7 24	25.0 27.0			CL	Very soft, gray, lean CLAY, mps=19 mm., trace gravel present, no odor, wet.	5					95				
							-MARINE DEPOSIT-										
30							V3=30.3-31 ft. Su=740 psf/ 150 (remolded)										
					32.8												
35	87 58 58 48	S8 8	35.0 37.0			SP	Very dense, gray, poorly graded SAND (SP), mps=28 mm., stratified with coarse to fine sand, no odor, wet.		5	10	35	50					
							NOTE: Casing refusal at 40 ft.										
							-GLACIAL TILL-										
40					40.0		-BOTTOM OF EXPLORATION-										
							Installed observation well in completed borehole. See Observation Well Installation Report HA05-2 (OW) for details.										

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA05-3

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start September 26, 2005
Finish September 27, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 18.5+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	3.0	1 3/8	1.9	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	25 31 31 25	S1 15	0.0 2.0	NO WELL INSTALLED		SP	Very dense, light to dark-brown, poorly graded SAND with gravel (SP), mps=25 mm., no odor, dry. -FILL- NOTE: NW casing pushed from 0-5 ft.	5	10	10	20	55					
					3.5												
5	1 2 4 12	S2 19	5.0 7.0			SM	Medium stiff, olive-brown, silty SAND (SM), mps=0.43 mm., no odor, moist. -MARINE DEPOSIT-					70	30				
					7.0												
10	4 8 9 13	S3 22	10.0 12.0			CL	Very stiff, olive-brown to gray, lean CLAY (CL), mps=0.075 mm., no odor, wet. -MARINE DEPOSIT-						100				
					13.0												
15	PUSH PUSH PUSH PUSH	S4 20	15.0 17.0			CL	Medium stiff, gray, lean CLAY (CL), mps=0.075 mm., occasional black staining, no odor, wet. -MARINE DEPOSIT- V1=15.3-16 ft. Su=700 psf/ 220 psf (remolded)						100				
20	WOH WOH WOH WOH	S5 24	20.0 22.0				Soft, gray, lean CLAY (CL), mps=0.075mm., slight black staining, no odor, wet. -MARINE DEPOSIT-						100				
25																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-27-05	15:50	-	56.0	56.7	11.5

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 56.1
Rock Cored (lin. ft.) 5.6
Samples 10S, 4C

Boring No. HA05-3

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-3
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25						CL	V2= 25.3-26 ft. Su=440 psf/ 190 psf (remolded)										
30	WOH WOH WOH 1	S6 24	30.0 32.0			CL	Soft, gray, lean CLAY (CL), mps=0.43 mm., occasional fine sand layers, no odor, wet. -MARINE DEPOSIT-						100				
35							V3=35.3-36 ft. Su=890 psf/ 370 psf (remolded)										
40	WOR WOH WOH WOH	S7 24	40.0 42.0			CL	Medium stiff, gray, lean CLAY (CL), mps=0.43mm., occasional fine sand layers, no odor, wet. -MARINE DEPOSIT-						100				
					43.8												
45	63 15 13 12	S8 15	45.0 47.0			SM	Medium dense, gray silty SAND with gravel (SM), mps=25 mm., moderately bonded, no odor, wet. -GLACIAL TILL-	5	10			60	25				
50	23 13 15 15	S9 7	50.0 52.0			SM	Medium dense, gray silty SAND with gravel (SM), mps=25 mm., moderately bonded, no odor, wet. -GLACIAL TILL-	5	10			60	25				
55	36 100(7 in)	S10 0	55.0 56.1				NOTE: Split spoon refusal at 56.1 ft. Small rock fragments present in tip of spoon. Drove casing to 56.1 ft. Advanced roller bit to 56.7 ft.										
					56.7		Begin NQ rock core. See Core Boring Report HA05-3 for details.										
60																	

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA05-3

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT5\PROJECTS\30322\30322-000.GPJ Nov 4, 05

HALEY & ALDRICH

CORE BORING REPORT

Boring No. HA05-3
File No. 30322-000
Sheet No. 3 of 3

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weathering	Well Diagram	Elev./ Depth (ft)	Visual Description and Remarks
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
50									
									Top of bedrock at 56.1 ft. Begin NQ rock core at 56.7 ft
		C1	56.7	4/0	100/0			56.7	Hard, gray, fresh to slightly weathered, aphanitic to fine grained SCHIST. Joints horizontal to moderately dipping, very close to close, planar to undulating, rough, open.
		C2	57.1	6/0	100/0				
		C3	~~57.1~~ 57.6 57.6 58.8	15/13	100/86				
		C4	58.8 62.3	38/25	90/66				
60							NO WELL INSTALLED		
								62.3	-BOTTOM OF EXPLORATION-

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-4

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start September 29, 2005
Finish September 29, 2005
Driller B. Enos
H&A Rep. B. Steinert
Elevation 20.0+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	-	Rig Make & Model: B-53 Mobile Drill Truck
Inside Diameter (in.)	3.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							-BITUMINOUS CONCRETE-										
	6 6 4 3	S1 10	0.4 2.4		0.3	SP	Loose to medium dense, dark-brown to black, poorly graded SAND (SP), mps=6.4 mm., no odor, damp, brick fragments present, heavy black staining at tip of spoon.			20	50	20	10				
							-FILL-										
	8 4 4 6	S2 15	2.4 4.4		2.6	CL	Medium stiff, olive-gray, mottled, lean CLAY (CL), mps=0.075 mm., no odor, damp.						100				
							-MARINE DEPOSIT-										
5	8 10 11 11	S3 18	4.4 6.4														
	9 10 9 9	S4 3	6.4 8.4			CL	Very stiff, olive-gray, mottled, lean CLAY (CL), mps=0.075 mm., no odor, damp.						100				
							-MARINE DEPOSIT-										
	2 2 2 2	S5 24	8.4 10.4			CL	Very stiff, olive-gray, mottled, lean CLAY (CL), mps=0.075 mm., trace sand, no odor, damp.						100				
10							-MARINE DEPOSIT-										
						CL	NOTE: Brick fragments and glass observed in cuttings. Soft to medium stiff, olive-gray, mottled, lean CLAY (CL), mps=0.075 mm., no odor, damp.						100				
							-MARINE DEPOSIT-										
				NO WELL INSTALLED	13.0												
15							V1 = 15.0-15.6 ft. Su = 1300 psf/ 90 psf (remolded)										
20	WOR WOR WOH WOH	S6 24	20.0 22.0			CL	Very soft, gray, lean CLAY (CL), mps=0.042 mm., no odor, wet, trace fine sand at tip of spoon.					10	90				
							-MARINE DEPOSIT-										
25																	

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water

Sample Identification	
O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon
G	Geoprobe
V	In-Situ Vane Shear

Well Diagram: Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

Summary
Overburden (lin. ft.) 67.0
Rock Cored (lin. ft.) -
Samples 14S

Boring No. HA05-4

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT\PROJECTS\30322\30322-000.GPJ Nov 7, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-4
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25							V2 = 25-25.6 ft. Su = 630 psf / 40 psf (remolded)										
30	WOR WOH WOH 4	S7 24	30.0 32.0			CL	Very soft, gray, lean CLAY (CL), mps=0.042 mm., no odor; wet, sand and silt present from 31-32 ft. -MARINE DEPOSIT-					10 30	90 70				
35	4 4 5 5	S8 12	35.0 37.0														
					36.5	SP	Loose, gray, poorly graded SAND with gravel (SP), mps=19 mm., no odor, wet. -MARINE DEPOSIT-		15	5		75	10				
40	35 44 56 50	S9 0	40.0 42.0		38.0		No recovery, possibly pushing stone at tip of spoon.										
45	9 13 10 12	S10 16	45.0 47.0			SM	Medium dense, gray, silty SAND with gravel (SM), mps=19 mm., no odor, wet. -GLACIAL TILL-		15	5	20	30	30				
50	7 9 11 15	S11 16	50.0 52.0			SM	Medium dense, gray, silty SAND with gravel (SM), mps=25 mm., no odor, wet. -GLACIAL TILL-		15	5	20	30	30				
55	14 13 15 15	S12 0	55.0 57.0				No recovery.										
60	20 22 26 35	S13 24	60.0 62.0			SM	Dense, gray, silty SAND with gravel (SM), mps=19 mm., no odor, wet. -GLACIAL TILL-		15	5	20	30	30				

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-4
File No. 30322-000
Sheet No. 3 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
65	30 37 60 80	S14	65.0 67.0			SM	Very dense, gray, silty SAND with gravel (SM), mps=19 mm., no odor, wet. -GLACIAL TILL-		15	5	20	30	30				
					67.0		-BOTTOM OF EXPLORATION- NOTE: Hole caved in to 32 ft. after pulling casing. Backfilled hole with cuttings, sand and cold patch at surface.										

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.
NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA05-5

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 3
Start September 29, 2005
Finish September 30, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 15.5+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	3.0	1 3/8	1.9	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							-BITUMINOUS CONCRETE-										
	12 10 10 11	S1 6	0.9 2.9		0.7	SP	Medium dense, brown, poorly graded SAND with gravel (SP), mps=25 mm., no odor, dry, concrete dust present. -FILL-	10	25	5	5	55					
	9 6 6 5	S2 3	2.9 4.9		3.4	CL	Stiff, olive-brown to gray, sandy, lean CLAY (CL), mps=0.43 mm., no odor, moist.					30	70				
5	7 3 2 5	S3 3	5.0 7.0			CL	Medium stiff, olive-brown to gray, sandy, lean CLAY (CL), mps=0.43 mm., no odor, wet.					30	70				
	7 8 5 5	S4 2	7.0 9.0		7.5		Very little material recovered, glass fragments and wood fibers present, petroleum odor and sheen. -FILL-										
	2 2 2 3	S5 19	9.0 11.0			ML	Soft, dark-brown, sandy SILT (ML), mps=0.43 mm., wood fibers present, organic odor, wet.					25	75				
10					10.0		-ORGANIC DEPOSIT-										
	1 4 4 4	S6 13	11.0 13.0			ML	Soft, olive-brown to gray, sandy, SILT (ML), mps=0.43 mm., no odor, wet.					25	75				
					11.6		-MARINE DEPOSIT-										
						CL	Medium stiff, gray, lean CLAY (CL), mps=0.43 mm., occasional fine sand layers, no odor, wet. -MARINE DEPOSIT-						100				
15	5 8 11 14	S7 24	15.0 17.0			CL	Very stiff, gray to olive-brown, lean CLAY (CL), mps=0.075 mm., mottled, slightly blocky, no odor, wet. -MARINE DEPOSIT-						100				
20							V1= 20.3-21 ft. Su= 780 psf/ 330 psf (remolded)										
25																	

NO WELL INSTALLED

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-30-05	9:00	0.25	55.7	59.9	44.0
9-30-05	9:45	0.75	-	39.9	5

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 56.1
Rock Cored (lin. ft.) 3.8
Samples 13S, 1C

Boring No. HA05-5

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-5
File No. 30322-000
Sheet No. 2 of 3

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	WOR 1 3 2	S8 24	25.0 27.0			CL	Medium stiff, gray, lean CLAY (CL), mps=0.43 mm., occasional sand partings, no odor, wet. -MARINE DEPOSIT-						100				
30							V2= 30.3-31 ft. Su= 780 psf/ 330 psf (remolded)										
35	WOR WOR 1 2	S9 24	35.0 37.0			CL	Medium stiff, gray, lean CLAY (CL), mps=0.43 mm., occasional sand partings, no odor, wet. -MARINE DEPOSIT- NOTE: Attempted vane shear test at 40 ft., but unable to push vane into material.						100				
40	7 6 50(5 in.)	S10 10	40.0 41.4		40.0	SP	Medium dense, gray, poorly graded SAND (SP), mps=0.43 mm., no odor, wet.					100					
					41.0		-MARINE DEPOSIT-										
45	59 24 15 24	S11 8	45.0 47.0			SP	Dense, gray, poorly graded SAND with gravel (SP), mps=32 mm., no odor, wet. -GLACIAL TILL-	10	10	5	20	55					
50	15 8 6 6	S12 16	50.0 52.0			SC	Medium dense, gray, clayey SAND with gravel (SC), mps=19 mm., no odor, wet. -GLACIAL TILL-		15	10	10	35	30				
					53.0	ML	Hard, gray, sandy SILT with gravel (ML), mps=32 mm., bonded, no odor wet. -GLACIAL TILL- NOTE: Split spoon refusal on probable bedrock at 55.7 ft. Advanced roller bit to 56.1 ft.	10	20			15	55				
55	55 100(3 in.)	S13 3	55.0 55.7		56.1		NOTE: Begin NQ rock core. See Core Boring Report HA05-5 for details.										

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size.

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

CORE BORING REPORT

Boring No. HA05-5
File No. 30322-000
Sheet No. 3 of 3

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weath-ering	Well Dia-gram	Elev./ Depth (ft)	Visual Description and Remarks
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
55									Top of bedrock at 55.7 ft. Begain NQ rock core at 56.1 ft.
	3 3 3	C1	56.1 59.9	45/18	100/40			56.1	Hard, gray, fresh, slightly weathered aphanitic to fine grained PHYLLITE. Joints dipping at low to high angles, very close to close, planar to undulating, rough, tight to partly open, near vertical secondary joint, quartz veins.
							NO WELL INSTALLED	59.9	-BOTTOM OF EXPLORATION-

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-6

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 1
Start September 28, 2005
Finish September 28, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 20.0+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	2.5	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Sand % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0							-BITUMINOUS CONCRETE-										
	16 22 20 17	S1 14	0.5 2.5		0.3	SP	Dense, brown, poorly graded SAND with gravel (SP), mps=19 mm., no odor, dry.		15	10	25	50					
	11 12 11 9	S2 15	2.5 4.5			SP	Medium dense, brown, poorly graded SAND (SP), mps=13 mm., no odor, dry.		10	5	20	65					
							-FILL-										
5	6 5 9 6	S3 0	4.5 6.5		4.5		No recovery. Wet at 4.5 ft.										
	9 5 3 4	S4 13	6.5 8.5			SP	Medium dense, dark-brown, poorly graded SAND (SP), mps=13 mm., no odor, wet.		5	15	20	60					
					7.5	CL	-FILL-										
	WOH 1 WOH 2	S5 16	8.5 10.5	NO WELL INSTALLED			Medium, stiff, gray, lean CLAY (CL), mps=0.075 mm., no odor, wet.						100				
10						CL	Very soft, gray, lean CLAY (CL), mps= 0.43 mm., some sand particles in the clay, no odor, wet.					5	95				
					10.5		-MARINE DEPOSIT-										
							-BOTTOM OF EXPLORATION-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-28-05	10:00	0.2.5	10.0	10.0	9.0

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 10.5
Rock Cored (lin. ft.) -
Samples 5S

Boring No. HA05-6

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT5\PROJECTS\30322\30322-000.GPJ Nov 7, 05

TEST BORING REPORT

Boring No. HA05-7

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 1
Start September 26, 2005
Finish September 26, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 20.5+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	2.5	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: -
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	21 26 22 25	S1 8	0.0 2.0			SP	Dense, brown to dark-brown, poorly graded SAND with gravel (SP), mps=28 mm., no odor, moist.	5	15	15	30	35					
	38 22 10 15	S2 12	2.0 4.0			SP	Dense, brown to dark-brown, poorly graded SAND with gravel (SP), mps=28 mm., no odor, moist.	5	15	15	30	35					
					3.0	SC	-FILL-			5	5	70	20				
	14 50 50 37	S3 6	4.0 6.0		4.0	SW	Dense, brown, clayey SAND (SC), mps=4.75 mm., no odor, moist, wood fiber present. -FILL- Very dense, brown, well graded SAND with silt (SW), mps=19 mm., no odor, moist, wood fibers present.		10	10	15	40	25				
5	23 18 17 7	S4 7	6.0 8.0		6.0	SP	-FILL- Dense, brown, poorly graded SAND (SP), mps=32 mm., no odor, wet.	5	5	15	35	40					
					7.5		-FILL-										
10	1 2 2 1	S5 24	10.0 12.0	NO WELL INSTALLED		CL	Soft, gray, lean CLAY (CL), mps=0.43 mm., occasional black staining, occasional sand parting, no odor, wet. -MARINE DEPOSIT-						100				
					12.0		-BOTTOM OF EXPLORATION-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-26-05	14:30	0.25	10.0	10.0	9.7
9-26-05	14:35	0.30	-	4	DRY

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 12.0
Rock Cored (lin. ft.) -
Samples 5S

Boring No. HA05-7

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-8

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 1
Start September 26, 2005
Finish September 26, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 22.0+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	SSA	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	-	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Solid Stem Auger Probe
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED													
	50	S1	0.9				-CONCRETE-										
	45	14	2.9														
	7				1.9	CL	Very stiff, gray to olive-brown, lean CLAY (CL), mps=0.043 mm., moderately mottled, moderately blocky, no odor, dry.					5	95				
	12																
	4	S2	2.9														
	5	24	4.9		3.5	CL	Medium stiff, gray, lean, CLAY (CL), mps=0.43 mm., frequent sand partings, no odor, moist.						100				
	4																
5	3																
	WOH	S3	5.0			CL	Soft, gray, sandy, lean CLAY (CL), mps=0.43 mm., shells present, no odor, moist.					25	75				
	1	20	7.0				-MARINE DEPOSIT-										
	2																
	1				7.0		-BOTTOM OF EXPLORATION-										

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-26-05	13:30	0.25	-	7.0	-

Sample Identification
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (lin. ft.) 7.0
Rock Cored (lin. ft.) -
Samples 3S

Boring No. HA05-8

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT5\PROJECTS\30322\30322-000.GPJ Nov 4, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-9

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 1
Start September 26, 2005
Finish September 26, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 22.0+/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	SSA	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	-	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Solid Stem Auger Probe
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED													
	6 27 30 43	S1 13	0.9 2.9			SP	Dense, brown, poorly graded SAND with gravel (SP), mps=28 mm., no odor, moist. -FILL-	5	10	10	30	45				
					2.9	SM	NOTE: Driller missed sample from 2.9-4.9 ft. Sample collected from auger flights.				25	60	15				
5	8 8 11 14	S2 20	4.9 6.9		4.9	CL	Brown, silty SAND (SM), mps=2.0 mm., no odor, moist. -FILL- Very stiff, olive-brown to gray, lean CLAY (CL), mps=0.075 mm., slightly blocky, mottled, no odor, moist. -MARINE DEPOSIT-						100				
					6.9		-BOTTOM OF EXPLORATION-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-26-05	15:17	0.25	-	6.5	4.5

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe
V In-Situ Vane Shear

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 6.9
Rock Cored (lin. ft.) -
Samples 2S

Boring No. HA05-9

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT5\PROJECTS\30322\30322-000.GPJ Nov 4, 05

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA05-10

Project Eastern Waterfront Development Portland, ME
Client Riverwalk, LLC
Contractor Maine Test Borings, Inc.

File No. 30322-000
Sheet No. 1 of 1
Start September 28, 2005
Finish September 28, 2005
Driller R. Idano
H&A Rep. K. Stone
Elevation 19.0 +/-
Datum Portland City
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	SSA	SS	-	Rig Make & Model: B-53 Mobile Drill Trailer
Inside Diameter (in.)	-	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Solid Stem Auger Probe
				Hoist/Hammer: Winch/Doughnut Hammer

Depth (ft.)	SPT[1]	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size[2], structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0				NO WELL INSTALLED			-CONCRETE-										
	22 27 19 15	S1 15	0.7 2.7		0.6	SP	Dense, brown, poorly graded SAND with gravel (SP), mps=19 mm., slight black staining, no odor, dry.		15	10	10	55	10				
	10 10 6 10	S2 12	2.7 4.7		2.7 3.2	SP CL	Medium dense, brown, poorly graded SAND (SP), mps=19 mm., no odor, dry. -FILL- Very stiff, olive-brown, lean CLAY (CL), mps=0.075 mm., no odor, moist, with brick fragments.			10	15	75	100				
5	6 6 8 10	S3 17	4.7 6.7		4.7	CL	Stiff, olive-brown, lean CLAY (CL), mps=0.075 mm., no odor, moist. -MARINE DEPOSIT-						100				
					6.7		-BOTTOM OF EXPLORATION-										

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
9-28-05	11:45	0.25	-	4.7	DRY

Sample Identification	
O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon
G	Geoprobe
V	In-Situ Vane Shear

Well Diagram: Riser Pipe, Screen, Filter Sand, Cuttings, Grout, Concrete, Bentonite Seal

Summary	
Overburden (lin. ft.)	6.7
Rock Cored (lin. ft.)	-
Samples	3S
Boring No.	**HA05-10**

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None; Toughness: L-Low, M-Medium, H-High; Plasticity: N-Nonplastic, L-Low, M-Medium, H-High; Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

[1]SPT = Sampler blows per 6 in. [2]Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters).

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\GINT\PROJECTS\30322\30322-000.GPJ Nov 4, 05

APPENDIX C

Observation Well Installation & Groundwater Monitoring Reports

HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

Well No. OW-2

Boring No. HA05-2(OW)

PROJECT	Eastern Waterfront Developement	H&A FILE NO.	30322-000
LOCATION	Portland, Maine	PROJECT MGR.	W. Chadbourne
CLIENT	Riverwalk, LLC	FIELD REP.	B. Steinert
CONTRACTOR	Maine Test Borings, Inc.	DATE INSTALLED	10/13/2005
DRILLER	R. Idano	WATER LEVEL	NA*

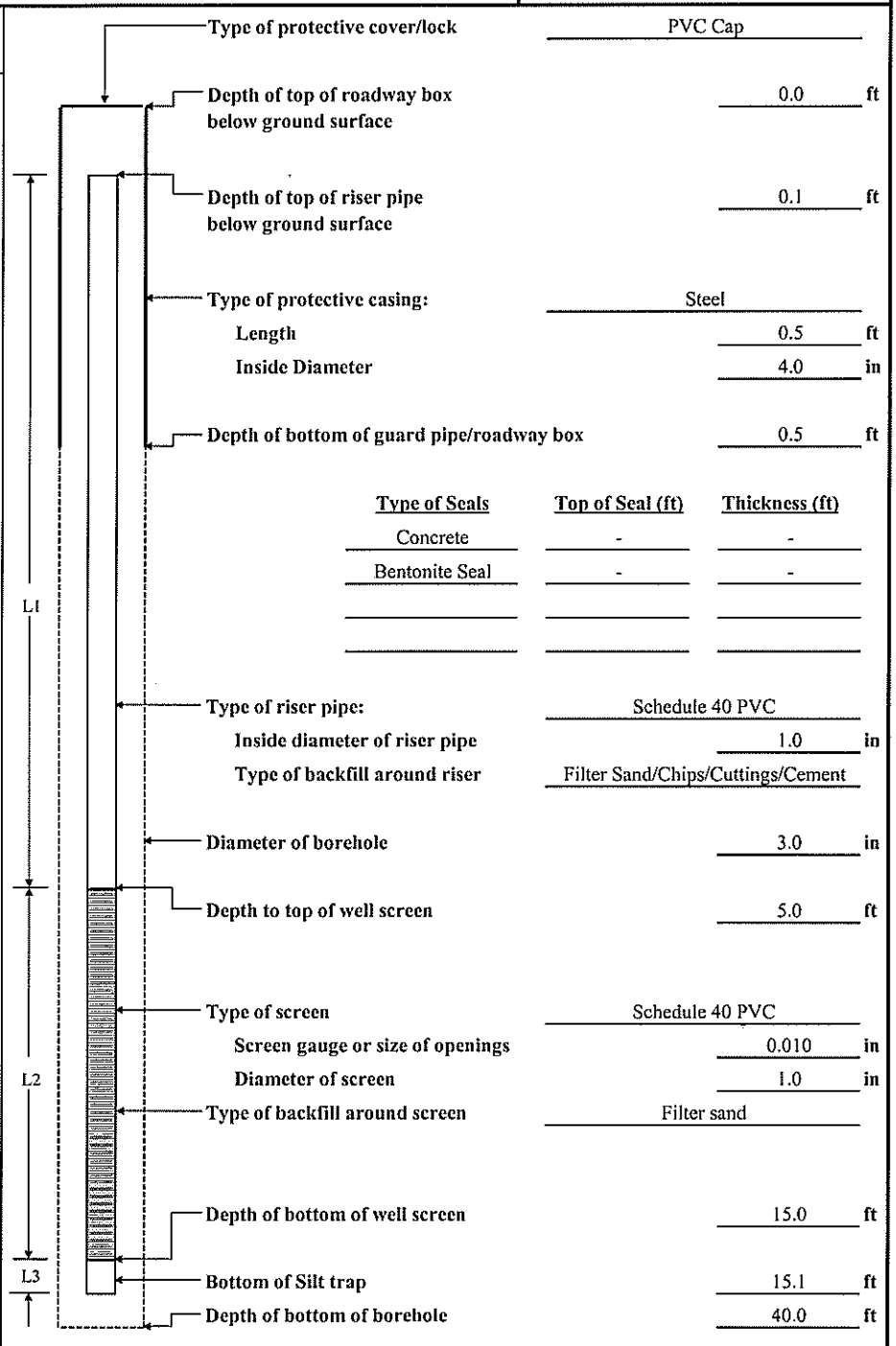
Ground El. 21.5 +/- ft
El. Datum Portland City

Location See Plan

☐ Guard Pipe
☑ Roadway Box

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
Bituminous Concrete	
0.9	
7.0	
	Filter Sand
Marine Deposit	
40	19

(Bottom of Exploration)
(Numbers refer to depth from ground surface in feet)



(Not to Scale)

Type of protective cover/lock	PVC Cap
Depth of top of roadway box below ground surface	0.0 ft
Depth of top of riser pipe below ground surface	0.1 ft
Type of protective casing:	Steel
Length	0.5 ft
Inside Diameter	4.0 in
Depth of bottom of guard pipe/roadway box	0.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	-	-
Bentonite Seal	-	-

Type of riser pipe:	Schedule 40 PVC
Inside diameter of riser pipe	1.0 in
Type of backfill around riser	Filter Sand/Chips/Cuttings/Cement
Diameter of borehole	3.0 in
Depth to top of well screen	5.0 ft
Type of screen	Schedule 40 PVC
Screen gauge or size of openings	0.010 in
Diameter of screen	1.0 in
Type of backfill around screen	Filter sand
Depth of bottom of well screen	15.0 ft
Bottom of Silt trap	15.1 ft
Depth of bottom of borehole	40.0 ft

4.9	+	10.0 ft	+	0.1 ft	=	15.0 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS: *Well filled with water at completion.

Form 2007

HALEY & ALDRICH

GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
HA05-2(OW)

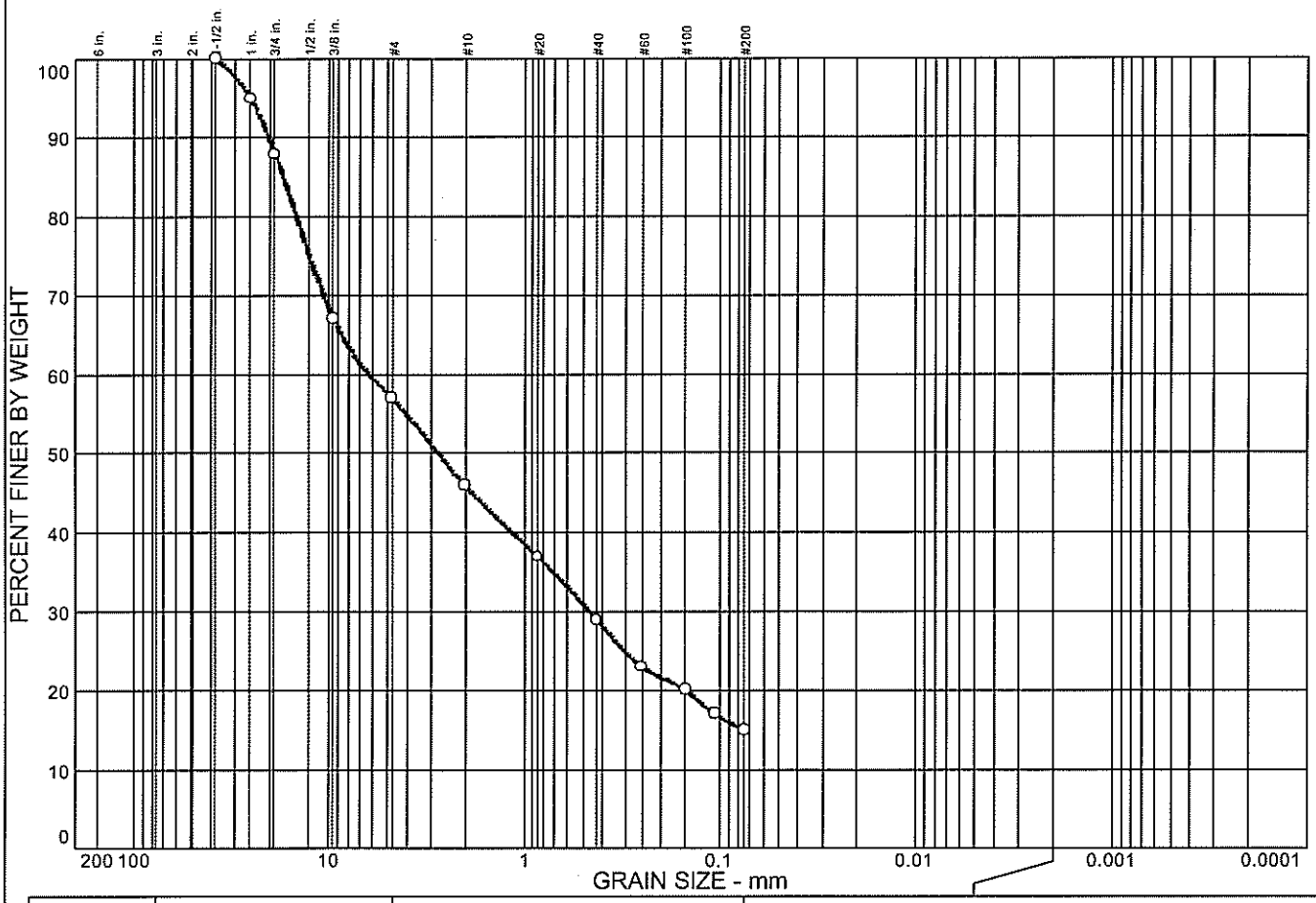
PROJECT	Eastern Waterfront Developement	H&A FILE NO.	30322-000
LOCATION	Portland, Maine	PROJECT MGR.	W. Chadbourne
CLIENT	Riverwalk, LLC	FIELD REP.	B. Steinert
CONTRACTOR	Maine Test Borings, Inc.	DATE	10/10/2005
ELEVATION SUBTRAHEND	21.5 +/- (Portland City Datum)		

Date	Time	Elapsed Time (days)	Depth of Water from Ground Surface	Elevation of Water	Remarks	Read By
10/14/2005	12:00	8	4.2	17.3	Reading taken by Woodard & Curran	W&C
10/17/2005	7:00	11	2.8	18.7		BCS
10/17/2005	12:45	11	2.6	18.9		BCS
10/17/2005	17:00	11	2.6	18.9	Bailed water out after measurement.	BCS
10/18/2005	6:45	12	3.0	18.5		BCS
10/18/2005	14:10	12	2.8	18.7		BCS
11/4/2005	14:00	29	2.9	18.6		ARB

APPENDIX D

Laboratory Test Results

U.S. STANDARD SIEVE SIZE



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
O	0.0	12.0	31.0	11.0	17.0	14.0	15.0	

	Expl. No.	Sample No.	Depth (ft)	Atterberg Limits %			Water Content (%)	C_u	C_c	USCS
				W_L	W_P	I_P				
O	HA05-01	C01	0.0-4.0				15.4			GM

	Sample Description
O	Dark brown Silty gravel with sand

Remarks:

O SAMPLE CONTAINED 15± % ASPHALT PIECES

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

Eastern Waterfront Development
Portland, Maine

GRAIN SIZE DISTRIBUTION

DATE: 11/4/2005

FILE NO: 30322-000