REPORT ON
PROPOSED PEDESTRIAN SKYWAY
BEDFORD STREET
PORTLAND, MAINE

by

Haley & Aldrich, Inc.
South Portland, Maine

for

University of Southern Maine
Portland, Maine

File No. 28438-003
November 2003

HALEY & ALDRICH

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

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HALEY & ALDRICH

13 November 2003
File No. 28438-003

University of Southern Maine
Department of Facilities Management
25 Bedford Street
PO Box 9300
Portland, Maine 04104-9300

Attention: Mr. John Rasmussen

Subject: Proposed Pedestrian Skyway
Bedford Street
Portland, Maine

Ladies and Gentlemen:

This report presents the results of our subsurface explorations and geotechnical engineering evaluations conducted for the proposed Pedestrian Skyway at the University of Southern Maine in Portland, Maine. This work was undertaken at your request in accordance with our proposal dated 2 October 2003.

INTRODUCTION

The proposed skyway will cross over Bedford Street, providing a link between the main portion of campus north of Bedford Street and the Community Education Facility and Parking Garage (currently under construction) to the south (see Figure 1, Project Locus).

PROPOSED CONSTRUCTION

The proposed project consists of an earth-supported walkway (walkway) located between Masterton and Luther Bonney Halls and a bridge (skyway). A bridge abutment pier will be located on the north side of Bedford Street (north abutment). A bridge support pier will be located on the south side of Bedford Street (south pier). The currently envisioned configuration north of Bedford Street (where borings were completed) is shown on Figure 2, Site and Exploration Location Plan.

The walkway dimensions are approximately 14 ft. wide by 95 ft. long. The skyway dimensions are approximately 10 ft. wide by 90 ft. long. The top surface of the skyway is at about El. 59.25 at the bridge abutment. The span between the north abutment and the south

pier is 70 ft. The skyway will then span approximately 20 ft. more to the south to connect with the Community Education Facility and Parking Garage structure. Roadway clearance will be approximately 15.5 ft.

The north abutment will consist of two 24-in. by 24-in. piers with a 12-in. concrete wall between piers. Footings for both the north abutment and the south pier will be approximately 20 ft. by 10 ft. by 4 ft. in size. The southernmost end of the walkway will be supported by the Community Education and Parking Garage superstructure.

Proposed bearing elevation for the footings is at El. 36. A 12-in. thick concrete wall is also proposed along sides of the walkway.

Construction of the walkway and skyway on the north side of Bedford Street will require fills of up to 12 ft. over the existing site grading. Much of this area will have to be excavated prior to filling in order to construct the north abutment foundation.

Preliminary information on structure loading was provided to us by Einhom Yaffee Prescott Architects and Engineers (EYP). According to EYP, the vertical loading at the end of the bridge will be about 150 kips. In addition, EYP does not expect any significant uplift loading.

SITE CONDITIONS

The site north of Bedford Street currently consists of a lanscaped area bounded by sidewalks and academic buildings. The area between Luther Bonney and Masterton Halls is flat. The ground surface near Bedford Street slopes down at approximately 2 horizontal to 1 vertical (2:1) to the sidewalk below. Ground surface elevations range from El. 53 where the proposed earth-supported walkway begins to El. 42 on the west shoulder of Bedford Street.

The area of the site south of Bedford Street is currently under construction. At the time of the explorations, it consisted of a sidewalk and a parking area. The ground surface in the area of the south pier is at approximately El. 43. Elevations discussed in this report are in feet and are referenced to National Geodetic Vertical Datum (NGVD).

SUBSURFACE EXPLORATIONS

Maine Test Borings, Inc. of Brewer, Maine drilled seven (7) test borings (B1-03 through B7-03) on 20 and 21 October 2003. The borings were drilled using a 2-1/2-in. I.D. hollow stem augers. Soil samples were obtained by driving a 1-3/8-in. I.D. split-spoon sampler with a 140-lb. weight dropped 30 in.

Test borings were drilled to depths ranging from 1.9 to 12.7 ft. below ground surface and were terminated at refusal on probable bedrock.

A Haley & Aldrich representative was present to monitor the drilling activities and to prepare logs of the test borings. Haley & Aldrich personnel located borings in the field by pacing and taping from existing site features. Ground surface elevations at the boring locations were estimated using topographic information provided by EYP. The boring locations shown on Figure 2 and ground surface elevations included on the boring logs are considered approximate.

Test boring logs prepared by Haley & Aldrich are included in Appendix A of this report.

SUBSURFACE CONDITIONS

The subsurface explorations conducted in the vicinity of the proposed walkway/skyway encountered topsoil, fill, naturally-deposited glacial till and bedrock. A general description of the soil units encountered in the explorations are listed below.

- Topsoil – Very loose to loose, gray to dark brown silty SAND (SM), roots. Encountered thickness ranged from 0.3 to 0.7 ft.

- Fill – Very loose to medium dense, light brown to red-brown to gray well-graded SAND with gravel (SW) to silty SAND (SM). Borings B2-03 and B4-03 penetrated through a few inches of concrete at depths of 1.5 to 2 ft. below ground surface. Encountered thickness of fill ranged from 0.6 to 7.1 ft. thick.

- Glacial Till – Medium dense to very dense, red-brown to brown-gray silty SAND (SM) to silty GRAVEL with sand (GM). The delineation between glacial till and the underlying weathered bedrock was not always distinct, since the glacial till contained weathered bedrock and the weathered bedrock was mixed in varying degrees with soil. Glacial till was not encountered in borings B6-03 and B7-03. Encountered thickness ranged from 2.3 to 5.6 ft.

- Weathered/Competent Bedrock – A zone of weathered bedrock was encountered above more competent bedrock. Competent bedrock was judged from the behavior of the augers during drilling. The thickness of weathered bedrock encountered varied from 0.2 to 1.6 ft. The depth to refusal ranged from 1.9 to 12.7 ft., and the elevation of refusal ranged from El. 37.3 to El. 46.7.

Explorations were also completed for the Community Education Facility and Parking Garage currently under construction. Based on a rock contour plan from our 12 July 2002 report, we estimate that bedrock will be encountered at approximately El. 38 at the south pier.

Water was not encountered in borings B3-03 through B7-03 immediately after drilling was completed. Water was measured at 8.3 ft. below ground surface in B1-03 immediately after

drilling. In boring B2-03, water was measured at 7.5 ft. below ground surface 16 hours after completion of drilling. Groundwater levels are expected to vary seasonally as a result of precipitation, runoff, construction activity in the area and other factors.

In summary, subsurface explorations indicate that soils consist of topsoil, fill and glacial till and weathered bedrock overlying more competent bedrock within the general limits of the walkway and skyway foundations. We expect excavations for the bridge foundations to encounter bedrock.

GEOTECHNICAL ENGJNEERING RECOMMENDATIONS

Recommended Subgrade Preparation and Foundation System

All topsoil, organic matter, existing fill and other unsuitable materials should be entirely removed where present within the limits of the proposed walkway and skyway foundation units.

Based on the conditions encountered in the test borings, we anticipate that excavations will be made through existing fill, glacial till and weathered bedrock.

We recommend that the proposed north abutment, south pier and walkway walls be supported on spread and continuous wall footing foundations that bear on glacial till, recompacted weathered bedrock or sound bedrock. Bedrock subgrades should be reasonably cleaned of loose rock fragments. We anticipate that bedrock surfaces will be uneven. If the rock surface within the foundation unit limits slopes more than approximately 4 horizontal to 1 vertical (4H:1V), the rock surface should be benched to create a nearly level surface, or the foundation should be pinned to the rock with grouted steel dowels.

Footings bearing on undisturbed glacial till or recompacted weathered bedrock should be designed for a maximum allowable bearing pressure of 3.5 kips per sq. ft. (ksf); footings bearing directly on sound intact bedrock can be designed using a maximum allowable bearing pressure of 20 ksf. If the glacial till subgrade soils become disturbed, the disturbed soil should be removed and replaced with compacted structural fill. We recommend that continuous wall footings be at least 2-ft. wide.

If both bedrock and glacial till soils are encountered within the limits of individual footings or continuous wall footings, special foundation preparation details will be needed. At individual footings, we recommend that all the soil be removed and that the foundation be supported entirely on bedrock. For continuous wall footings, a transition zone approximately 10 ft. long should be provided where the soil is removed to the bedrock surface, or a maximum depth of 12 in.; this soil should be replaced with %-in. to 1-in. size crushed stone.

Earth-Supported Walkway

The walkway leading to the north abutment should be supported on a minimum of 2 ft. of compacted structural fill. Structural fill should be provided a minimum of 18 in. outside the limits of the proposed walkway pavement. The walkway subgrade should be sloped to drain away from the centerline.

Structural fill should be placed in a maximum 8-in. thick loose lift and compacted at approximately optimum water content to a dry density of at least 95 percent of maximum dry density as determined by ASTM D1557.

It is noted that the recommended pavement section will not prevent freezing of the subgrade soils. As a result, pavement roughness due to non-uniform frost action may result. However, to eliminate such non-uniform frost action would require that an approximately 4-ft. thickness of granular subbase be used. It is common practice to tolerate seasonal movement to avoid the cost of the added thickness of subbase.

Listed below are our recommended options to reduce non-uniform frost movement in areas if it is not tolerable.

- Compacted Structural Fill – A full 4 ft. thickness of structural fill may be used.
- .Insulation – Polystyrene insulation placed directly beneath the 2 ft. of structural fill subbase, combined with drainage sloping away from centerline, should be sufficient to reduce frost-related movements. We recommend using 2 in. of extruded polystyrene in continually shaded areas. One inch of extruded polystyrene may be used in areas that receive significant winter sun.

The subgrade should be level prior to placement of insulation. Joints should be staggered horizontally in both directions (if two layers are used). Joints should be sealed with an adhesive as recommended by the manufacturer. Construction equipment should not be allowed to drive directly on the insulation. A minimum of 12 in. of structural fill should be maintained between self-propelled construction equipment and insulation.

Frost Protection

The bottoms of footings should be founded a minimum of 4.5 ft. below the lowest adjacent ground surface exposed to freezing. If footings are founded on sound, clean bedrock (not weathered bedrock or glacial till), a minimum of 2 ft. of soil cover is acceptable.

Foundation Drains

A perimeter foundation drainage system should be provided for the north abutment. Free draining granular fill (structural fill) should be provided within a 2-ft. wide zone adjacent to the foundation and foundation wall to promote drainage of water from infiltration at the surface. Topsoil should be provided and the finish grade should be sloped to drain away from the abutment.

Seismic Design Criteria

We recommend that the skyway be designed in accordance with the seismic requirements of the latest edition of the BOCA National Building Code. The site coefficient, S, is 1.0; the effective peak velocity-related acceleration coefficient, Av, is 0.10 and the effective peak acceleration coefficient, As, is 0.10.

The soils at the site are not considered to be liquefaction susceptible.

Lateral Earth Pressures on Foundation (Abutment) Wall

It is recommended that foundation walls associated with the skyway abutment, and which are unevenly backfilled, be designed to resist combined lateral forces resulting from soil pressures and surcharges.

Foundation walls that are free to rotate at the top, are backfilled on one side with compacted structural fill, and are designed to drain, should be designed for an equivalent fluid unit weight of 36 lbs. per cu. ft. (pcf). Only hand-operated compaction equipment should be used within 8 ft. of the wall to prevent additional horizontal pressures from building up on the abutment walls.

Compacted Fill

Compacted Structural Fill used beneath the beneath walkways, adjacent to foundation walls, and where additional fill is necessary within the limits of the proposed structure should consist of a sandy gravel or gravelly sand, free of organic material, loam, trash, snow, ice, frozen soil, or other objectionable material, and should be well graded within the following limits:

Sieve Size	Percent Finer By Weight
6 in.	100
No. 4	30 to 90
No. 40	10 to 50
No. 200	0 to 8

In open areas, compacted structural fill should be placed in layers not exceeding 8 in. in loose measure and compacted with self-propelled compaction equipment at approximately optimum moisture content to a dry density of at least 95 percent of the maximum dry density as determined by ASTM D1557. In confined areas, the loose layer thickness should be reduced to 6 in. and compaction performed by hand-guided compaction equipment.

Common Fill outside the limits of the proposed walkway abutment should consist of inorganic mineral soil or rock fragments that can be readily placed in layers not exceeding 10 in. in loose measure and compacted to 90 percent of ASTM D1557. We anticipate that the existing fill, glacial till and any bedrock excavated from the site will be suitable for reuse as common fill.

Prospective contractors intending on using the excavated onsite granular soils for Common Fill should be aware that these materials may be difficult to place and compact when wet, and that the material may have to be spread out and dried prior to placement if it becomes wet.

CONSTRUCTION CONSIDERATIONS

General

The purpose of this section of the report is to comment on items related to excavation, earthwork, and related aspects of the proposed construction. It is written primarily for the engineer having the responsibility for the preparation of plans and specifications. Since it identifies potential construction problems related to foundations and earthwork, it will also aid personnel who monitor the construction activities. Prospective contractors for this project should evaluate construction problems on the basis of their own knowledge and experiences in the area, taking into consideration their proposed construction methods and procedures.

Excavation Dewatering

Based on observations of water levels and moisture conditions of soils in brings, we anticipate that groundwater will not be encountered in foundation and site development excavations. Localized pockets of trapped water may be encountered in some of the glacial till and bedrock excavation areas. Where encountered, we believe that excavation dewatering may be accomplished by open pumping from sumps located within the excavations.

Subgrade Preparation

The subgrade conditions at the site are expected to consist primarily of granular soils, weathered bedrock and sound bedrock. Granular soils that contain a significant amount of fines (greater than about 20 percent passing the No. 200 sieve) are considered susceptible to disturbance due to construction traffic and water. Therefore, equipment and personnel should not be permitted to travel across exposed silty subgrades. Abutment foundation subgrades

should be protected against freezing during construction. Any soft or disturbed subgrade areas should be excavated and replaced with compacted structural fill.

Construction Monitoring

The foundation and earthwork recommendations contained herein are based on the predictable behavior of a properly engineered and constructed foundation. Monitoring of foundation installations is required to enable the geotechnical engineer to keep in contact with procedures and techniques used during construction. Therefore, it is recommended that a person qualified by training and experience be present to provide monitoring at the site during final preparation of bearing surfaces and placement of compacted structural fill.

CLOSURE

This report has been prepared for specific application to the subject project in accordance with generally accepted soil and foundation engineering practices. The recommendations presented herein are based, in part, on the information on subsurface conditions and proposed construction details described herein. We request that Haley & Aldrich be provided the opportunity for a general review of the final design and specifications, in order to determine that our earthwork and foundation recommendations have been interpreted as they were intended. In particular, if any changes in the nature, design, or location of the proposed facilities are made, we should review the applicability of our recommendations.

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

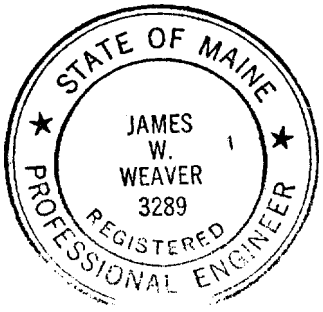
Sincerely yours,
HALEY & ALDRICH, INC.

Brian K. Lawrence

Brian K. Lawrence, P.E.
Staff Engineer

James W. Weaver

James W. Weaver, P.E.
Vice President



Enclosures:

Figure 1	- Project Locus
Figure 2	- Site and Exploration Location Plan
Appendix A	- Logs of Test Borings

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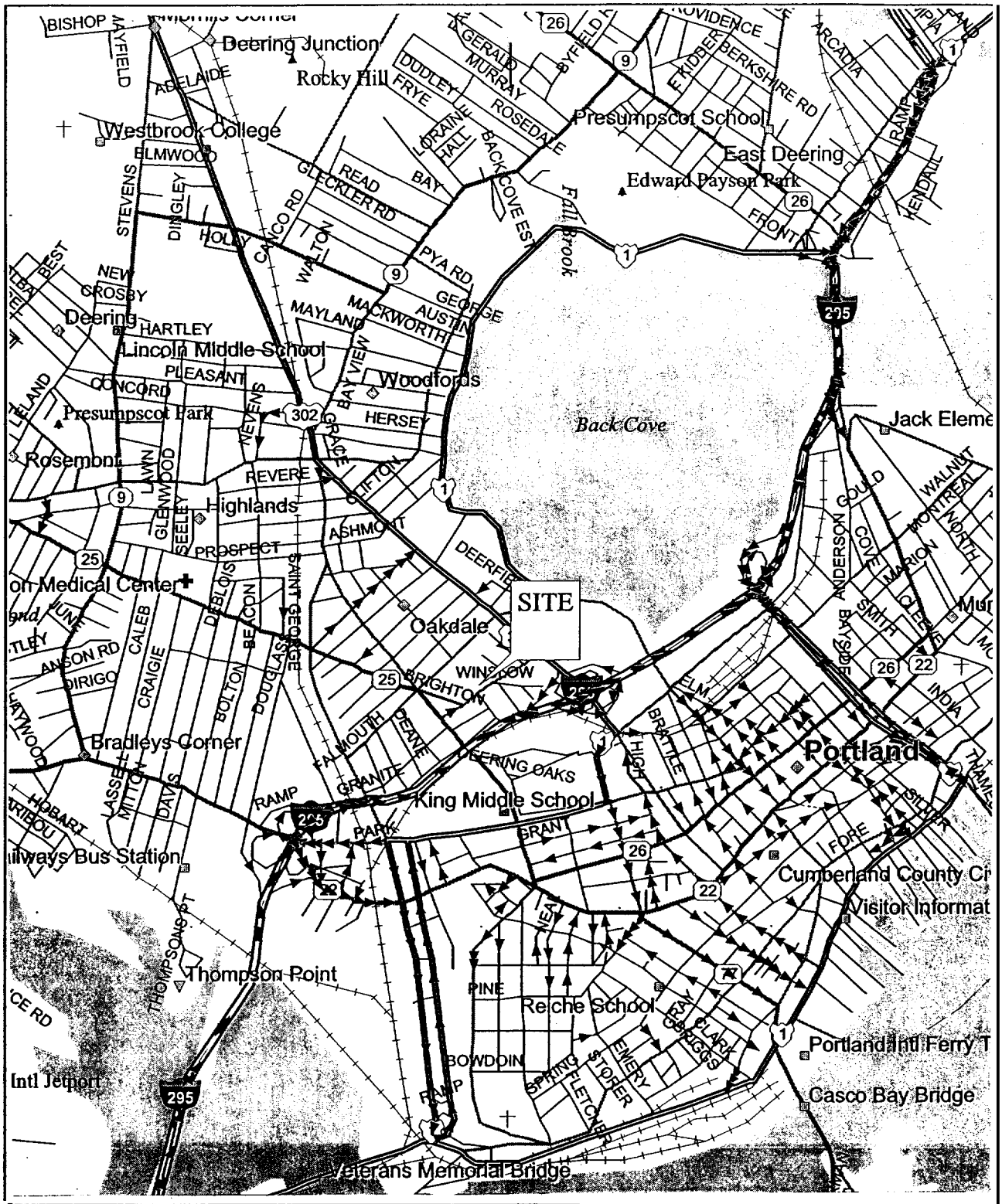
Figure



SITE COORDINATES: N43°39'43", W70°16'34"

"MAP FROM DELORME'S STREET ATLAS USA, 2000 FREEPORT, MAINE"

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

PROPOSED PEDESTRIAN SKYWAY
UNIVERSITY OF SOUTHERN MAINE
PORTLAND, MAINE

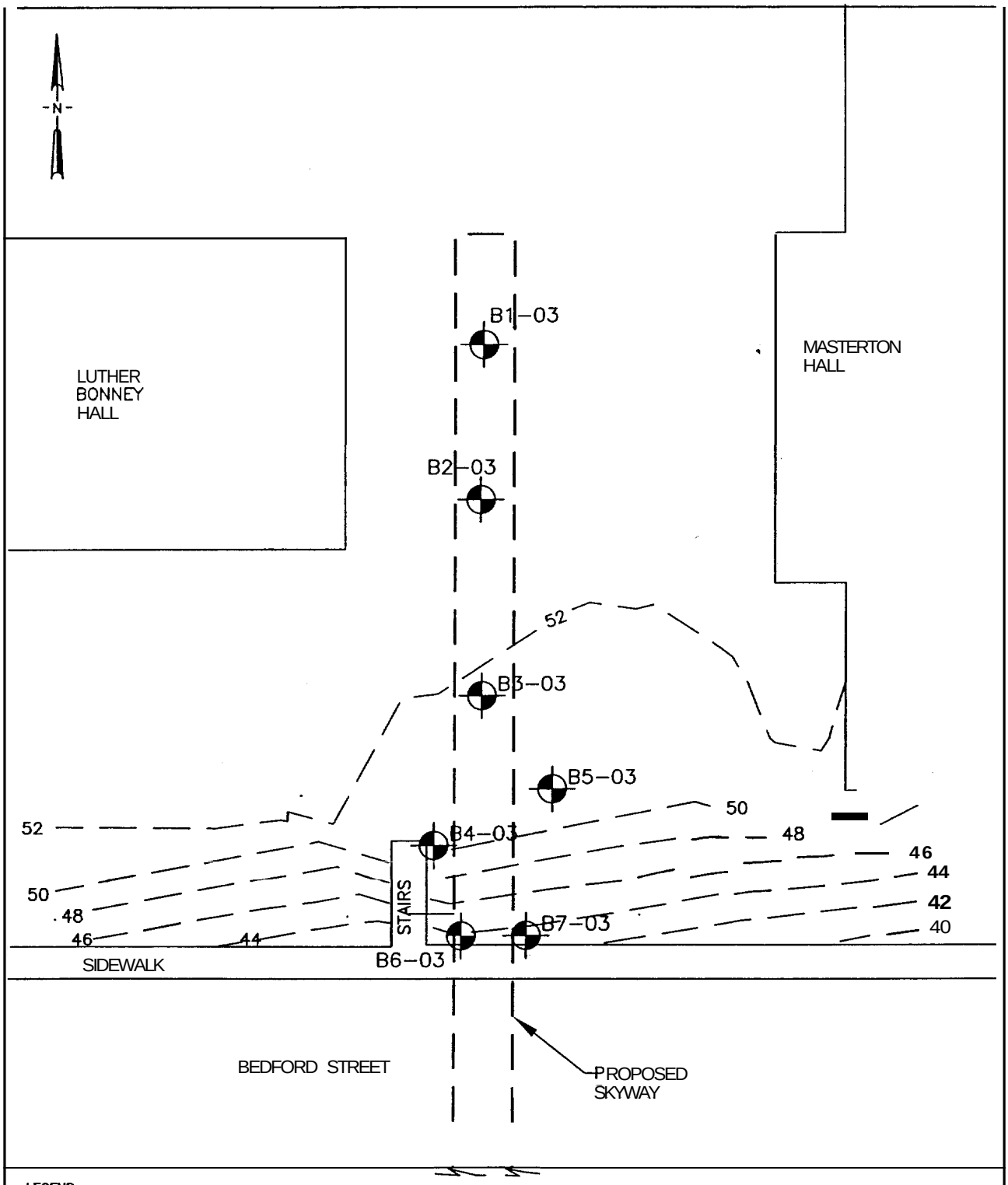
PROJECT LOCUS

APPROX. SCALE: 1:25,000

NOVEMBER 2003

FILE NO. 28438-003

FIGURE 1



LEGEND:

B1-01 LOCATION AND DESIGNATION OF TEST BORING

NOTES:

1. PLAN PROVIDED BY EYP ARCHITECTS *AND* ENGINEERS AND MODIFIED BY HALEY & ALDRICH TO *SHOW* TEST BORING LOCATIONS.
2. TEST BORINGS WERE DRILLED ON 20 AND 21 OCTOBER 2003 BY MAINE TEST BORINGS, INC. OF BREWER, MAINE.
3. TEST BORINGS WERE LOCATED BY HALEY & ALDRICH BY TAPING AND PACING FROM EXISTING SITE FEATURES.
4. REFER TO APPENDIX A OF THIS REPORT FOR TEST BORING LOGS.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

PROPOSED PEDESTRIAN SKYWAY
UNIVERSITY OF SOUTHERN MAINE
PORTLAND, MAINE

SITE AND EXPLORATION LOCATION PLAN

APPROX. SCALE: 1:25,000

NOVEMBER 2003

FILE NO. 28438-003

FIGURE 2

APPENDIX A

Logs of Test Borings

HALEY & ALDRICH

TEST BORING REPORT

Boring No. 81-03

Project Proposed Pedestrian Skyway, USM. Portland, Maine
Client University of Southern Maine
Contractor Maine Test brings, Inc.

File No. 28438-003
Sheet No. 1 of 1
Start October 21,2003
Finish October 21, 2003
Driller W. Hallett
H&A Rep. B. Lawrence
Elevation 53.0
Datum NGVD
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Truck
nside Diameter (in.)	2 1/2	1.375		Bit Type: Cutting Head
				Drill Mud: -
lammer Weight (lb.)		140		Casing: -
lammer Fall (in.)		30	-	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	4	S1	0.0	NO WELL INSTALLED	52.7		Loose dark brown silty SAND, mps=0.4 mm, moist, roots					85	15				
	5	12	2.0		0.3		-TOPSOIL-		15	15	35	30	5				
	4						Loose red-brown well-graded SAND with gravel (SW), mps=3/4 in., moist										
	4						-FILL-										
	2	S2	2.0														
	3	18	4.0														
	4				49.5		Loose dark brown silty SAND (SM), mps=2 mm, moist				20	55	25				
	9				3.5				25	25	35	15					
							Note: Encountered cobble/boulders starting at 3.2 ft										
					48.0		Loose red-brown silty SAND (SM), mps=1/4 in., moist										
5					5.0		-FILL/REWORKED GLACIAL TILL-										
							Note: auger cuttings indicate brown-gray silty SAND (SM), mps=2 mm, moist to wet										
							GLACIAL TILL-										
					44.5												
		NR	8.7		8.5		Top of weathered -BEDROCK-										
		50/.1	8.8		44.3		More competent -BEDROCK-										
					8.7		BOTTOM OF EXPLORATION AT 8.8 FT										
10					44.2												
					8.8		Auger and spoon refusal										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing		Water
10/21/03	08:20	0.0	-	8.8	8.3

Sample Identification

O open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram

Screen
Filtersand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 8.8
Rock Cored (lin. ft.) -
Samples S2

Boring No. B1-03

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\28438003\28438003TB.GPJ Oct 29, 03

HALEY & ALDRICH

TEST BORING REPORT

Boring No. B2-03

Project **Proposed** Pedestrian Skyway, USM Portland, Maine
Client University **of Southern** Maine
Contractor **Maine Test** Borings, Inc.

File **No.** 28438-003
Sheet No. 1 of **1**
Start **October** 21,2003
Finish **October** 21, 2003
Driller **W.** Hallett
H&A Rep. **B. Lawrence**
Elevation 52.5
Datum **NGVD**
Location **See Plan**

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: **Mobile Truck**
Inside Diameter (in.)	2 1/2	1.375		Bit Type: **Cutting Head**
Hammer Weight (lb.)	-	140	-	Drill Mud: -
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	3	S1	0.0		52.1		Loose dark brown silty *SAND* (SM), mps=2 mm, moist, roots				15	65	20				
	4	16	2.0		0.4		-TOPSOIL-										
	7						**Medium** dense brown silty *SAND* (SM), mps=1/2 in, moist		10	15	30	30	15				
	12						-FILL-										
	9	s2	2.0				**Note:** concrete at 2.0 ft				20	60	20				
	6	14	4.0														
	6				49.1		Light brown to dark brown silty *SAND* (SM), mps=2 mm, moist										
	8				3.4		Medium dense red-brown silty GRAVEL with sand (GM), mps=1/2 in.,		40	10	5	30	15				
	12	s3	4.0		48.5		moist										
	50/.4	6	4.9		4.0		GLACIAL TILL-										
5							Red-gray weathered bedrock/soil										
							-GLACIAL TILL-										
				NO WELL INSTALLED													
					43.5												
					9.0		Weathered BEDROCK-										
					42.3												
		NR	10.0		10.2		BOTTOM OF EXPLORATION AT 10.2 FT										
		50/.2	10.2				Spoon refusal										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
10/21/03	07:15	16.0	4.0	8.6	7.5

Sample Identification

O OpenEndRod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram

Riser Pipe
Screen
Filtersand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 10.2
Rock **Cored** (lin. ft.) -
Samples S3

Boring No. B2-03

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Touahness: L-low M-Medium. H-High **Dry Strenath:** N-None. L-Low. M-Medium. H-High. V-Very High

[1]SPT = Sampler Mows 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 Halev & Aldrich. Inc.**

USCS_TB4 USCSUB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\28438\003\28438003TB.GPJ Oct 29, 03

HALEY & ALDRICH

TEST BORING REPORT

Boring No. B3-03

Project Proposed Pedestrian Skyway, USM, Portland, Maine
Client University of Southern Maine
Contractor Maine Test brings. Inc.

File No. 28438-003
Sheet No. 1 of 1
Start October 20, 2003
Finish October 20, 2003
Driller W. Hallett
H&A Rep. B. Lawrence
Elevation 52.0
Datum NGVD
Location See Plan

	Casing	Sampler	Barrel
Type	HSA	SS	
Inside Diameter (in.)	2 1/2	1.375	
Hammer Weight (lb.)	-	140	
Hammer Fall (in.)	-	30	

Drilling Equipment and Procedures
Rig Make & Model: Mobile Truck
Bit Type: Cutting Head
Drill Mud: -
Casing: -
Hoist/Hammer: Winch/Safety Hammer

Depth (ft.)	SPT	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, 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	2 4 5 10	S1 12	0.0 2.0	NO WELL INSTALLED	51.7 0.3		Loose brown silty SAND (SM), mps=2mm, moist. roots -TOPSOIL-			10	15	60	15				
							Loose gray silty SAND (SM), mps=2 mm, moist, no roots										
	9 8 25\3	S2 18	2.0 3.8		49.0 3.0		Medium dense dark bown silty SAND (SM), mps=4 mm, moist -FILL-			10	5	60	25				
							Dense red-brown well-graded SAND with silt and gravel (SPSM), mps=1/2 in., moist GLACIAL TILL-		30	20	20	20	10				
5	50/.3	NR 0	5.0 5.3		46.7 5.3		BOTTOM OF EXPLORATION AT 5.3 FT Spoon refusal										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
10/20/03	-	0.0			

Sample identification
O OpenEndRod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram
Riser Pipe
Screen
Filtersand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (lin. ft.) 5.3
Rock Cored (lin. ft.) -
Samples S2
Boring No. B3-03

Field Tests:

'SPT = Sampler blows per 6 in. *M: particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters)

Note: Soil identification based on the Modified USCS as practiced by Haley & Aldrich, Inc.

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TEST BORING REPORT

Boring No. B4-03

Project Proposed Pedestrian Skyway. USM. Portland, Maine
Client University of Southern Maine
Contractor Maine Test brings, Inc.

File No. 28438-003
Sheet No. 1 of 1
Start October 20,2003
Finish October 20, 2003
Driller W. Hallett
H&A Rep. B. Lawrence
Elevation 50.0
Datum NGVD
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Truck
Inside Diameter (in.)	2 1/2	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: -
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, 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	1 2 5 4	S1 12	0.0 2.0	NO WELL INSTALLED	49.6 0.4		Very loose gray silty SAND (SM), mps=2mm, moist, roots -TOPSOIL-				15	60	25				
							Loose brown poorly-graded SAND (SP), mps=1/4 in., moist, trace glass -FILL-		10	35	35	15	5				
							Note: concrete at 1.5 A										
5	1 WOH 1 1	s2 10	5.0 7.0				Very loose olive silty SAND (SM), mps=2 mm, moist, occasional root -FILL-				10	50	40				
					42.5 7.5		Note: obstruction at 7.5 ft										
10	5 9 11 14	S3 16	10.0 12.0				Gray weathered bedrock with soil GLACIAL TILL/WEATHERED BEDROCK-										
					37.3 12.7		BOTTOM OF EXPLORATION AT 12.7 FT Auger refusal										

Water Level Data

Date	Time	Time (hr.)	Depth (ft.) to: Bottom of Casing		Water
10/20/03	15:00	0.0	-	12.7	Dry

Sample Identification
O OpenEndRod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram
Riser Pipe
Screen
Fillersand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (lin. ft.) 12.7
Rock Cored (lin. ft.) -
Samples s3

Boring No. B4-03

USCS_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\28438\003\28438003TB.GPJ Oct 29, 03

HALEY & ALDRICH

TEST BORING REPORT

Boring No. B5-03

Project Proposed Pedestrian Skyway, USM, Portland, Maine
Client University of Southern Maine
Contractor Maine Test brings, Inc.

File No. 28438-003
Sheet No. 1 of 1
Start October 20, 2003
Finish October 20, 2003
Driller W. Hallett
H&A Rep. B. Lawrence
Elevation 50.5
Datum NGVD
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Truck
Inside Diameter (in.)	2 1/2	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: -
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. partide size', 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	49.8		-TOPSOIL-				20	50	30				
	3 8 9	S1 8	0.5 2.0		0.7		Loose, dark brown silty SAND (SM), mps=2 mm, moist Medium dense brown silty SAND with gravel (SM), mps=3/4 in., moist, trace brick	15	25	20	25	15					
							-FILL-										
5	15 50/.3	S2 8	4.6 5.4		45.5 5.0		Very dense gray-brown poorly-graded GRAVEL with silt and sand, mps=1/2 in., rock is soft. mixed with soil		50	20	10	10	10				
					41.5		-GLACIAL TILL-										
10	46 10/0	S3 6	10.0 10.5		9.0 39.5 10.6		Very dense gray weathered bedrock/trace soil, dry Auger through weathered/soft bedrock to 10.6 ft -WEATHERED BEDROCK- BOTTOM OF EXPLORATION AT 10.6 FT. Auger refusal More competent bedrock										

Water Level Data

Date	Time	Elapsed T (hr.)	Depth (ft.) to: Bottom of Casing		Water
10/20/03	12:45	0.0	-	7.7	Dry

Sample Identification

O OpenEndRod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 10.6
Rock Cored (lin. ft.) -
Samples s3

Boring No. B5-03

Field Tests: Dilatancy: R-Rapid. S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Touahness: L-Low. M-Medium. H-High Dry Strenath: 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.

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HALEY & ALDRICH

TEST BORING REPORT

Boring No. B6-03

Project Proposed Pedestrian Skyway, USM, Portland, Maine
Client University of Southern Maine

File No. 28438-003
Sheet No. 1 of 1
Start October 21, 2003
Finish October 21, 2003
Driller W. Hallett
H&A Rep. R. Estes
Elevation 44.0
Datum NGVD
Location See Plan

	Casing	Sample	Barrel	Drilling Equipment and Procedures
Type	SSA	SS	-	Rig Make & Model: Mobile Truck
Inside Diameter (in.)	=	1.375	-	Bit Type: Cutting Head
Hammer Weight (lb.)	=	140	-	Drill Mud: -
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	% Fine	% Sand	% Coarse	% Medium	% Fine	% Fines	Field Test: Dilatancy	Toughness	Plasticity	Strength
0	1	S1	0.0	NO WELL INSTALLED	43.3		Very loose dark brown silty SAND (SM) with roots and organics, moist, mps = 3 mm						5	80	15				
	1	12	2.0		0.7		-TOPSOIL-	5	10		20		30	30	5				
	2				42.2		Loose olive-brown well-graded SAND (SW) with gravel, moist, mps = 1.0 in.												
	4				1.8		-FILL-												
	~~50/0.3'~~	~~S2~~	~~2.0~~		41.8		Weathered BEDROCK-												
	Refusal	5	2.3		2.2		More competent -BEDROCK-												
					41.7		BOTTOM OF EXPLORATION AT 2.3 FT												
					2.3		Auger refusal on *bedrock at* 2.3 ft												

Water Level Data					
Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
10/21/03	10:40		-	2.3	Dry

Sample Identification
O open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (lin. ft.) 2.3
Rock Cored (lin. ft.) -
Samples S2

Boring No. B6-03

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.

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HALEY & ALDRICH

TEST BORING REPORT

Boring No. B7-03

Project Proposed Pedestrian Skyway, USM, Portland, Maine
Client University of Southern Maine
Contractor Maine Test Borings, Inc.

File No. 28438-003
Sheet No. 1 of 1
Start October 21, 2003
Finish October 21, 2003
Driller W. Hallett
H&A Rep. R. Estes
Elevation 43.0
Datum NGVD
Location See Plan

	Casing	Sampler	Barrel
		SS	-
Inside Diameter (in.)	-	1.375	
Hammer Weight (lb.)	-	140	-
Hammer Fall (in.)	-	30	-

Drilling Equipment and Procedures
Rig Make & Model: Mobile Truck
Bit Type: Cutting Head
Drill Mud: -
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	1	S1	0.0	NO WELL INSTALLED	42.3		Very loose dark brown silty SAND (SM) with roots and organics, moist, mps=0.25 in			5	5	75	15				
	2	14	1.6		0.7		-TOPSOIL-	10	10	15	30	30	5				
	4				41.7		Loose red-brown well-graded SAND with gravel, moist, mps=1.0 in.										
	50/0.1				1.3		-FILL-										
					41.4		Weathered BEDROCK-										
					1.6		More competent -BEDROCK-spt refusal										
					41.1		BOTTOM OF EXPLORATION AT 1.9 FT										
					1.9		Auger refusal on BEDROCK										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
10/21/03	11:15	-	-	1.5	Dry

Sample Identification
O OpenEndRod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

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

Summary
Overburden (lin. ft.) 1.9
Rock Cored (lin. ft.) -
Samples S1
Boring No. B7-03

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 Strenath: N-None. I-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.

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