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



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UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

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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:

INTRODUCTION

proposal dated 2 October 2003.

PROPOSED CONSTRUCTION

OFFICES

Boston Massachusetts

Cleveland Ohio

Dayton *Ohio*

Denver Colorado

Detroit

Michigan Hartford

Connecticut

Los Angeles California

Manchester New Hampshire

Newark *New Jersey*

Rochester New York

San Diego California

Tucson Arizona

Washington District & Columbia

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

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 proposed project consists of an earth-supported walkway (walkway) located between

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

This report presents the results of our subsurface explorations and geotechnical engineering

in Portland, Maine. This work was undertaken at your request in accordance with our

The proposed skyway will cross over Bedford Street, providing a link between the main

Garage (currently under construction) to the south (see Figure 1, Project Locus).

portion of campus north of Bedford Street and the Community Education Facility and Parking

evaluations conducted for the proposed Pedestrian Skyway at the University of Southern Maine

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 southernmostend 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 150kips. 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.



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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 **linits** of the walkway and skyway foundations. We expect excavations for the bridge foundations to encounter bedrock.

GEOTECHNICAL ENGINEERING 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.



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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 **lccse** 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.



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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	<i>0</i> 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.

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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.



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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.

Brin K. Samence

Brian K. Lawrence, P.E. Staff Engineer

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James W. Weaver, P.E. Vice President

Enclosures:

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Figure 1 Figure 2 Appendix A

Project Locus
Site and Exploration Location Plan
Logs of Test Borings

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FIGURE 1



FIGURE 2

APPENDIX A

Logs of Test Borings



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Project Proposed Pedestrian Skyway, USM, Portland, Maine File No. 28438-003 Chient University of Southern Maine Sheel No. 1 of 1 Contractor Maine Tell to rings. Inc. Sheel No. 1 of 1 Type HSA SS Rig Make & Model: Mobile Truck Barrel Inside Diameter (in.) 2 1/2 1.375 Bit Type: Cutting Head Tile No. 28438-003 Harmer Weight (lb.) - 140 Bit Type: Cutting Head Torilling Equipmentand Procedures Jillier W. Hallett iammer Fall (fn.) - 30 Orill Matt Casing: - Jelist/Hammer: Winch/Safety Hammer Jelist/Hammer. (Field Tell (field for field	3	13-0	E).	No	ng	orii	Bo				RT	BORING REPOR	TEST					۶۲ H	ALEY &	H/ Al					
Casing Sampler Barrel Drilling Equipment and Procedures Driller Type HSA SS Rig Make & Model: Mobile Truck H&A Rep. B. Lawrence Inside Diameter (in.) 2 1/2 1.375 Bit Type: Cutting Head Iatum NGVD Harmer Weight (lb.) - 140 Case rg: - Iatum NGVD iammer Fall (in.) - 30 - Viual-Manual Identiition and Description Gravel Sand E E E E E E E G C E E E E E G C E E E E E G C E E E E E G C E E E E E G C E E E E E G C E E E E E G C S E E E E G C S E E E E G E E E E E E G C S E E E E <td></td> <td>200: 200:</td> <td>20, 20,</td> <td>38-(1 ber</td> <td>2843 1 d ctol</td> <td>2 0. 0</td> <td>lo. t N</td> <td>le N nee art</td> <td>기 가 가</td> <td></td> <td></td> <td></td> <td>Portland, Maine</td> <td>, USM, P</td> <td>/way, aine nc.</td> <td>an Sky ern M ngs. 1</td> <td>destri South : brii</td> <td>ed Pec ity of S ne Test</td> <td>Propos Univers r Mai</td> <td>oject ent ntracto</td> <td>Pro Clie Co</td>		200: 200:	20, 20,	38-(1 ber	2843 1 d ctol	2 0. 0	lo. t N	le N nee art	기 가 가				Portland, Maine	, USM, P	/way, aine nc.	an Sky ern M ngs. 1	destri South : brii	ed Pec ity of S ne Test	Propos Univers r Mai	oject ent ntracto	Pro Clie Co					
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wrater Level Data Sample Identification well Diagram Immary Data Time Elapsed Depth (ft.) to: 0 OpenEndRod IIII Riser Pine Overburden (lin ft.) 5.3			5.3		ary ft.)	umi (lin	<u>nı</u> en	 urd	bi	/erł	Ov) to:	th (ft.	Dep	ed	Elapse	Time	ate						
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10/20/03 - 0.0 U Undisturbed Sample Grout Samples S2				2	SZ			es	pl	mp	Sa	Cuttings Grout	U Undisturbed Sample					0.0	-	20/03	10/2					
S Split Spoon G Geoprobe Bentonite Seal Boring No. B3-03		3	3-0	B)_	No	gl	in	ori	Bo	Concrete Bentonite Seal	S Split Spoon G Geoprobe													
Field Tests:													<u> </u>						:s:	eld Tes	Fi					
'SPT = Sampler Mows per 6 in, *M particle size (mmi) is determined by direct observation within the limitations of sampler size (in million Note; Soil identification based on th th th USCS as practiced by Haley & Aldrich Inc.					nillin 174	<u>in m</u> : <u>h.</u> 1	<u>ze (</u> Iric	<u>x si</u> Alc	<u>pie</u> 8	amp ay 2	<u>ns of sa</u> v Hale	servation within the limitations USCS as practiced by	e (mm) is determined by direct obs that fit	particle size ased on	lion h	⁴ M.	in. 1 ider	sper6i : Soi	n <mark>oler</mark> Mov Not	T = San	¹ SP					

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			Ca	asing	San	npler	Barrel		Drilling Equipmer	it and F	Procedures			rille	r	~	W	.н И.Н	zo, Ialle	200 ett	5	
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Insi	de Dia	meter (in) 2	1/2	1	375		Bit Ty	/pe: Cutting Head				E	leva	atio	n	5	0.0				
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t)			- F	ram	b t	ubol	! \	/isual-N	Manual Identificatio	n and E	Description		Gra	avel	6	Sanc	1	}	F	ield %	Tes	.t
lepth (r	ЪТ	ample Rec. (sample bepth (f	/ell Diag	tt) T	SCS Syr	(Densit) structure. d	y/consis	stency, color, GROUF	NAME,	, max. particle geologicinter	size', pretation)	6 Coars	6 Fine	% Coars	6 Mediu	% Fine	% Fines	ilatancy	oughnes	lasticity	trength
- 0 -	1	S1	0.0	5	ш <u>с</u> 49.6	2	Verv loose	e grav si	lty SAND (SM), mos	=2mm.	moist, roots				H	15	60	25	4		Р	<u>~</u>
	2	12	2.0		0.4			- 3- 02	-TOPSOI	L	4/4		\square	10	35	35	15	5				
	5						LOOSE Drov	wn poori	iy-graded SAND (SP) -FILL-	mps=1	1/4 II., moist,	trace glass										
	<u> </u>						Note: cond	crete at 1	1.5 A				Ì									
5	1 VNOH	s2 10	5.0 7.0				Very loose	onal root				10	50	40								
	1												1									
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10	5 9 11 14	\$3 16	10.0	NO WELL INSTAL	37.3		Gray weat	hered bee GLA	drock with szil CIAL TILL/WEATH													
					12.7			BOT	TOM OF EXPLORA	TIONA	T 12.7 FT											
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	l	Wa	tor Lov		ta			Sar	mole Identification		lell Disgram		1_1		1	1	<u> </u>			1		
<u> </u>		Time			Dep	th (ft.) to:	<u> </u>	OpenEndRod		Riser Pipe	0	erbi	s Unde	en (lin.	uy ft.)	1	2.7			
	ate 20/03	11me 15:00	Time (1 0.0	hr.) B	ottom Casing -	12.7	Water 7 Drv	T U	Thin Wall Tube Undisturbed Sample		Screen Fillersand Cuttings	Ro	ck (mpl	Jan es	ed ((lin.	ft.) s3		-			
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HL AI	ALEY DRIC	& H	TEST BORING REPORT Boring No. B5-03 Proposed Pedestrian Skyway, USM, Portland, Maine inversity of Southern Maine Maine 28t. brings, Inc. File No. 28438-003 Shoet No. 1 of 1 Start October 20, 2003 Casing Sampler Barrel Drilling Equipment and Procedures Driller W. Hallett HSA SS - Big Make& MxLit: Mobile Txxk B& Trype. Cutting Head Drill MxL - Casing - Drill MxL - Casing - - Elevation 50.5 Datum Elevation 50.5 Datum Drill MxL - Location 50.0 20 - 140 - Casing - Casing - Hoist March - Field No.2 Elevation 50.5 Datum Datum So Plan 20 - Hoist Marche - Casing - Casing - So B - Field Test So Datum - Field Test So Datum - - Field Test So Datum - - 20 -																		
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			C	asing	San	npler	Barrel	Drilling Equipmer	nt and Procedures		D	nısı rille	n er	Ű	V	V. H	zo, Halle	200 ett	3		
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Insid	de Dia	meter ((in.) 2	1/2	1.	375		Bit Type: Cutting Head			E	leva	atic	m	5	0.5					
Han	nmer \	Veight	(lb.)	•	1	40	-	Drill Mud: -				atu	m tio	n	<u>ז</u> האכ	Pla	<u>n</u>				
Har	nmer I	- Fall (in.)		-	3	0	-	Hoist/Hammer: Winch/S	afety Hammer												
(¥)		e No. (in)	l (j)	gram	epth	ymbol	۱ <u> </u>	/isual-Manual Identificatio	nand Description		Gra	avel	e Se	San E	d		F	ield sg	Tes	t	
Depth (SPT	Sample & Rec.	Sample Depth (Well Dia	Elev. (f)	uscs s	(Density structure, c	y/consistency, color, GROUP ccr. moisture, optional descr	NAME, max. partide size', iptions, geologic interpretat	ion)	% Coars	% Fine	% Coar	% Medi	% Fine	% Fines	Dilatanc	Toughne	Plasticity	Strength	
- 0 -					40 R		-	-TOPSOI	L-			-		20	50	30					
-	3	S1 8	0.5		0.7		<u>Loose.dar</u> Medium do	<u>k brown silty SAND (SM), m</u> ense brown silty SAND with g	ps = 2 mm, moist gravel (SM), mps = 3/4 in.,	/	15	25	20	25	15						
	9						moist, trac	e brick													
-	15		46		45,5			Indense gray-brown poorly-graded GRAVEL with silt and sand, 50 20 10 10 =1/2 in., rock is soft. mixed with soil -GLACIAL TILL- 50 20 10 10													
- 5 -	507.3	8	54		5.0		Very dense mos - 1/2	e gray-brown poorly-graded G	RAVEL with silt and sand,			50	20	10	10	10					
ŀ							шрз=1/2 1	-GLACIAL 7	mLL-												
-				A																	
				STALLE	41.5																
				L IN	9.0		Very dense	e gray weathered bedrock/trace	e soil, dry		•										
- 10 -	46	S3	10.0	MEL	39.5		Auger thro	ugh weathered/soft bedrock to	10.6 ft												
	10/0	0	10.5	2 2	10.6		\	BOTTOM OF EXPLORA	FION AT 10.6 FT.	—1											
							Auger refu	sal													
							More comp	etent bedrock													
														·							
		<u> </u>							· · · ·												
	1	Wa	ter Lev	el Dat	Dord	h/ft	to:	Sample Identification	Well Diagram			_	<u>n</u>	nma	iry						
Da	ate	Time	T (I	hr.) B	ottom	<u></u>	Water	O OpenEndRod	Screen	Ove	erbi	urd	en ((lin. (lin	ft.)	10	0.6				
10/2	20/03	12:45	0.0		-	7.7	- Drv	F Thin Wall Tube U Undisturbed Sample	Cuttings	San	npl	es	c u	(1111.	s3	3					
								S Split Spoon	Grout Concrete	Boi	16	ã Ì	J.		-	R	5_01	2			
Fie	eld Test	s:	I	Dilata	incv:	R-R	apid. S-Slo	<u>G Geoprobe</u> ow, N-None Plas	Bentonite Seal ticity: N-Nonplastic. L-Lo	w, M-	Me	y i diu	чО <u>m</u> .	H-F	tiat	ית ו	J-U.	,		_	
L'SP	T = San	npler_blov	wsper6	Toual	ness: Max	L-L imum	ow. M-Mec	lium. H-High Dry (mm) is determined by direct of	Strenath: N-None. L-i ov servation within the limitations	/. M.M.		tiun ar si	n_ ze(H-H	iah Ilim	_V-		/ Hic	ah		
		No	te: Soi	l ider	ntificat	ionba	ased on vis	sual-manual methods of th	e USCS as practiced by	Hale	18	Ald	ric	h. li	nc.		-				

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			Ca	asina	San	nple	Barrel		Drilling Equipmen	tand Procedures		Fii Di	nisl ille	n r	0	CEOU V	Der V₋F	21, Taik	200 eft	13	
Гур	e		8	SA SA	5	s.	-	Rig	Make & Model: Mot	pile Truck		H	S A	Re	ep.	R	ε. Ε	istes			
nsi	de Dia	meter (i	in.)		1	375	-	Bit 7	ype: Cutting Head			E	eva	atic	m	4	4.0				
lan	nmer V	Veiaht ((lb.)		1	40	-	Drill	Mud: -			Da Lo	atui xca	m tior	<u>ו ו</u>	N See	VGV Pla	vD m			
ian	nmor F	all (in)		-		10	_	Hois	ing: - t/Hammer: Winch/S	ofety Hammar						~~	1 10				
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E		N L	(H)	agra	ő	Synt		/isual·	-Manual Identification	and Description		Ē	6	arse	dium	6	88	cy	ness	ţ	£
Depth	SPT	Samp & Rec	Samp Dept	Well D	Elev./	uscs :	(Densit structure, c	y/cons odor, m	istency, color, GROUP loisture, optional descri	NAME, max. particle size', ptions. geologic interpreta	lion)	% Coa	% Fine	% Co	% Me	% Fin	% Fin	Dilatan	Tough	Plastic	Streng
- 0 -	1	S1	0.0		43.3		Very loose	dark l	brown silty SAND (SM)with roots and organics, n	wist,				5	80	15				
ŀ	2	12	2.0		0.7		mps=3 m	n 	TOPSOI	[. .]	5	10	20	30	30	5				
	4				42.2		Loose oliv mos ≈ 1.0	e-brow in.	vn well-graded SAND (S	SW) with gravel, moist,	1			-		-	_				
	50/0.3 Refusa	<u>- S2</u> - 5	<u>2.0</u> 2.3		41.8		Weethoused	וחשם	-FILL-			F									
					41.7		More com	petent	-BEDROCK-												ĺ
	1				2.3			BC	OTTOM OF EXPLORA	TION AT 2.3 FT											
							Auger refu	isal on	bedrock at 2.3 ft												l
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	Water Level Data Sample Identification Well Diagram												5	Sur	nma	ary					
D	ate	Time	Liapse Time (1	ea βα∟ β	lottom	th (ft.) Botto) to: ^m Water	0	open End Rod	Screen	Ove	erbe	urd	en	(lin. Aire	ft.)	2	2.3			
101	21/02	10.40		in of (Casing	of Ho		T 11	I hin Wall Tube	Filter Sand	Koo San	ж (nole	Jon es	ed	(IIN.	π.)	•	-			
		10.40				2.3	Dry	S	Split Spoon	Grout	-	- 				32					
	<u> </u>		l					G	Geoprobe	Concrete Bentonite Seal	Bo	rin	g l	NC).	12-1	B	6-0			
Fie	eld Test	s:		Dilata	ancy: hn <u>ęss:</u>	א-ה L-L	apid, S-Sk .ow. M-Mec	ow, N lium.	-None Plas H-High Dry	sucity: N-Nonplastic, L-L Strength: N-None, L-Lo	ow, M- w. M-	-Me Me	diu <u>Jiur</u>	m, n	нн <u>Н-Н</u>	igh.	<u>v</u> .	Ver	<u>y Hi</u>	gh_	
<u>'SP</u>	'i = San	n pier blov Not	<u>rsper6i</u> te: Soi	n. 1 ider	<u>Ma)</u> Maificat	umum ion b	particle size	(mm) is sual-m	s determined by direct ob anual methods of th	e USCS as practiced by	s of sai Hales	npk , R	¥ Si ∆la	ze (Iric	<u>in m</u> h li	illim nc	eten	S).			

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ſ			Ca	asing	San	npler	Barrel	[Drilling Equipme	ntand P	Procedures		D	nıs. rille	n r	U	Vu.	V. F	zı, Halle	ett	5	
Ì					s	S		Rig	Make & Model: Mo	bile True	ck		н	8A	Re	<u>р.</u>	F	<u>ξ.</u> Ε	stes			
Insi	de Dia	meter (in.)	-	1.	375		Bit	Type: Cutting Head				IE De	leva	atio m	n	4 N	3.0	v n			
Har	nmer V	Veight	(lb.)	-	1	40	-		Mua: -			1	Lo	ca	tion	1 5	See	Pla	n n			
<u>Ha</u> r	nmer F	all (in.)		-	3	ю	-	Hois	st/Hammer: Winch/S	afety H	ammer											
		9 Z c	â	E	f	bot	T	Visual	Manual Identificatio	n and D	escription		Gra	avel		San	d		F	ield ø	Tes	t
۲ ۳	-	ble (j)	t de U	Diagr	ą	Syn		V ANRU					arse	e	barse	adiun	e	Jes	Ŋ	nes	<u>₹</u>	£
Depi	SPT	& Re	Sam Depi	Well	Elev.	nscs	(Densit structure, d	y/cons odor, n	istency, color, GROUP noisture. optional desci	NAME.	max. partide size geologic interpret	e', ation)	0 %	% Fir	Ŭ %	% W	% Fi	% Fi	Dilata	Toug	Plasti	Stren
- 0 -	1	S1	0.0		42.2		Very loose	dark	brown silty SAND (SM) with ro	oots and organics,	moist,			5	5	75	15				
╞	2	14	1.6		42.J 0.7		mps = 0.25	in.	-TOPSOI	L			10	10	15	30	30	5				
	50/0.1				41.7 1.3		Loose red-	brown	well-graded SAND wit	h gravel	, moist, mps = 1.0	in.					_					
					41.4 1.6		Weathered	BED	ROCK-													
					41.1		(<u>Niore com</u>	B(-BEDROCK-spt refusa	TION A	T 1.9 FT	J						·				
ļ		ļ			ومد		Auger refu	ısal on	BEDROCK													
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		Wa	ter Lev	el De	 ata			S	ample Identification	W	ell Diaoram		1		Sun							=
~		Time	Elapse	ed L	Dept	th (ft.)) to:	0	OpenEndRod	Ē	Riser Pipe	Ove	erbu	urd	en ((lin.	ft.)		1.9			_
	ate		Time (I	nr.) B	ottom Casing	Botto of Ho	m Water	Т	Thin Wall Tube	Ш	Selfer sand	Roo	. k (Con	ed	(lin.	ft.)		-			
10/2	21/03	11:15	-		-	1.5	Dry	U	Undisturbed Sample		Cuttings Grout	San	nple	es_			S 1					
								S	Split Spoon		concrete	Во	rin	gì	No.	•		B	7-0.	3		
Fie	eld Test	s:	L	Dilat	ancy:	R-R	apid. S-Sk	w, N	-None Plas	sticity: N	V-Nonplastic, L-	Low, M	Me	diu	m,	H	ligi	٦ <u>,</u>	1/	I LIF	ah	-
_'SP	T=San	npier blov	wsper6	<u>in,</u>	<u>nness:</u> <u>²Max</u>	dimum dimum	ow, IVI-IVIEC	uum. (mm) is sual n	s determined by direct ob	Surenation	n: N-NORE. I-L(within the limitatio	JW. M <u>-</u> nsofsar	nple	NUN X Siz	LL Ze (i	in mi	iga. illim	eters	s)	y ril	gl()	

USCS_TB4 USCSUB4.GLB USCSTB+CORE4.GDT G:PROJECTS/284381003/284380037B.GPJ Oct 28,03