			PL	RMITIS	SUED	odice)	
	Maine - Building or Use			Issue Date	:	BL; 14 A	004
	04101 Tel: (207) 874-8703	3, Fax: (207) 874-87	16 03-0070	, <u> </u>	2002	115 B00	9001-
Location of Construction:	Owner Name:		Owner Address			Plone:	
88 Bedford St Business Name:	University Of		107 Mane Ave			228-8412	
Dusmess Name;	Contractor Name: Granger Northern, Inc.		Contractor Milites		# N F 7.69 A F	Phone	0.0
Lessce/Buyer's Name	Phone:	nern, inc.	84 Middle St. P Permit Type:	ortland		207774350	
source straine	I none.	·	Foundation On	lv/Commercia	al		Zone:
Past Use:	Proposed Use:		Permit Fee:	Cost of Wor		District:	1
Parking lot	FOUNDATIO	N ONLY For parking		ı	\$0.00	2	[
	garage See pe		FIRE DEPT:	Approved	INSPECTIO		
		#6300H		☐ Denied	Use Group:	52	Туре: 2
				~ 2 d/\ / /			/
			Sarc	2300//		1/3//	3.3
Proposed Project Description)n; / E1	1, 2000114	İ		/	7v. (V	11
	TFor parking garage See perm	03011 03011	Signature:		Signature:	-cu/	ny
			PEDESTRIAN AC	TIVITIES DIST	FRICT (P.A.E).) (·
			Action: Appr	oved App	proved w/Cond	litions 🔲 l	Denied
			Signature:		Date	e:	
Permit Taken By:	Date Applied For:		Zonin	g Approva	aI		
mjn	01/31/2003						
	ation does not preclude the	Special Zone or Revi	ews Zoi	ning Appeal	H	listoric Prese	rvation
Applicant(s) from the Federal Rules.	meeting applicable State and	Shoreland	☐ Variar	nce] []]	Not in District	or Landma
Building permits de septic or electrical	o not include plumbing, work.	☐ Wetland	☐ Misce	llaneous	□r	Does Not Requ	iire Review
	e void if work is not started hs of the date of issuance.	Flood Zone	Condi	tional Use		Requires Revie	:w
False information n permit and stop all	nay invalidate a building work	Subdivision	☐ Interp	retation		Approved	
		Site Plan	□ Аррго	ved	A	Approved w/Co	onditions
		Maj Minor MM	☐ Denied	i		Denied	
		Date: APPER	Date:		Date:	· · · · · · · · · · · · · · · · · · ·	
		Ph. 403	ooll				
		CERTIFICATI	ON				
hereby certify that I am	the owner of record of the nar	med property, or that th	e proposed work	is authorized	by the owner	er of record	and that
have been authorized by	y the owner to make this appli	cation as his authorized	l agent and I agree	to conform t	o all applica	able laws of	f this
risdiction. In addition, Iall have the authority to	if a permit for work described to enter all areas covered by su	f in the application is is	sued, I certify that	t the code offi	icial's autho	rized repres	sentative
ich permit.	o omer an areas covered by su	on permit at any reason	adie nout to entoi	ice the provis	sion of the c	ode(s) appi	icable to
IGNATURE OF APPLICAN	Т	ADDRESS	· · · · · · · · · · · · · · · · · · ·	DATE		PHON	E
ESPONSIBLE PERSON IN	CHARGE OF WORK, TITLE			DATE		PHONI	F.

DATE

PHONE

City of Portland, Maine - Building or Use Permit			Permit No:	Date Applied For:	CBL 144004
389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716		03-0070	01/31/2003	-115 B009001	
Location of Construction:	Owner Name:		Owner Address:		Phone:
88 Bedford St	University Of Maine		107 Maine Ave		() 228-8412
Business Name:	Contractor Name:		Contractor Address:	- Section - Sect	Phone
	Granger Northern, Inc	: .	84 Middle St. Port	land	(207) 774-3500
Lessec/Buyer's Name	Phone:		Permit Type:	WITH THE PROPERTY OF THE PROPE	
			Foundation Only/	Commercial	
Proposed Use:		Propose	d Project Description:		27-HA-
FOUNDATION ONLY	For parking garage See permit #0300	4	_	or parking garage Se	e permit #030011
		ļ			
Dept: Zoning	Status: Approved with Condition	Davier-	Manage Calana	1 1 2 2	0.1.10.0.10.0.0
Note:	Diates. Approved with Condition	is Keviewer;	Marge Schmucka	11	
1) See Permit # 030011					Ok to Issue: ✓
1) 50010111111 050011					
Dept: Building	Status: Approved with Condition	s Reviewer:	Mike Nugent	Approval Da	te: 01/31/2003
Note:			_		Ok to Issue:
Alternative pile testin approved, formal approved.	g method must be formally approved oval forthcoming. MJN	l as a Alternative	e method. Discussed		· · · · · · · · · · · · · · · · · ·
Comments:					
1/31/2003-gg: Permit has	been paid in full, see permit # 0300	11. /gg			

•

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

Haley & Aldrich, Inc. 500 SouthBorough Drive, Suite 10 South Portland, ME 04106-6935 Tel: 207.772.5439

Fax: 207.871.5999 www.HaleyAldrich.com



Letter of Transmittal

Date	31 January 2003			
File Number	28438-002	28438-002		
From	Kenneth L. R	Kenneth L. Recker		
То	City of Portla			
	389 Congress Portland, Mai			
Attention		gent, Inspection Services Manager		
Copy to		en, University of Southern Maine (Transmittal only)		
Subject	Parking Garage University of Southern Maine Portland, Maine			
Copies	Date	Description		
1 ea	12 July 2002 9 Jan 2003	Report on Subsurface and Foundation Investigation Pile Driving Submittal by H.B. Fleming		
Transmitted via	☐ First class r	mail □ Overnight express ⊠ Hand delivery □ Other		

Per request of John Rasmussen of University of Southern Maine

City of Portland, Maine - E	Building or Hse Permit	ł	Permit No:	Date Applied For:	Topt,
389 Congress Street, 04101 Te				01/31/2003	CBL: (14 A 004 115 B009001
Location of Construction:	Owner Name:	201,0110.11	Owner Address:	, , , , , , , , , , , , , , , , , , , ,	
88 Bedford St	University Of Maine				Phone:
Business Name:	Contractor Name:		107 Maine Ave		() 228-8412
			Contractor Address:		Phone
Lessee/Buyer's Name	Granger Northern, Inc.		84 Middle St. Portl	land	(207) 774-3500
Lessewhiyer's Name	Phone:		Permit Type:		
		ļ			
Proposed Use:		Propose	ed Project Description:		
FOUNDATION ONLY For parking Dept: Zoning Status:	ng garage See permit #0301			or parking garage Se	
Note:	Approved with Conditions	Keviewer:	Marge Schmuckal	Approval Da	te: 01/08/2003
1) See Permit # 030011				•	Ok to Issue: 🗹
7 700 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5					
Dept: Building Status:	Approved with Conditions	Reviewer:	Mike Nugent	Approval Dat	te: 01/31/2003
Note:			1,100	- -	
1) Alternative pile testing mathod	must be formally			(Ok to Issue: 🔽
Alternative pile testing method approved, formal approval forti	hcoming. MJN	as a Alternative	method. Discussed	method and have co	nceptually

H.B. FLEMING

89 PLEASANT AVE

SOUTH PORTLAND, MAINE 04106

Phone: 207-799-8514 Fax: 207-799-8538

www.HBFLEMING.com



Granger Northern, Inc. 84 Middle St. Portland, ME 04101

Re: USM Parking Garage Pile Driving Criteria

Attn: Rick Bergeron

Dear Rick.

The intent of this letter is to communicate H.B. Fleming's intended pile driving criteria. We have included in our submittal the following:

- Pile Driving Equipment Data Sheet, describing in detail the individual elements of the pile driving system
- Manufacturer's cut sheet for the intended pile hammer
- Pile Profile drawing describing pertinent elements of in-place piles
- Manufacturer's cut sheet for the cast steel points
- Two WEAP analyses

Piles will be HP14x89 ASTM A572 Gr. 50 steel and will be fitted with cast steel driving points. The piles will be driven to an Ultimate Capacity of 300 tons (2.0 times the design load of 150 tons). GZA GeoEnvironmental, Inc., of Norwood, MA, will perform dynamic testing on six piles to verify capacity.

We propose using an MKT DE-42 open-ended diesel pile hammer to drive the piles. The DE-42 has a ram weight of 4,200 lbs, a maximum stroke of 10'-6", and a rated energy of 42,000 ft-lbs. The hammer cushioning consists of 2.5 inches of Hamortex material. NOT IN COMPCIONCE WIGGOTEC REPORT HT A PLEASE comment

In order to anticipate capacities and stresses of various length piles on site, we have completed two WEAP analyses. One analysis is based on a pile length of 50', and another is based on a pile length of 10'. In order to achieve the required 600 kip ultimate capacity, the 50' piles will be driven to 13 blows per inch for three consecutive inches. Using the same driving criteria for the 10' piles (13 blows/in) results in higher compressive stresses than in the 50' piles. We have included a summary of the WEAP results below in a table.

PILE LENGTH	CAPACITY (KIPS)	BLOWS PER INCH	MAX. COMPRESSION STRESS (KSI)
50'	600	12.9	COM RESIDITION STRESS (KSI)
10'	+/-690	12.9	40.02
	T7-09U	12.9	+/-45

HAA PLEASE COMMONT

Dave Gifford

Harand by Haleyt. Aldrich Sm. 1/27/03 Acceptable, Kil

H.B. FLEMING PILE EQUIPMENT DATA SHEET

Project: USM Parking Garage	3	Data: 1/7/02
Location: Portland, ME	Date, 1/7/03	
		Client: Grainger Northern Inc.
HAMMER	Manufacturer:	MKT
	Model:	DE-42
RAM	Туре:	Single Acting Diesel
ICALIVI.	Length of Stroke:	10' - 6"
	Rated Energy at Given Stroke:	
	Modifications:	42,000 ft-lb None
		None
ANVIL		
HAMMER CUSHION	Material:	
	Thickness:	Hamortex
		2.5"
	Area:	$285 \text{ in}^2 \sqrt{}$
	Modulus of Elasticity:	(29,000 psi)
	Coefficient of Restitution:	0.8
DDHMIN		
DRIVE HEAD		
	Weight:	1300 јь
	٠.	
PILE CUSHION	Cushion Material:	N/A
	Thickness:	N/A
	Modulus of Elasticity:	N/A
	Coefficient of Restitution:	N/A
•		17/11
PILE	Pile Type:	HP14x89
	Length in Leads:	Up to 65'
1 .1	Weight/LF:	89 lb
	Wall Thickness:	0.615"
1 1 .	Taper:	N/A
	Cross Sectional Area:	
	Design Capacity of Pile:	26.1 in ²
	Splice Description:	150 tons
	Tip Treatment Description:	Full Penetration Butt Weld
	Tip Treatment Description:	Cast Steel Point

MAXIMUM DIESEL HAMMER FLEXIBILITY FITTING IN 8 × 20 LEADS WITH RAM WEIGHTS TO 4,200 LBS.

DE42/35

AND ENERGY RANGES. ANOTHER MKT
FIRST PROVIDING THE CONTRACTOR
WITH HAMMER SIZE FLEXIBILITY AND
COSTS. MKT DIESEL HAMMERS CONTINUE OPERATION. USING EITHER STANDARD OR ONE HAMMER -- MULTIPLE RAM SIZES TO OFFER FEATURES WHICH INSURE REMOTE FUEL DELIVERY SYSTEMS. DEPENDABLE AND PRODUCTIVE

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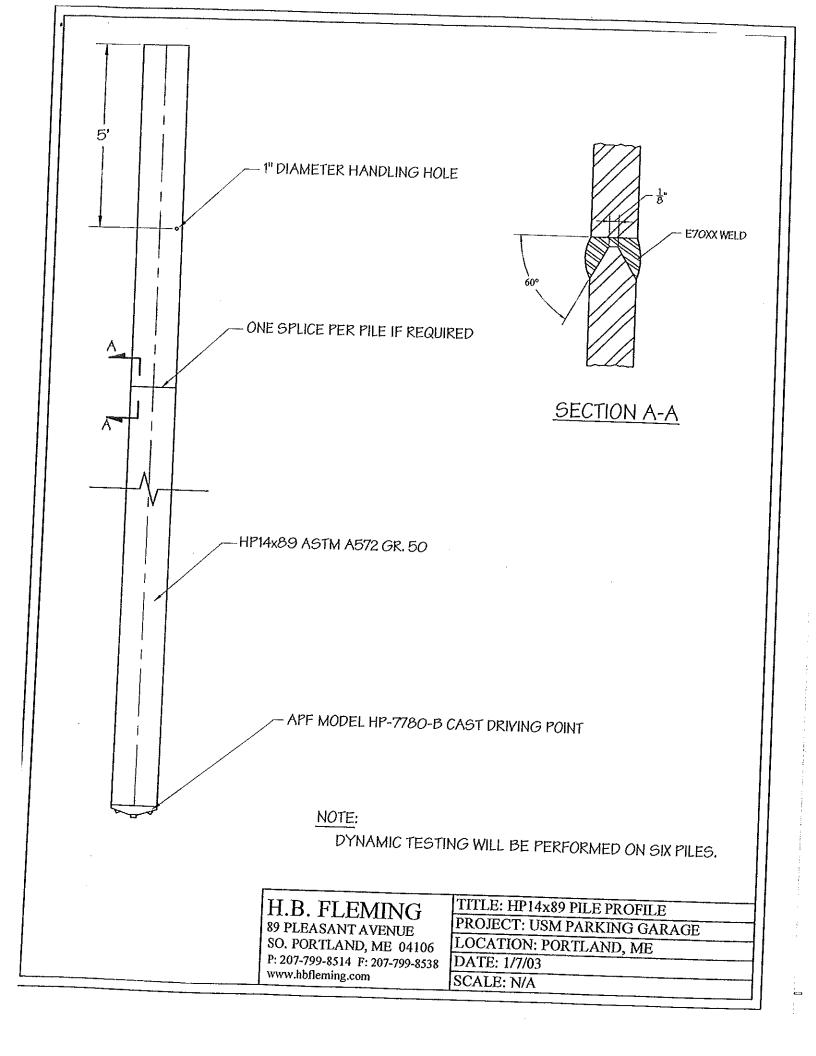
ENERGY RATING (FT.LBS.) BEARING BASED ON ENGINEERING MAXIMUM OBTAINABLE STROKE OVERALL LENGTH WITH DRIVE CAP	42,000
	42,000
	42,000
	.230
9	10'-6"
1	16:-7-
8,60	-9,300
(LBS.) 9.550	7000

PRODUCT LIST

** gire

SINGLE ACTING DIESEL PILE HAMMERS AIR PILE HAMMERS VIBRATORY PILE DRIVERSIEXTRACTORS VIBRATORY HAMMER ACCESSORIES PILE DRIVING LEAD SYSTEMS CUSTOM ENGINEERED PRODUCTS

DOUBLE ACTING DIESEL PILE HAMMERS DRIVE CAPS AND ACCESSORIES
HYDRAULIC POWER UNITS
HYDRAULIC AUGER SYSTEMS
BOTTOM BRACES
LEAD ACCESSORIES



þ 7/05 10:43 T

MOULTON! P-82/82

HARD-BITE ... 1281.773842 P.

installation Instructions

HARD-BITE POINT MODEL HP_7730-8.

BOTTOM VIEW

TOP V. EM

Dimensions

To bet point unite iny and of a secure suspire find,

التقويل المعالمة المع

业。

2. Wild point to the sile in elitre list or vertical position using E60 or E70XX electrodes.

Wild scrass full wieth of Nange lollowing than

Welg See Chard 13 amg MODEL HP-7780-8 A .csffv

MADE IN U.S.A.

ASTH AIL8 90/60 HEAT KEATED

Materiel Cast Steel

CE A COLAN XF # * 38 ¥ 12 × 17 716 31Te

Call toll free 800-526-9047

HARD-BITE" HP 77600

1. Material: Points shall be made in one Erece of ASTM A27 65/35 or AAR M-201 Grads B.

Design:

4

Commercially manufactured Hipile driving point

shall have the following characteristics:

2.01 Points shall have continuous backage en the entire inner edges of the H I=r I=r e pue a. Backing up welds along the puside of the flanges, poses of:

Encasing the web of the pile to assu e alignment and prevent separation: ö

The soil bearing surface of the driving poins shall have seven integrally east tabon dieucing wedges, three to be located one each flange, one to be centered on the west. 2.02

2.03 Minimum overall widths of the farges of 8", 10", 12" and 14" points skall be so in chart, line A.

Minimum width of the web (excitusive of Protruding cutting wedge of 8", 10", 12" and 14" points shall be as in chall, no B. 2.04

Minimum height of the point (exclusive of the protruding cutting wedges) from this soil bearing surface of the web to poetring interface shall be as in chart, line C. 2.05

2.06 Chart

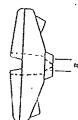
NOT TO STALE 1-1/8" 2.1/16" 1,1/8" 1.1/16" 15/16" 1.7/8"

-1/4-.g/>

12

<u>.</u>

6



SAMPLE SPECIFICATION
PROVIDED AS A CONVENIENCE
TO ENGINEERS & DESIGNERS

4550CIATED PILE PITTING COLD BOX 1048, CHINON, NJ. 0:01.

07-Jan-2003 GRLWEAP (TM) Version 1998-2 1.30 kips 14175 kips/in 0.100 in 0.040 in 0.070 sec/ft 0.150 sec/ft Skin Friction Distribution 50.00 ft 26.10 in2 Res. Shaft = 15 % (Proportional) MKT DE 42/35 Helmet Hammer Cushion Pile Model Skin Quake Toe Quake Skin Damping Toe Damping Pile Length Pile Top Area Efficiency ----Tension Stress (ksi) ----Stroke (feet) 50.0 16.00 8 0.0 8.00 9.0 100.00 83 66.7 Blow Count (blows/in) 200 833 16.7 H.B. FLEMING : 12/16/2002 : 50.0 6.0 20.0 0.0 2000 1600 1200--Compressive Stress (ksi) -Ultimate Capacity (kips)

H.B. FLEMING: 12/16/2002:

U/-Jan-2003 GRLWEAP(TM) Version 1998-2

Ulitmate Capacity kips	faximum ssion √tress ksi	Jm on Stress ksi	Blow Count plows/in	Stroke feet	inergy kips-ft	
200.0	25.237	0.198	2.3	8.20	16.91	
300.0	28.916	0.728	3.9	8.89	16.78	
400.0	33.470	1.234	6.0	9.24	17.30	
500.0	37.539	1.064	8.5	9.85	18.57	
600.0	40.020	1.517	12,9	10.00	18.73	•
650.0	40.201	1.633	17,1	9.75	18.14	
700.0	41.023	1.837	21.6	9.82	18.27	
800.0	41.936	2.754	38.8	9.85	18.30	
900.0	42.735	3.686	88.2	10.00	18.42	
1000.0	41.943	3.994	9999.0	9.74	17.81	

Input File: C.W.B. FLEMING/PROJECTS/BIDDING/USM PILES/USM/1489.GW Hammer File: C.Program Files/GRL & PDR/GRL WEAPWAAMMER.ALT

Echo Print of Input Data

ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of an impact driven pile. The program contains mathematical models which describe hammer, driving system, pile and soil during the hammer blow. Under certain conditions, the models only crudely approximate often complex dynamic situations.

A wave equation analysis also relies on input data which represents normal situations. The data may be the best available information at the time of the analysis, however, it may greatly differ from actual field conditions.

The program authors, therefore, recommend prudent use of GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic measurements. Estimates of bending or other local non-axial stresses and prestress effects must also be accounted for by the user.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of a safety factor to yield a design or working load.

GRL WEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS Version 1998-2 English Units

: 12/16/2002 ;

MKT		
	Dampg	6.0
Made by:	C-Sik	0.0100 0.0100 0.0100 0.0100
42/35	O. A. a.	1.000 c 1.000 c 1.1 0.904
Hammer Model: DE 42/35	No. Weight Stiffn kips k/inch 1 1.400	2 1.400 65596.5 1.000 0.0100 3 1.400 65596.5 1.000 0.0100 Imp Biock 0.800 42661.1 0.900 0.0100 Helmet 1.300 14175.0 0.800 0.0100

HAMMER OPTIONS:

0.020	
154 Hamner Type 0 Stroke Convergence Crit. 1 Hamner Damping	
Hammer File ID No. Stroke Option Fuel Pump Setting	

70~

HAMMER DATA:

5.00	
(inch)	e
(ki) 10.00 Actual Stroke	4640
10.00	Chency,
(kips)	+
Ram Weight Maximum Stroke	

Maximum Pressure (psi) 1450.00 Actual Pressure (psi) 1450.00 Compression Exponent 1.350 Expansion Exponent 1.250 Ram Diameter (inch) 12.00 Minimum Stroke (ft) 5.00 (s) 0.00100 Ignition Duration (s) 0.00200 Combustion Delay

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

0.0
(inz) 0. (bst) 0. 0.00 0.0 0.0
PILE CUSHION 223.50 Cross Sect. Area (125.0 Elastic-Modulus (125.0 Thickness (inch) 0.8 Coeff of Restitution 0.0 RoundOut (#) 75.0 Stiffness (kips/fin)
USHION PILE
<u>. 4</u>
HAMMER CUSHION Cross Sect. Area (in2) Elastic-Modulus (kst) Thickness (inch) Coeff of Restitution RoundOut (ft) Stiffness (kips/in) 14
HAMMER CUSHIC Cross Sect. Area (Elastic-Modulus Thickness (inc Coeff of Restitution RoundOut (Stiffness (Aps/ii
HAMMEJ Cross Sec Elastic-M Thickness Coeff of R RoundOut Stiffness

01/07/2003 12/16/2002 H.B. FLEMING 1998-2

GRLWEAP(TM) Version

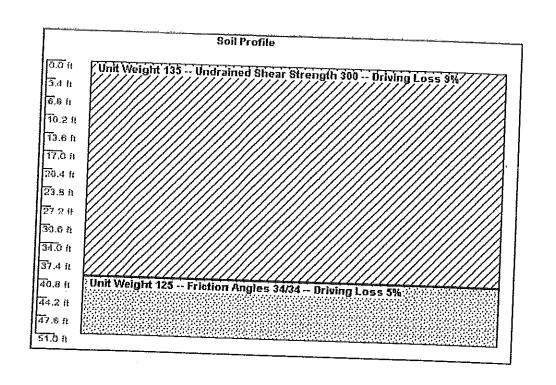
D Top Area E-Mod Spec Wt Circuf Strength Wave Sp EA/c ft in in ksi 1b/ft3 ft ksi ft/s k/ft/s 0.0 26.10 29000, 492.0 4.8 50.000 16524, 45.8 50.0 26.10 29000, 492.0 4.8 50.000 16524, 45.8 PILE PROFILE: LbTop

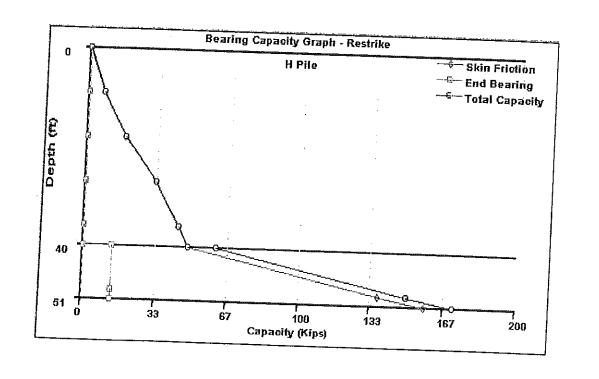
Wave Travel Time 2L/c (ms) · 6.052

Pile and Soil Model Total Capacity Rut (kips) 200.0 No. Weight Stiffn C-Sik T-Sik CoR Soil-S Soil-D Quake LbTop Circuif Area kips kin ft ft kips s'ft inch ft ft in2 \$ 0.1 0.070 0.100 3.33 4.8 26.1 0.4 0.070 0.100 6.67 4.8 26.1 0.4 0.070 0.100 10.00 4.8 26.1 0.9 0.070 0.100 10.00 4.8 26.1 0.9 0.070 0.100 16.67 4.7 26.1 1.2 0.070 0.100 16.67 4.7 26.1 1.2 0.070 0.100 23.33 4.8 26.1 1.7 0.070 0.100 23.33 4.8 26.1 1.7 0.070 0.100 23.33 4.8 26.1 2.8 0.070 0.100 33.33 4.8 26.1 2.8 0.070 0.100 33.34 4.8 26.1 2.8 0.070 0.100 40.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 50.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 46.00 4.7 26.1 3.8 0.070 0.100 4.7 26.1 0 Pile Segments: Automatic Smith
ns 0 Time Increment/Critical
0 Output Option
0 1 Analysis Time-Input (ms) Pile Damping Fact (k/ft/s) 0.916 Hips Kin ff hips significant in the control of the Soil Resistance Distr. No. 501 Damping Option Smith Max No Analysis Iterations 0 Time I Residual Stress Analysis 0 Output Couput Time Interval I Analysis Output Segment Generation Automatic Uniform/Non-Uniform/2-Pile No. of Slacks/Splices % Skin Friction

01/07/2003 GRLWEAP(TM) Version : 12/16/2002; H.B. FLEMING_ 1998-2

Rut BICt Stroke (ft) Tea Str it Comp Str it ENTHRU BIRt (kips) (bpf) down up (kst) (ks) (ksj-4) (brins) 250.0 27.4 8.20 8.16 -0.20(11,41) 25.24(7) 31 6.9 41.2 30.0 47.4 8.89 8.87 -0.73(7,35) 28.92(15, 5) 16.8 39.6 40.0 71.9 9.24 9.39 -1.23(11,15) 33.47(15, 5) 16.8 39.7 500.0 10.19 9.85 9.91 -1.06(4,34) 37.34(15, 5) 18.6 37.7 600.0 155.0 10.00 9.60 -1.52(11,18) 4.02(15, 5) 18.7 37.9 650.0 205.5 9.75 9.72 -1.63(11,18) 4.02(15, 5) 18.1 38.0 700.0 259.4 9.82 9.85 -1.84(11,18) 41.02(15, 5) 18.3 37.8 900.0 1058.4 10.00 9.63 -3.69(7,17) 41.94(15, 5) 18.3 37.8 1000.0 9999.0 9.74 9.69 -3.99(7,17) 41.94(15, 5) 18.4 37.8 1000.0 9999.0 9.74 9.69 -3.99(7,17) 41.94(15, 5) 17.8 38.0





07-Jan-2003 GRLWEAP (TM) Version 1998-2 1.30 kips 14175 kips/in 0.100 in 0.040 in 0.200 sec/ft 0.150 sec/ft Skin Friction Distribution 10.00 ft 26.10 in2 Res. Shaft = 15 % (Proportional) Helmet Hammer Cushion DE 42/35 Pile Model Skin Quake Toe Quake Skin Damping Toe Damping Pile Length Pile Top Area Efficiency Z¥7 ----Tension Stress (ksi) ----Stroke (feet) 16.00 8 66.7 Blow Count (blows/in) 50.0 33.3 16.7 H.B. FLEMING : 12/16/2002 : 50.0 40.04 20.0 2000 1600 1200 -Compressive Stress (ksi) -Ultimate Capacity (kips)

H.B. FLEMING: 12/16/2002:

07-Jan-2003 GRLWEAP(TM) Version 1998-2

Ulitmate Capacity kips	faximum ssion tress ksi	um on Stress ksi	Blow Count olows/in	itroke feet	inergy kips-ft	
100.0	21.974	0.000	1.0	6.70	18.15	
200.0	26.095	0.000	2.7	8.45	15.37	
300.0	30.180	0.000	4.0	8.85	14.78	
400.0	34.526	0.064	5.6	9.05	13.98	
500.0	38.479	0.284	7.1	9.62	13.84	
600.0	42.004	0.749	9.7	9.90	12.99	
700.0	44.696	1.079	14.1	10.00	12,46	
0.008	47.050	0.953	21.4	10.00	11.91	
900.0	47.964	1.089	33.1	10.00	11.39	
1000.0	48.685	1.314	57.7	10.00	11.03	

Input File: C:\P.16EMING\PROJECTS\BIDDING\USM PILES\1489_10.GW Hammer File: C:\Program Files\GRL & PDI\GRL\WEAP\HANMER.ALT

Echo Print of Input Data

-100 0.154 0 0 0 0 0 1 15 0 0 0 0 0 0 0.000
1.300 283.500 125.0 2.500 8800 0.010 0.0
0.000 0.0 0.000 0.000 0.000 0.0
10.000 26.100 25000.000 492.000 4.750 50.000 0.850 0.010

MKT DE 4235 1 3 0
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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of an impact driven pile. The program contains mathematical models which describe hammer, driving system, pile and soil during the hammer blow. Under certain conditions, the models only crudely approximate often complex dynamic situations.

A wave equation analysis also relies on input data which represents normal situations. The data may be the best available information at the time of the analysis, however, it may greatly differ from actual field conditions.

The program authors, therefore, recommend prudent use of GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic measurements. Estimates of bending or other local non-axial stresses and prestress effects must also be accounted for by the user.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of a safety factor to yield a design or working load.

GRL WEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS Version 1998-2 **English Units**

: 12/16/2002;

Model: DE 42/35 Made by: MKT	ght Stiffn CoR C-SIk Dampg k/inch ft k/ft/s	2 1.400 65596.5 1.000 0.0100 3 1.400 65596.5 1.000 0.0100 8lock 0.800 42661.1 0.900 0.0100 ct 1.300 14175.0 0.800 0.0100 6.0
Hammer Model: DE 42/35	No. Weight Stif kips k/inch I 1,400	2 1.400 65596, 3 1.400 65596, Imp Block 0.800 42 Helmet 1.300 141

HAMMER OPTIONS:

HAMMER DATA:

150.00	
(inch)	; _
(kips) 4.20 Ram Length (ff) 10.00 Actual Stroke	iciency 0.720
(kips)	盟
Ram Weight Maximum Stroke	

Maximum Pressure (psi) 1450.00 Actual Pressure (psi) 1450.00
Compression Exponent 1.350 Expansion Exponent 1.250 oneut 1.350 Expansion Exponent 1.250 (inch) 12.00 Minimum Stroke (ft) 5.00 ((s) 0.00100 Ignition Duration (s) 0.00200 Compression Exponent
Ram Diameter (incl Combustion Delay

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

PILE CUSHION HAMMER CUSHION

900 (inch) 0.00 ution 0.0 Cross Sect. Area (in.2) 283.50 Cross Sect. Area (in.2)
Elastic-Modulus (iss) 125.0 Elastic-Modulus (iss)
Thickness (inch) 2.50 Thickness (inch) 0.00
Coeff of Restitution 0.8 Coeff of Restitution 0.8 Coeff of Restitution 0.8 Coeff of Restitution 0.8 Coeff of Restitution 0.8 Coeff of Restitution 0.9 Stiffness (kips/fin) 14175.0 Stiffness (kips/fin) 0.0

: 12/16/2002 : H.B. FLEMING 1998-2

01/07/2003

GRLWEAP(TM) Version

PILE PROFILE:

b Top Area E-Mod Spec Wt Circmf Strength Wave Sp E-A/c ft in 2 ksi lb/ft3 ft ksi ft/s k/ft/s 0.0 26.10 29000, 492.0 4.8 50.000 16524, 45.8 10.0 26.10 29000, 492.0 4.8 50.000 16524, 45.8 L b Top

Wave Travel Time 2L/c (ms) 1.210

Pile and Soil Model Total Capacity Rut (Lips) 100.0

No. Weight Stiffn.C-Sik T-Six Cor Soil-S Soil-D Quake LbTop Circuf Area Lb29 18223. 0.010 0.000 0.85 1.7 0.200 0.100 3.33 48 26.1 3 0.297 18923. 0.010 0.000 0.100 5.0 0.200 0.100 6.57 4.8 26.1 3 0.297 18923. 0.000 0.000 1.00 8.3 0.200 0.100 10.00 4.8 26.1 Toe 85.0 0.050 0.100 10.00 4.8 26.1 Toe 85.0 0.150 0.04

PILE, SOIL, ANALYSIS OPTIONS: Uniform/Non-Uniform/2-Pile 0 Pile Segments: Automatic No. of Stacks/Splices 0 Pile Dampine (%).

O Time Increment/Critical
O Output Option
Analysis Time-Input (ms) Pile Damping (%)
Pile Damping Fact (k/ff/s) 0.916
15 % End Bearing Smith % Skin Friction 15 Soil Resistance Distr. No. (Soil Damping Option Sm Max No Analysis Iterations Residual Stress Analysis (Output Time Interval 1

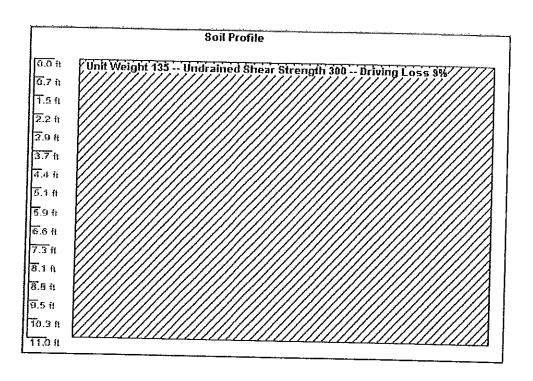
Output Segment Generation Automatic

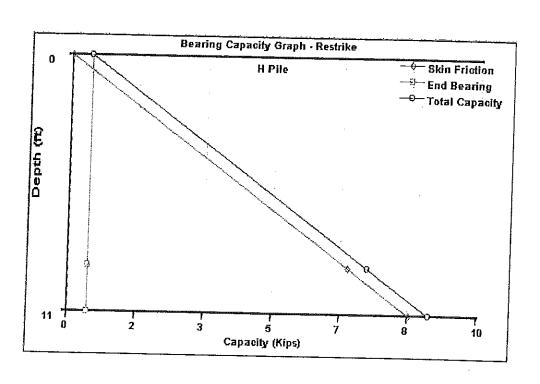
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: 12/16/2002; H.B. FLEMING 1998-2

01/07/2003 GRLWEAP(TM) Version

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ELECTRICAL PERMIT City of Portland, Me.

To the Chief Electrical Inspector, Portland Maine:

The undersigned hereby applies for a permit to make electrical installations in accordance with the laws of Maine, the City of Portland Electrical Ordinance,

National Electrical Code and the following specifications:

ESURGAN AND TO STATE OF THE SURGAN AND THE SURGAN A

1144004

Date _	4/29/03	
Permit #	2003-4371	
CBL#	15 BODG	سون سنده سند

LOCATION: USM, Parking Garage	SECTION C METER MAKE & #	CBL# 13 5 00C
CMP ACCOUNT #	OWNER USM	
TENANT	PHONE #	

			PHONE #					
AUTIETO	1					TOTA	L EACH	
OUTLETS		Receptacles	Switches	Smoke Detector			.20	
FIXTURES	-	Incandescent						
·····	-	meanuescent	Fluorescent	Strips			.20	
SERVICES	-	Overhead	l indouera mai					
	-	Overhead	Underground Underground	TTL AMPS	<800		15.00	
	 	Overnoud	Underground		>800		25.00	
Temporary Service	1	Overhead	Underground	TTL AMPS				
	*		Onderground	TTE AIVIPS		1	25.00	25.00
METERS	-	(number of)				·	25.00	
MOTORS	1	(number of)					1.00	
RESID/COM	\vdash	Electric units					2.00	
HEATING	+	oil/gas units	Interior	Exterior			1.00	
APPLIANCES	<u> </u>	Ranges	Cook Tops	Wall Ovens			5.00	
	<u> </u>	Insta-Hot	Water heaters	Fans			2.00	
	 	Dryers	Disposals	Dishwasher			2.00	
		Compactors	Spa	Washing Machine	_		2.00	
		Others (denote)		YVASTING IVIACIIII	= -		1	
MISC. (number of)		Air Cond/win					2.00 3.00	
		Air Cond/cent		Pools			10.00	
		HVAC	EMS	Thermostat			5.00	
		Signs		monnodat			10.00	
		Alarms/res					5.00	
		Alarms/com					15.00	
		Heavy Duty(CRKT)					2.00	
		Circus/Carnv					25.00	
		Alterations					5.00	
		Fire Repairs					15.00	
	_	E Lights					1.00	
		E Generators					20.00	
DANELO								
PANELS		Service	Remote	Main			4.00	
TRANSFORMER		0-25 Kva					5.00	
		25-200 Kva					8.00	
		Over 200 Kva				1	10.00	
				TOTAL AMOUNT	DUE			25.00
		MINIMUM FEE/COM	MERCIAL 45.00	MINIMUM FEE	3	5.00		45,00

CONTRACTORS NAMEMilliken Bros., Inc.	MASTER LIC. # MC60003818
ADDRESS 474 Riverside Industrial Parkway	LIMITED LIC. #
TELEPHONE(207) 797-8375	
SIGNATURE OF CONTRACTOR	

White Copy - Office • Yellow Copy - Applicant

ELECTRICAL PERMITCity of Portland, Me.

To the Chief Electrical Inspector, Portland Maine:

The undersigned hereby applies for a permit to make electrical installations in accordance with the laws of Maine, the City of Portland Electrical Ordinance,

National Electrical Code and the following specifications:

SURCIAL PROPERTY OF THE PROPER

114A004

Date _	4/25/03
Permit #	2003-4366
CBL#	45 BOOC

LOCATION: USM, Parking Garage	6 Bodlod METER MAKE & #	CBL# 45 500C
CMP ACCOUNT # _441-1690042-001	OWNER USM	
TENANT	PHONE #	

				PHONE #	! <u></u>					
OUTLETS	C1	Dogontoslas		To the second				TOTA	L EAC	H FEE
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FIXTURES	-	Incandescent	591	Fluorescent	_	Otrino				
	+		371	Tidorescent		Strips		591	.20	118.20
SERVICES	1	Overhead	-	Underground		TTI AMOO				
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	1 -		 	Onderground			>800	1	25.00	25.00
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				ondorground		TIL AIVIPS		(%) (%)	25.00	
METERS	1	(number of)							25.00	
MOTORS	5	(number of)						1	1.00	1.00
RESID/COM	╅╼	Electric units						5	2.00	10.00
HEATING	1-	oil/gas units		Interior					1.00	
APPLIANCES		Ranges		Cook Tops		Exterior			5.00	
	1	Insta-Hot		Water heaters		Wall Ovens			2.00	
	 	Dryers		Disposals		Fans			2.00	
. <u>,</u>	-	Compactors		Spa		Dishwasher			2.00	
		Others (denote)		Эра		Washing Machine	9		2.00	
MISC. (number of)		Air Cond/win							2.00	
(-	Air Cond/cent							3.00	
	-	HVAC		EMS		Pools			10.00	
		Signs		EIVIS		Thermostat			5.00	
		Alarms/res							10.00	
	2	Alarms/com							5.00	
	-	Heavy Duty(CRKT)						12	15.00	30.00
		Circus/Carny							2.00	
		Alterations							25.00	
		Fire Repairs	_						5.00	
		E Lights							15.00	
	1	E Generators							1.00	
		L Generators						1	20.00	20.00
PANELS	6	Service								
TRANSFORMER	0	0-25 Kva		Remote	1	Main		7	4.00	28.00
THE CONTRACT OF THE CONTRACT O	2	25-200 Kva							5.00	
		Over 200 Kva						2	8.00	16.00
	1	Over 200 KVa						1	10.00	10.00
		MINIMALINA PERIODA				TOTAL AMOUNT				
		MINIMUM FEE/COM	NMER	KCIAL 45.00		MINIMUM FEE	3	5.00	·	278.40

CONTRACTORS NAMEMilliken Bros., Inc.	MASTER LIC. # MC60003818
ADDRESS 474 Riverside Industrial Parkway	LIMITED LIC. #
TELEPHONE (207) 797–8375	

SIGNATURE OF CONTRACTOR

White Copy - Office • Yellow Copy - Applicant

REPORT ON SUBSURFACE AND FOUNDATION INVESTIGATION PROPOSED COMMUNMITY EDUCATION FACILITY AND PARKING GARAGE BEDFORD STREET PORTLAND, MAINE

by

Haley & Aldrich, Inc. South Portland, Maine

for

University of Southern Maine Portland, Maine

File No. 28438-001 July 2002



UNDERGROUND **ENGINEERING & ENVIRONMENTAL** SOLUTIONS

Haley & Aldrich, Inc. 500 SouthBorough Drive Suite 10

South Portland, ME 04106-6935 Tel: 207.772.5439

Fax: 207.871.5999 www.HaleyAldrich.com



12 July 2002 File No. 28438-001

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

Attention:

Mr. John Rasmussen

Subject:

Proposed Community Education Facility and Parking Garage

Bedford Street Portland, Maine

Ladies and Gentlemen:

This report presents the results of our subsurface and foundation investigation for final design of the Community Education Facility and Parking Garage on Bedford Street in Portland, Maine. These services were performed in accordance with our proposal dated 23 April 2002.

In summary, it is our opinion that the garage may be supported on high capacity piles driven to bearing in the underlying glacial till and bedrock and the Community Education Facility may be supported on spread footings bearing on the undisturbed, naturally deposited soil or compacted structural fill placed after removal of unsuitable material or raises-in-grade. In addition, earth-supported bituminous pavement may be used for the lowest level in the parking garage and an earth-supported slab-on-grade may be used in the lowest level of the Community Education Facility. Specific recommendations for foundation design and construction are presented below.

INTRODUCTION

The site is located on Bedford Street and is bounded by Bedford Street, Surrenden Street, I-295, Conant Street and Winslow Street as shown on Figure 1, Project Locus. The site is presently a paved parking lot, except for Powers House at 86 Winslow Street. We understand that residential buildings previously occupied portions of the site along Bedford Street and Surrenden Street. We understand that basement walls and previous foundations remain below the present ground surface. Ground surface elevations vary from approximately El. 24 in the southeast corner to El. 44 in the northwest corner.

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 of Columbia

Printed on recycled paper

Elevations in this report are in feet and referenced to National Geodetic Vertical Datum (NGVD).

PROPOSED CONSTRUCTION

The proposed facility will include community meeting rooms and auditorium and a five-level, 1200-space parking garage. The Community Education Facility will have a plan area of approximately 16,600 sq. ft. The lowest floor level in the Community Education Facility varies from approximately El. 33 to El. 45. The Parking Garage will have a plan area of approximately 75,600 sq. ft. Columns in the parking garage will be spaced at approximately 60-ft. by 35-ft. Column loads vary from as much as 1800 kips in the interior to as much as 1400 kips on the exterior. Maximum wall loads are on the order of 50 kips per ft. Uplift loads due to seismic loading may be up to 400 kips. The lowest floor level in the garage is El. 27. The Community Education Facility will be constructed adjacent to the Parking Garage but with a separate structural system and foundation.

SUBSURFACE EXPLORATIONS

Recent Explorations

During 24 to 26 June 2002, Maine Test Borings, Inc. (MTB) of Brewer, Maine, drilled six test borings, B101 to B106, at the site at locations shown on Figure 2, Site and Subsurface Exploration Plan. MTB drilled the borings to depths below ground surface varying from 9.0 ft. to 60.6 ft. Haley & Aldrich monitored the borings and prepared the logs included in Appendix A. Table I summarizes the results of borings.

Borings B101 and B103 were drilled with 3-in. diameter casing by wash boring techniques. A core of bedrock was recovered in each boring. The remaining borings were drilled with hollow stem augers to refusal. Soil samples were typically obtained at 5-ft. intervals in the borings. Standard Penetration Resistance (N) was measured at each sample interval in accordance with ASTM test designation D1586. The undrained shear strength of the clay was measured by field vane shear at various depths.

Previous Borings

During 2 to 4 January 2002, MTB drilled seven borings, B1 to B7, at the site at locations shown on Figure 2. MTB drilled the borings to depths below ground surface varying from 6.1 ft. to 63.0 ft. Haley & Aldrich monitored the borings and prepared the logs included in Appendix B. Table I summarizes the results of borings.

Borings were drilled with hollow stem augers. Soil samples were typically obtained at 5-ft. intervals in the borings. Standard Penetration Resistance (N) was measured at each sample interval in accordance with ASTM test designation D1586. The undrained shear strength of



the clay was measured by field vane shear at various depths. A groundwater observation well was installed in completed boring B3. The observation well installation and groundwater monitoring reports are included in Appendix C.

Haley & Aldrich determined the locations of borings by pacing from existing site features. Haley & Aldrich estimated the ground surface elevations at borings by linear interpolation between ground surface contours near the plotted locations.

The boring logs and related information depict subsurface conditions and water levels encountered at the locations and during the times indicated on the logs. Subsurface conditions at other locations may differ from those encountered in the borings. The passage of time may result in a change in groundwater conditions at the exploration locations.

SUBSURFACE CONDITIONS

The explorations encountered four principal soil units below the bituminous pavement at the site: fill, marine deposit, glacial till, and weathered bedrock. Encountered thickness and generalized descriptions of the soil units are presented below in order of increasing depth below ground surface.

Fill – Fill consists of loose to very dense, brown, well-graded SAND (SW) with gravel; to grayish brown silty SAND (SM) with gravel; to gray brown sandy lean CLAY (CL). Fill thickness, including the bituminous pavement, varied from 0.8 ft. to 5.3 ft. Boring B7 encountered an old concrete foundation at a depth of 4.5 ft. below ground surface. We understand that buried foundations from previous structures on the site are located along Bedford Street and Surrenden Street.

Marine Deposit - The marine deposit consists of medium dense, gray brown, poorly-graded SAND (SP); to medium stiff to stiff, gray, lean CLAY (CL). Encountered thickness varied from 0.5 ft. to 46.0 ft.

Glacial Till - The glacial till stratum consists of medium dense to very dense, brown to gray, silty SAND (SM) with gravel and oversized pieces of cobbles and boulders. Encountered thickness varied from 0.3 ft. to 11.0 ft.

Weathered Bedrock – Weathered bedrock consists of very dense, gray to black, sand and gravel size pieces of weathered and decomposed bedrock. Augers penetrated up to 2.0 ft. into weathered bedrock.

All borings, except B101 and B103, terminated on what was judged to be sound bedrock. A 4.6-ft. and 5.0-ft. core of bedrock was recovered from B103 and B101, respectively. Estimated contours of the top of sound bedrock are presented on Figure 3, Bedrock Contour Plan.



Water was observed in the borings at depths below ground surface varying from 5.3 ft. to 41.0 ft. Water in the observation well was measured at a depth of 5.6 ft. below ground surface 3 days after installation. Observations of water level in the borings were made over a relatively short period of time and may not represent the stabilized groundwater level. Groundwater levels at the site will vary with season, precipitation, temperature and construction activity in the area. Therefore, water levels during and following construction will vary from those observed in the borings and observation well.

STRENGTH AND COMPRESSIBILITY CHARACTERISTICS OF CLAY STRATUM

The undrained shear strength of the clay stratum was determined by field vane shear tests in the borings. Measured undrained shear strength varied from 371 lbs. per sq. ft. (psf) to 1,300 psf. The stress history of the deposit was estimated by comparing the measured undrained shear strength with correlations for strength and stress history of clay from other projects with similar conditions.

The stress-strain or compressibility characteristics of clays are highly dependent upon their stress history. If clay is stressed within the limits of the maximum previous stress, σ_{vm} , the strain (settlement) will be a function of the recompression ratio (RR) of the clay. If the applied stress exceeds the maximum previous stress, the strain will be proportional to the virgin compression ratio (CR). The stress history and appropriate compression ratios were estimated for the clay deposit as discussed above. The correlations indicate that the deposit is overconsolidated, that is, the maximum previous stress is on the order of 1,000 psf greater than the existing overburden stress. The deposit likely became overconsolidated due to desiccation (drying) resulting from a lowering of the groundwater level at some time in the geologic past which also increased the effective overburden stress throughout the stratum.

RECOMMENDATIONS FOR FOUNDATION DESIGN

Recommended Foundation Type

Garage

In order to consider foundations above the clay stratum, we made estimates of the settlement of the clay from the superimposed load of the garage. We estimate that settlement below the most heavily loaded columns would be on the order of 6 in. to 10 in. We anticipate that settlement of this magnitude is unacceptable. Therefore, we recommend that the structure be founded on piles driven through the clay to end bearing in the glacial till or bedrock. We considered supporting the structure on drilled shafts socketed into bedrock but the preliminary estimated costs of this foundation system was significantly greater than that for end-bearing piles.



In our opinion, steel H-piles are the most appropriate pile type. We anticipate that HP14x89 piles, 50-ksi steel, with a design capacity of 300 kips and an ultimate capacity of 600 kips will be the most economical pile size. H-piles should be fitted with driving points to protect the tips. Anticipated pile lengths vary from approximately 10 ft. on the northwest side up to 55 ft. on the southeast side. Piles should be spaced at least 3-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 piles should be driven to bearing in the glacial till or bedrock with a hammer delivering a minimum of 55,000 ft. lbs. of energy per blow. A final penetration resistance equal to 10 blows per in. for the final 6 in. of driving should be required. If abrupt refusal is encountered, driving may be terminated when the pile penetration is less than ½-in. for 10 successive blows.

Prior to installation, one of the H-piles should be load tested to twice the design capacity. In our opinion, in lieu of a pile load test, the contractor may monitor the installation of a minimum of six production piles using the Case-Goble Pile Driving Analyzer (PDA) equipment to verify that the piles achieve twice the design capacity with acceptable driving stresses. Monitoring with PDA in lieu of a load test will require the approval of local building officials.

We anticipate that some columns in the northwest portion of the garage may be supported on spread footings bearing on the undisturbed glacial till or bedrock or on compacted structural fill placed after removal of fill and marine sand and clay. Recommended bearing pressures are presented below. Footings should be founded a minimum of 4.5 ft. below the lowest surface exposed to freezing.

Permanent rock anchors such as high-strength steel threadbar rock anchors may resist uplift forces. Rock anchors should consist of grouted, grade 150 ksi, continuous upset threaded steel bars with double corrosion protection. Bars should be installed in minimum 4-in. diameter holes drilled through the overburden soils into sound bedrock and grouted with high-strength cement grout having a minimum 28-day compressive strength of 6,000 psi. All anchors should be proof tested to 125 percent of design load capacity prior to lock off. We can provide rock anchor details when the anticipated uplift loads are finalized.

Community Education Facility

The bituminous concrete and existing fill are not considered suitable for support of the building. All bituminous concrete and existing fill should be removed from within the building area.



We recommend that the building be supported on spread footings bearing on the naturally deposited, inorganic soil, bedrock, or compacted structural fill placed after removal of unsuitable soil or for raises-in-grade.

For uniformity, we recommend that footings be proportioned for an allowable bearing stress equal to 1,500 lbs. per sq. ft. multiplied by the least lateral dimension of the footing in feet, up to a maximum of 4,500 lbs. per sq. ft. All foundations should be at least 2 ft. wide. In some areas, bedrock may be above, at or near the proposed bottom of footing. For footings bearing on bedrock, the maximum slope of the bedrock surface should not be steeper than 4 horizontal to 1 vertical. Steeper slopes should be benched or tapered to the above criteria.

Individual footings should be founded either on soil or bedrock. Continuous footings may span both soil and rock provided a transition from soil to rock is provided. Tapering the bedrock to a slope of 4 horizontal to 1 vertical and backfilling with soil to a minimum depth of 1 ft. would be acceptable.

Exterior footings bearing on soil should be founded at least 4.5 ft. below the lowest adjacent ground surface exposed to freezing. Interior footings should be founded a minimum of 1.5 ft. below the floor slab. Exterior footings bearing on sound, intact bedrock may be founded at least 2.0 ft. below the lowest adjacent ground surface exposed to freezing.

We anticipate that portions of the Community Education Facility will overlie foundations of previous structures. All previous construction and fill should be removed from within the area of the Facility and be replaced with compacted structural fill. Compacted structural fill supporting footings should extend laterally from the footings to at least the limits defined by 1 horizontal to 1 vertical lines slopped outward and downward from points located at least 2 ft. horizontally beyond the bottom edges of the footings.

Footings adjacent to the Parking Garage should bear at the same elevation as the parking garage or the walls of the parking garage should be design for the lateral thrust of footings bearing at higher elevations. Transition to typical bearing level away from the Garage should be accomplished in several steps.

Ground Floor Slab

Garage

We understand that the lowest floor will be a bituminous concrete surface bearing on the existing subgrade or fill. We recommend that the floor have a pavement section as follows:

3 in. bituminous concrete, placed in two layers

3 in. screened or crushed gravel base course

12 in. sand or gravel subbase course



Existing fill materials may remain in place but all debris should be removed from the surface. The exposed subgrade should be proofrolled as described below. 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)

Sieve Size	Percent Finer by Weight
2 in.	100
½ in.	45 to 70
1/4 in.	30 to 55
No. 40	0 to 20
No. 200	0 to 5

Sand or Gravel (Maine DOT, Section 703.06b, Type E)

Sieve Size	Percent Finer by Weight
6 in.	100
1⁄4 in.	25 to 100
No. 40	0 to 50
No. 200	0 to 7

(Note: Compacted structural fill may be substituted for gravel subbase course)

All raises-in-grade below the floor should be accomplished with compacted structural fill.

Although groundwater was not observed above the lowest floor level, we anticipate that groundwater infiltrates at the higher elevations of the site and flows south. We recommend that a perimeter foundation drain be constructed on the outside of the foundation walls where the lowest floor level is below the exterior grade level. Gravity discharge and normal damp-proofing measures should be provided.

It should be noted that the subgrade soils are considered frost-susceptible. Therefore, pavement roughness due to non-uniform frost movement may occur. To eliminate such non-uniform frost movement would require approximately 4.5 ft. of structural fill subbase. However, it is common practice to tolerate seasonal movement to avoid the high cost of the added thickness of subbase.



Community Education Facility

We recommend that the floor slabs be designed as earth-supported slabs-on-grade bearing on a minimum of 6 in. of compacted structural fill. All previous construction and fill should be removed from within the building limits. All fill placed below the floor slab for raises-ingrade should consist of compacted structural fill. Normal dampproofing and vapor barriers should be provided below the slabs.

We recommend that a perimeter foundation drain be constructed on the outside of the foundation walls where the lowest floor level is below the exterior grade level. Gravity discharge and normal damp-proofing measures should be provided.

Seismic Design Considerations

We recommend that the building be designed according to the seismic requirements of the latest edition of the BOCA National Building Code. The site coefficient, S, is 1.5; the effective peak velocity-related acceleration coefficient, Av, is 0.10; and the effective peak acceleration, Aa, is 0.10. The subsurface soils are not considered liquefaction susceptible.

Lateral Foundation Loads

Garage

We recommend that lateral loads be resisted by earth pressure against pile caps and grade beams as follows:

$$P_r = (1/2\gamma K_p H^2) 1/3$$

Where P_r = Passive force in lbs. per ft. of beam, shaft or pile cap

 γ = Soil unit weight in lbs. per cu. ft. (use $\gamma = 120$)

 K_p = Passive earth pressure coefficient (use 3.0)

H = Thickness of pile cap or depth of beam in ft. below ground surface

In addition, a lateral resistance of 2 kips per pile may be used for piles. If this does not provide sufficient resistance to lateral forces, it may be necessary to install the piles as batter piles. Pile batter should be no flatter than 1 horizontal to 4 vertical.

Community Education Facility

We recommend that lateral loads be resisted by bottom friction on footings and that a coefficient of friction equal to 0.4 be used for footings bearing on soil. If this does not



provide sufficient lateral resistance, we will consider the problem in more detail, to take into account other factors.

Lateral Soil Pressure

We recommend that foundation walls, which are free to rotate at the top and backfilled, be designed to resist a lateral earth pressure calculated on the basis of an equivalent fluid unit weight of 40 lbs. per cu. ft. Foundation walls, which are restrained at the top and backfilled, should be designed to resist a lateral earth pressure calculated on the basis of an equivalent fluid unit weight of 55 lbs. per cu. ft. These fluid unit weights assume a free-draining granular backfill and an effective drainage system. Foundation walls in the garage adjacent to the ground floor of the Community Education Facility may be subject to surcharge due to the floor loads from the adjacent facility or footing loads if foundations are not lowered. The walls should be designed for a uniform lateral pressure acting over the full height of wall, calculated on the basis of 0.5 times the surcharge pressure, in addition to the lateral soil pressure recommended above.

Backfill Materials

Structural fill used below foundations and floor slabs and for backfill adjacent to walls should consist of sandy gravel to gravelly sand. It should be free of organic material, loam, trash, snow, ice, frozen soil and other objectionable material, and should conform to the following gradation:

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

Compacted structural fill should be placed in layers not exceeding 8 in. in loose measure and compacted by self-propelled vibratory equipment at the approximate optimum moisture content to a dry density of at least 95 percent of the maximum dry density, as determined in accordance with ASTM Test Designation D1557. In confined areas, the maximum particle size should be reduced to 3 in. and the loose layer thickness should be reduced to 6 in. and compaction performed by hand-guided equipment.

Compacted structural fill on the outside of the foundation walls should extend laterally a minimum of 2 ft. from the wall. Backfill beyond this limit on the outside of the building may consist of common fill. The top 12-in. of fill on the exterior of the building should consist of



low permeability material to minimize water infiltration next to the building. Grading should provide for runoff away from the building.

Common fill may consist of inorganic mineral soil that can be placed in layers not exceeding 12 in. in thickness and compacted with a minimum of four systematic passes of the equipment placing the fill.

CONSTRUCTION CONSIDERATIONS

General

The primary purpose of this section of the report is to comment on items related to excavation, earthwork, pile driving and related geotechnical aspects of proposed construction. It is written primarily for the engineer having responsibility for 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 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.

Excavation, Lateral Support and Control of Water

We anticipate that foundation excavation can be accomplished with sloped open excavation through the overburden soils provided safe side slopes can be maintained. Some sloughing and raveling should be anticipated in temporary slopes. Temporary excavations should be made in accordance with all OSHA and other applicable regulatory agency requirements.

We anticipate that groundwater may be encountered at proposed subgrade level or bottom of pile caps and grade beams. If encountered, open pumping from sumps can likely control groundwater. In general, the contractor should control groundwater and water from runoff and other sources by methods, which prevent disturbance of bearing surfaces or adjacent soils and allow construction in-the-dry.

Pile Installation

Pile driving may encounter obstructions in the form of previous foundations such as concrete walls, footings and slabs. Obstruction will likely be near the ground surface and may be removed by excavation.



Preparation of Slab Areas

All bituminous pavement and fill should be removed from the slab subgrade of the Community Education Facility. All bituminous concrete and fill containing debris should be removed from the slab subgrade of the Garage. The exposed subgrade should be systematically proofrolled with a minimum of two coverages of a fully loaded ten-wheel dump truck or similar equipment. Any soft or yielding areas encountered should be excavated and replaced with compacted structural fill prior to raising the grade for construction.

Construction Monitoring

The foundation 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. Therefore, we recommend that a person qualified by training and experience be present to provide monitoring at the site during pile driving, subgrade preparation and placement of compacted structural fill.

LIMITATIONS OF RECOMMENDATIONS

This report has been prepared for specific application to the subject project in accordance with generally accepted geotechnical engineering practices. In the event that any changes in the nature, design or location of the building is planned, the conclusions and recommendations contained in this report should not be considered valid, unless the changes are reviewed and the conclusions of this report modified or verified in writing.

The recommendations presented herein are based in part upon the data obtained from the referenced test borings. The nature and extent of variations from that disclosed by the explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

We recommend that we be provided with the opportunity for a general review of final design and specifications in order to determine that our earthwork and foundation recommendations have been interpreted and implemented in the design and specifications as they were intended.



It has been a pleasure to work with you on this project. Please do not hesitate to contact us if you have any questions or require additional information.

Sincerely yours,

HALEY & ALDRICH, INC.

Kenneth L. Recker, P.E.

Vice President

Enclosures:

Table I - Summary of Borings
Figure 1 - Project Locus

Figure 2 - Site sand Subsurface Exploration Plan

Figure 3 - Bedrock Contour Plan
Appendix A - Logs of Recent Borings
Appendix B - Logs of Previous Borings

Appendix C - Observation Well Installation and Groundwater Monitoring Report

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COMMUNITY EDUCATION FACILITY AND PARKING GARAGE UNIVERSITY OF SOUTHERN MAINE SUMMARY OF BORINGS PORTLAND, MAINE TABLE I

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NOTES:

ELEVATIONS REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM. 4 4 %

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FILE NO. 28438-001

APPENDIX A

Logs of Recent Borings



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HALEY & ALDRICH

CORE BORING REPORT

Boring No. B101
File No. 28438-001
Sheet No. 3 of 3

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Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recove in.	ry/RQD %	Weath- ering	Well Dia- gram	Elev./ Depth (ft)	Visual De and Rei	scription
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30 S7 WOR 24 1		-7.7 33.0	Medium stiff olive-gray lean CLAY with occasional silty fine sand seams with black streaks, wet -MARINE DEPOSIT-					5	95	N	М	м	
	35.0	SM	Medium dense grayish-brown and reddish-brown silty SAND, wet, uniform, mps=1 mm -GLACIAL TILL-				10	60	30				
	0.0	38.5 15.2 40.5	Gray highly weathered SCHIST -WEATHERED BEDROCK- 40.5 ft. SPT refusal on -BEDROCK- End of boring										

	HAI ALD	EY & RICH						TEST	BORING REPORT Boring No.	B103
	Projec Client Contra	Oi	OMMU NIVER MAIN	rot i	ı or	SOL	OTHE	KN MAIN	TY AND PARKING GARAGE, PORTLAND, ME File No. 28438-00 Sheet No. 1 of 3 Start 25 June	
L				Ca	sing	Sa	mpler	Barrel	Drilling Equipment and Procedures Finish 25 June	2002
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H	amme	er Fall (i	n.)	2	4		30	-	Notes: Drive Casing Hoist/Hammer: Winch Safety Hammer	
(#)		le No.	(III.)	£	agram	lev./Depth t.)	Symbol	V	/isual-Manual Identification and Description	Field Test
Depth (ft.)	i	Sample No.	Samp	Depth (ft.)	Well Diagram	Elev./	1 %	(Density/ structure, or	//consistency, color, GROUP NAME, max. particle size**, dor, moisture, optional descriptions, geologic interpretation)	Toughness Plasticity
- 0	2 2 3	S	. 1 *	.0		26.6	SM SM	Loose brow	vn silty SAND, roots, dry, mps=3 mm	
	2	1	· -	.0		0.3	SM	Loose grayi	-TOPSOIL- 5 10 10 45 20 15 15 10 10 45 20 16 17 17 18 19 19 19 19 19 19 19	
_						24.1			-FILL-	
- - 5						3.0				
- 5	4 9 12	S2 24					CL	Very stiff of	live-brown lean CLAY with occasional silty fine sand seams, 5 95 N	M M F
_	12							monica, mo	-MARINE DEPOSIT-	
- 10 -					a					
- 10 -	3 5 6 6	S3 24	10. 12.	0	NO WELL INSTALLED		CL	Stiff olive-br	rown lean CLAY with occasional silty fine sand seams, 5 95 N	ммн
	6		12.	١,	2			sugnity mott	iled, wet	
					1					
					≱ 2	1				
.				2		2.1				
15 -	1	S4 24	15.0		1.	5.0	CL i	Medium stiff	f olive-gray lean CLAY, wet	ммн
	1 2	~	17.0	'	10		SM j	Brown silty S	-MARINE DEPOSIT-	- +- + -
j		1	 	1).2 - 5.9	- -			-++-
20 +	1	S5	20.0				CL N	Medium stiff	olive-gray lean CLAY with black streaks, wet	
	1 1	24	22.0	'					-MARINE DEPOSIT-	MMH
f				1						
					_					
					24	$\begin{bmatrix} .1 \\ .0 \end{bmatrix}$		···		
5		Wal	ler Lev	 ∕el D	ata	!_			Sample Identification Well Diagram Summany	
Dat	le	Time	Elaps	ed	D	epth	(ft.) to		O Open End Rod Riser Pipe Out I was	
			Time ((hr.)	Bottor f Casi	<u>ng o</u>	ottom f Hole	Maior	T Thin Wall Tube Screen Rock Cored (lin. ft.) 4.7	i
5/25/	02	1645			Oper	۱ :	38.0		U Undisturbed Sample Samples 75,1C	
									G Geoprobe Concrete Boring No. B103	
	Test			Tou	tancy ghnes	<u> </u>	L-LOW	oid, S-Slow, v. M-Mediun	N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High	
	SPT	≘ Sample Note	r blows e: So	ner f	ì in		f + 1 ford		size is determined by direct observation within the limitations of sampler size (in millimeters) il-manual methods of the USCS as practiced by Haley & Aldrich, Inc.	ngn
									as practiced by maley & Aldrich, Inc.	

IALEY & LDRICH		TEST BORING REPORT		Fil	le	ing No.	:	284	438	B103 8-00 of	1		
SPT* Sample No. & Rec. (in.) Sample Depth (ft.)	Elev./Depth (ft.)	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation		rav g	/el	_ s	and E	d_			Toughness a	Plasticity	1
10 S6 25.0 6 14 23 27.0	0.4 26.7 S	with silt, wet, uniform, mps=1 mm -GLACIAL TILL-	11				0 !	50	10	7		<u>a</u>	
12 S7 30.0 12 12 16 32.0	-4.8 31.9 5 -6.2 33.3	mps=1.5 in -GLACIAL TILL-	15	15	5 7	0 15	5 5 1		5				Table and the state of the stat



CORE BORING REPORT

Boring No. B103 File No. 28438-001 Shoot No. 2 of 2

		T	1	·			OIXII	VG r	EPOKI F	ile No. 28438-001 Sheet No. 3 of 3
Depti (ft)	Drilling Rate Min./ft	Run No.	Depti (ft)	Recove in.	ry/RQD %	Weath- ering	Well Dia- gram	Elev./ Depth (ft)		ption
- 35	5	C1	33.4 38.0	55/34	100/62	Fresh		33.5	Moderately hard, fresh, fine grained, gra Joints close to moderate, moderately dipp Joints are planar to undulating, smooth to -BEDROG	ung primarily along toliation, rough, fresh, tight
	9 7							20.0		
								38.0	38.0 ft. end of boring	
							æ			
	n.b. i		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				NO WELL INSTALLED			
	Va		a de la companya de l							
		***************************************		A Particular and Application of the Control of the						
	***************************************			. Colonia de la colonia de la colonia de la colonia de la colonia de la colonia de la colonia de la colonia de	The state of the s					
	The state of the s									

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Y Y	IALEY LDRI	/ & E EHI ===					TEST	BORING REPORT Boring No.	B104
CI	roject ient ontracti	OIN	IMUN VERSI AINE '	110	rso	OIBE	MAIN MAIN	TY AND PARKING GARAGE, PORTLAND, ME File No. 28438-C Sheet No. 1 of 1 Start 26 Jun	
			(Casing	j Sa	mpler	Barrel	Drilling Equipment and Procedures Finish 26 Jun	e 2002
Ту	pe			HSA		SS	_	Rig Make & Model: Mobile B-53 Driller M.Co. H&A Rep. B.Es	
Ins	ide Dia	meter ((in.)	2.5	1	.375	-	Bit Type: Cutting Head Flevation 32.3	ics .
Ha	mmer \	Weight	(lb.)	-		140		Drill Mud: None Datum NGV	
Hai	mmer l	Fall (in.))	-		30	-	Notes: HSA 14.5 Location See Plan Hoist/Hammer: Winch Safety Hammer	1
		9 €	T -	E	£	ğ		Cravel Cond	Field Test
E E	,	S C E	e E	Diagr	llev./Depth	Symbol	1	risual-Manual Identification and Description	> 8
Depth (ft.)	SPT	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	m £	+	(Density structure, o	foonsistency, color, GROUP NAME, max. particle size**. dor, moisture, optional descriptions, geologic interpretation)	Dilatancy Toughness Plasticity
["	7	SI	0.5		32.0 0.3	£ ~~~ . !	Modina	-ASPHALT PAVEMENT.	311111111111111111111111111111111111111
	11 5 8	24	2.5		30,8 1,5		iviculum de	nse brown well-graded SAND with silt, dry, mps=0.5 in. 10 20 30 30 10 -FILL-	
- 5 -	6 8 11 14	S2 24	5.0 7.0	LED		CL	Very stiff, seams, mois	olive-brown lean CLAY with occasional silty fine sand st, slightly mottled -MARINE DEPOSIT-	4 W W H
.]	6 6 10	S3 21	10.0 12.0	INSTALLED	21.8 10.5		Medium den	se grayish-brown and reddish-brown silty SAND, wet, 5 65 30	1-1-1-
-	10				19.8		uniform, mp	-GLACIAL TILL-	
		Ī		WELL		sw	Dense brown	a silty SAND with gravel, wet	++4-
				S S	18.3 14.0			-GLACIAL TILL-	
			1		17.8	$\neg \uparrow$	14.5 ft. auge	-WEATHERED BEDROCK- r refusal on BEDROCK	
					14.5		End of borin	g	
			Leve	_				Sample Identification Well Diagram Summary	
Date	∍ T	ime E	lapsed me (hi	Bot	lom i	(ft.) to Bottom		O Open End Rod III Riser Pipe Overburden (lin. ft.) 14.5	
6/26/(2 0	730	(11)	of Ca	sing	of Hole	vvater	T Thin Wall Tube Filter Sand Rock Cored (lin. ft.)	
6/26/(I	1	Caved	14 Op		14.5 11.1	12.1 10.9	U Undisturbed Sample S Split Spoon Samples 3S	
Field	Tests:		D	ilatan	_		oid, S-Slow	G Geoprobe Concrete Bentonite Seal Boring No. B10	4
		ampler b	Tows no	oughn ar 6 in	ess:	L-LOW	v. M-Mediui	m, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Ve	y High
		Note:	Sol	denti	ficatio	n baş	ed on visua	size is determined by direct observation within the limitations of sampler size (in millimeters). I-manual methods of the USCS as practiced by Haley & Aldrich, Inc.	

	LAIDE VEDR	Y& CH					TEST	BORING REPO	RT		1	В	or	inç	g N	o.	7	В	108	5
CI	oject ient intraci	~.,	MMUI IVERS IAINE	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		σ_{1111}	JULY WEATIN	TY AND PARKING GAR E		O, ME	18	File Shed	et i		1	of	1-001 1 une 2		<u>. </u>	
				Casin	g Sa	ampler	Barret	Drilling Equipmer	nt and Procedures		-{F	inis	sh		26	5 Ju	ine 2	200	2	
Ту	oe			HSA		SS	-	Rig Make & Model: Mo			⊣ i	Orille A&F		en			Coff 3stes			
Ins	ide Di	ametei	(in.)	2.5	1	.375		Bit Type: Cutting Head	I		-	lev	_			35.				_
1		Weigh	- 1	No.		140	-	Drill Mud: None Notes: HSA			\vdash	oca.				NG	VD			
Hai	nmer	Fall (in		-		30	-	Hoist/Hammer: Winch	Safety Hammer			oca	HU	"	See	e Pi	an			
Depth (ft.)	,	Sample No. & Rec. (in.)	Sample Depth (#)	Well Diagram	Elev./Depth	Symbol	V	isual-Manual Identification				avel	1-	Sar		Ī.			J Te	T
o Dep	SPT	Sam	Sam	Well	1		(Density) structure, or	consistency, color, GROUP for, moisture, optional descri	NAME, max. particle siz iptions, geologic interpr	ze**, etation)	% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	
_	6	SI	0.5		34.7 0.3	1 01111	Medium de	-ASPHALT PAV ise brown well-graded SANL	EMENT-		5	10	20	30	30	=				Ë
-	8 6 6	17	2.5		32.9			-FILL-	with graver, dry, mps:	= 1.3 in	ľ				30					
-					2.1	CL	Stiff olive-b	rown lean CLAY, moist, slig -MARINE DEF	thtly mottled OSIT-							100	N	М	М	F
- 5 -	4 6 5	S2 20	5.0 7.0	-	30.5 4.5 28.7	SM	Medium der mps=1 mm			tled,				5	65	30				
.	10				6.3	SM	Medium den	-GLACIAL Ti se reddish-brown well-graded		silr —	10	10 1	10	30	20	10	_	-		
							wet, mps=1	.0 in. -GLACIAL TI		- 5.1.,			10	30	30	"				
							Water at 8.0													
10					25.3 9.7		Madium dan				_									
	6 12 0/0.2'	S3	10.0 11.2	NO WELL INSTALLED	23.8		Mediani den	se grayish-brown, highly wea -WEATHERED BE	thered SCHIST DROCK-					\top			1			_
ľ	0/0.2			Z	11.2		11.2 ft. SPT	refusal on BEDROCK			\dashv	\dashv	+	+	1	+			-	
			ĺ				End of boring	3									-			
			j	2													ļ			
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<u> </u>	!_	Wate	r Leve	l Data				Sample Identification	Mali Dis		<u> </u>		_	<u>_</u>	<u> </u>	1_	<u> </u>		<u> </u>	
Date	Т		Elanca	a	Denth	(ft.) to			Well Diagram	Overt		Sui		_						-
10.5	_+-	T	ime (h			Sottom of Hole	Motor	Thin Wall Tube	Screen Filter Sand	Overb Rock						11.	2			
/26/0 /26/0		840		10	.0	11.2 11.2		- Julian Dear Gumpie	Cuttings Grout	Samp			\ ₁₁₁		., 3S	_				
/26/0	2 0	855	Caved	Op	en	7.9	7.0	Geoprobe 5	Concrete	Borir	ıg	No	١.]	B10	05			1
	Tests;		Т	Ollatan oughn	ess:	L-Low	id, S-Slow, . M-Mediun	H-High Dougle	Bentonite Seat ity: N-Nonplastic, L-L						jh					-
*5	PI≃S	Sampler Note:	blowe n	er A in		******		ize is determined by direct obs -manual methods of the t	<u>engin: N-None, L-Lo</u>	<u>W. M-Me</u>	dļu	m.	H-I	Hial	h. \	/-Ve	ary F	ligh	l	1
						. ~	vii rioudi	Treating the front of the f	as practiced by عنامدر	Haley 8	A	dric	ch,	Inc	;					

	HALI ALDI	SY& NCH						TEST	ГВ	ORING REPO	ORT				В	or	ing	ı N	ο,		В1	06	
CI	roject lient ontra	t CO UN ctor M	T A TO	1/1/21		POU	JIRE	TRIN MAIN	ITY . NE	AND PARKING GA	RAGE	PORTLAI	ID, ME	8	ile Shea Stari	et l	i. No.	1 (of	001 1 ne 2	002		
				С	asing	Sa	mpler	Barrel		Drilling Equipm	ent and	l Procedures		F	inis	sh		26	Ju	ne 2	002		
Ту	ре			I	ISA		SS		Ri	g Make & Model: M				1	Prille 1&A		an			Coffi	n		
Ins	ide D	Diamete	r (in.)		2.5	1	.375		Bil	t Type: Cutting He				-	lev				38.C	stes		-	
		r Weigh		Į.			140		. t	ill Mud: None					alu	ım		1	ŊĠ	VD			
1		r Fall (ir	•		_		30	_	1	otes: HSA oist/Hammer: Winct	Cofor	17			oca	ŧtio:	n	See	Pla	an			
	Τ	0-	- [<u> </u>	E	 	7 8	<u> </u>		Macricianici. Willer	Salety	y Hammer		G	ave	<u></u>	0-			,			
Depth (ft.)		Sample No.	<u> </u>	Depth (ft.)	Well Diagram	Elev./Depth (ft.)	Symbol	,	Visua	al-Manual Identificat	on and	Description			_	-1	Sar	$\overline{}$				Tes	t_
ebt	SPT	. gag	and	epth	₩ Ö	. ee	uscs a	(Densit	ly/con:	sistency, color, GROU	P NAME	, max. particle	size**	% Coarse	<u>e</u>	% Coarse	% Medium	Fine	Fines	ancy	F es	city	ŧ
-0	S) (v, «s	(V)	Ω	Š	-	, CS	structure, o	odor,	moisture, optional des	criptions	s, geologic inter	oretation)	%	1%	8	≥	% ₽	% F	Ditatancy	Toughness	Plasticity	Strongth
Ľ	6	SI	+),5		37.8 0,2	SW	Medium d	Ionea I	-ASPHALT PA	VEMEN	NT-		5	10	50	30	30	5				=
	7 3 7	18		2.5		36.4		in.	iense i	brown well-graded SA	1D with	gravel, dry, m	os=1.25	ľ			30	30	3		1		
	7		\bot	_		1.0	ML	Stiff olive-	-brow	-FILI or SILT with occasiona	fine cor	nd canma and la				5	5	15	75		1		
-		ļ						moist, mps	s≕1 r	mm			yers,										
-				ļ		34.0 4.0	SM	Medium de	lense s	-MARINE D grayish-brown and redd				_		Ш						\perp	_
- 5 -	6	S2	5	.0				uniform, n	nps=	1 mm			wci,				5	65	30				
-	6	18		.0						-GLACIAL TILI	, DEPOS	SIT-	ļ										
-	7	_	_			31.3 6.7	SM	Medium de	ense b	prown well-graded SAN	ID with	gravel and cilt		10	_	4.5	25	200	40	_	- 1		_
.				Ì		30.5 7.5		mps=1.25	in				wei,	10		10	25	30	10	4	\perp	_	
.						29.0		Grayish-bro	own,	-GLACIAL TILL highly weathered SCH	IST		/		-								
					E	9.0		9.0 ft. auge	er refi	-WEATHERED I	3EDRO	CK-	/		7	\dagger	\dashv	\top	+	+	+	-	_
					NO WELL INSTALLED			End of bori	ing														
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	r	Wat			Data		156 1 4		Sa	ample Identification		ell Diagram			Sı	ımı	mar	<u></u>	=				=
Date	е	Time	Elap Time		Bot	Depth tom t	3ottom			Open End Rod		Riser Pipe Screen	Over						9.	0			
6/26/0	n2 +	0930		,	OI GE	sing d			Ť	Thin Wall Tube	110	Filter Sand	Rock			il) Ł	n. f	t.)	-				
6/26/(0935	Cav	red	Op	- 1	9.0 5.5	8.8 5.3	U S	Undisturbed Sample Split Spoon		Cuttings Grout	Sam	ples	\$			28					1
<u></u>									G	Geoprobe		Concrete Bentonite Seal	Bori	_					B1	06			
Field				To		cy: less:	R-Rap L-Lov	old, S-Slov v. M-Medit	v, N- um. I		ticity: N	I-Nonplastic. I	-Low, M-N	led	um	, H	I-Hi	gh			11-1		1
<u> </u>	SPT_=	Sample. Note	rblow S	s ne	r 6 in		******	imum nadial		is determined by direct of anual methods of the		h: N-None, L- on within the limi							v-V eters	ery <u> </u> s)	<u> 119h</u>		1
							., 1143	SH VII YISU	<u>kai*III</u>	anual membas of th	<u> </u>	as practiced	by Haley	& A	<u>tdri</u>	<u>ich</u>	<u>. Inc</u>	٥,					_[

APPENDIX B

Logs of Previous Borings



	HALI ALDI						TEST	BORING REPORT Boring No.	B1
C	rojec lient ontra		0.11110	nunity rsity of Test I	OUGH	HOLD D	vianic	Parking Garage, Bedford Street, Portland, Maine File No. 28438-000 Sheet No. 1 of 3 Start 2 January	
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Casin	g S	ample	r Barrel	Drilling Equipment and Procedures Finish 2 January	2002
Ту	/ре			HSA		SS		Rig Make & Model: Mobile B53 H&A Rep. K Book	
Ins	side D	Diamete	er (in.)	2 1/2		1 3/8		Bit Type: Cutting Head Drill Mud: None Elevation 24.2	er -
Ha	mme	r Weigl	ht (lb.)			140	_	Holst/Hammer Wingh/ Sofatt II	
Ha	mme	r Fall (i	n.)			30	-	Notes: 2" x 7" FV Location See Plan	
£		Sample No.		am (th.	Symbol		Gravel Sand	ield Test
Depth (ft.)	1 2	ge .	일을	Diag	Q	Sylv	1	and Description and Description	12
l a	*LdS	San	Sample	Vell Diagram	Elev./Depth	USCS USCS	(Density, structure, or	//consistency, color, GROUP NAME, max. particle size**, dor, moisture, optional descriptions, geologic interpretation)	Toughness Plasticity
- 0					-BITUMINOUS PAVEMENT-	다 다 다			
ŀ	52 53	S1 22			0.3	3 SW	Dense, bro	wn well-graded SAND(SW), mps=0.5 in., no odor, dry 15 15 20 40 10	
}	16						-FILL-		
-									
ŀ					20.2				
- 5 -	-	S2	-		4.0				
_	5 7 8	24				SP	Medium der	nse, gray brown poorly-graded SAND(SP), no odor, wet DEPOSIT-	
_	Ž								
-									
- i									
- 10 -				日日	14.2				
	1 WOH	S3 24	10.0		10.0	CL	Medium stift	f, gray, lean CLAY(CL), no odor, wet	M M -
	WOH	1	12.0	INS					*' W
				LW C					
				Ž					
15	WOR	S4	15.0	1		CL	Medium stiff	, gray, lean CLAY(CL), no odor, wet	
	WOR WOH	24	17.0				FV at 15.0 ft	., Su=560 psf	и М
F	WOH		ļ						
20 🕂	HOTE								
- 3	NOH HOM	S5 24	20.0 22.0			CL	Medium stiff,	gray, lean CLAY(CL) with black streaks, no odor, wet 100 N M	М
Ľ	2								
				'					
5		Wat	er Leve	el Data		_'_		Sample Identification Well Diagram Summan	
Date	Э	Time	Elapse	d	Depth	(ft.) t	o:	O Open End Rod Riser Pipe Out I die	
			Time (F	of Ca	tom (Sottom of Hole		T Thin Wall Tube Screen Coverburden (lin. ft.) 63.0 Rock Cored (lin. ft.)	
1/2/0	2	1430		63	ł	63.0		U Undisturbed Sample Samples 139	
		-					1 1	S Split Spoon G Geographe G Geographe G Geographe G Geographe G Geographe G Geographe G Geographe G Geographe G Geographe G Geographe G G G G G G G G G G G G G G G G G G G	
Field	Tests	:	<u> </u>	Dilatan	cy;	R-Rar	old S-Slove	N-None Plasticity, N-Nonplastic 1-Low M-Modium, H-Uigh	
	-	*SPT = S	oannbier.	DIOWS D	erun		v. M-Medium **Maximum p	by Strength, N-None, L-Low, M-Medium, H-High, V-Very I	ligh
		NOIĐ	, <u>SOII</u>	<u>ruenti</u>	ircatio	n bas	ed on visual	l-manual methods of the USCS as practiced by Haley & Aldrich, Inc.	

	HAUE			7,000	î j		,,,,,,	TEST BORING REPORT		ŀ	ile	No	ig N o. No,	284					
(#) 4#CeC	= -		& Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation		ě	% Fine	,	Sar unipal %	ıd .			Field	Plasticity D	
- 20	WO WO WO 2	H S H 2		25.0 27.0			CI	Medium stiff, gray, lean CLAY(CL) with black streaks, no odor, wet FV at 25.0 ft., Su=740 psf							100	=	М		
-30	WOI WOI WOI 2	H 24		30.0			CI	Medium stiff, gray, lean CLAY(CL) with black streaks, no odor, wet							00	N	M	М	
-35	WOH WOH WOH 2	I 24		5.0 7.0			CL	Stiff, gray, lean CLAY(CL) with black streaks, no odor, wet, fine sand lense, dense FV at 35.0 ft., Su=1,300 psf						11	00	N	М	М	
-40 -	WOH 1 2 2	S9 24		0.0			CL	Stiff, gray, lean CLAY(CL) with black streaks, no odor, wet						10	00	4 i	м	М	
- 45 -	WOH 1 2 3	S10 24	45 47				CL	Stiff, gray, lean CLAY(CL) with black streaks, fine sand layers, no odor, wet -MARINE DEPOSIT-	The state of the s					10	0	1 1	A 1	М	
-50	WOH 5 5 4	S11 24	50. 52.			5.8	SM	Medium dense, brown silty SAND with gravel(SM), mps=1.2 in., no odor, wet	15	15	5	20	0 25	20					_
55 -	10 17 13 19	S12 12	55.0 57.0			4.1	SM	Dense, gray silty SAND with gravel(SM), mps=1.2 in., no odor, wet -GLACIAL TILL-	20	15	10	20	20	15					
60	14 39 10 85	\$13 24	60.0 62.0)	-36 61	.8		Very dense, gray black decomposed bedrock	15 1	15	10	20	20	20					
SPT = NOTE:	Sample Soli i	r blows dentific	per 6 I ation	n. **M based	aximu i on vi	m par Sual-	ticle s manu	size is determined by direct observation within the limitations of sampler size. Ial methods of the USCS as practiced by Haley & Aldrich, Inc.	В	or	ing	g N	lo.		1	31			1

Sheet No. 3 of 3 of 3 of 3 of 3 of 3 of 3 of 3
-38.8 63.0 Auger refusal at 63.0 ft

	AIDRI IDRI						TEST	BORING REPORT Boring No.	B2
Cli	oject ent ntract		Comm Univer Maine	sny o	ເວບແມ	nern M	cility and I	Parking Garage, Bedford Street, Portland, Maine File No. 28438-000 Sheet No. 1 of 2 Start 3 January	2002
				Casir	g S	ampler	Barrel	Drilling Equipment and Procedures Finish 3 January Driller M Coff	
Han	de Dia	amete Weigh Fall (ir	it (lb.)	HSA 2 1/2		SS 1 3/8 140 30	-	Rig Make & Model: Mobile B53 Bit Type: Cutting Head Drill Mud: None Hoist/Hammer: Winch/ Safety Hammer Notes: 2" x 7" FV Driller M. Coff H&A Rep. B. Lawr Elevation 24.6 Datum NGVD Location See Plan	
£		o c) E	ff	Ī			Field Tes
Depth (ft.)	SPT*	Sample No.	Sample	Well Diagram	Elev./Depth	USCS Symbol	(Density	/Isual-Manual Identification and Description //consistency, color, GROUP NAME, max. particle size**, dor, moisture, optional descriptions, geologic interpretation)	Toughness Plasticity
0	100/.3	3 S1	0.3		24.		\	-BITUMINOUS PAVEMENT.	
	6	3 S2 8	2.0 4.0		23.4 1.2 21.0	ML ML	Brown, we Stiff, dark	-FILL- Ill-graded SAND with gravel(SW), mps=1/2", moist brown SILT(ML), moist, occasional shell fragment 5 95 R	
	5		4.0	_	3.0 21.4 3.2	SM CL	Medium de Stiff, brow	ense, brown silty SAND(SM), mps=2 mm, moist 65 35 R 65 35 R 95 5	
5	4 6 10 10	S3 24	5.0 7.0			CL	Very stiff,	brown lean CLAY(CL), moist -MARINE DEPOSIT-	ММ
10	4 4 6 6	S4 24	10.0			CL	Stiff, mottle partings	ed brown gray lean CLAY(CL), moist, frequent find sand	ММ
5	1 1 1 1 1	S5 24	15.0 17.0			CL	Medium stif sand parting	f, gray, lean CLAY(CL), wet, black streaks, Occasional fine s	MM
o V	VOR VOH 1 2	S6 24	20.0 22.0				Medium stifi FVI 20 ft., !	f, gray lean CLAY(CL), wet, black streaks Su=700 psf	ммі
<u> </u>		V/Jai	ter Lev	el De	la .		- T	Comple Medification 1997	
Date		Time	Elaps Time (ed hr. ^B	Dep ottom Casing	th (ft.) t Bottom of Hole	Water	Sample Identification Well Diagram Summary O Open End Rod T Thin Wall Tube Sample Identification Well Diagram Riser Pipe Screen Filter Sand Rock Cored (lin. ft.)	
/3/0	-	1445			14.2		41.0	U Undisturbed Sample Samples Samples 11S S Split Spoon Grout Concrete Roring No. 703	
ield	Tests:			Dilata Tougl	mess:	11.0\	pid, S-Slow	G Geoprobe Bentonite Seal Borning NO. B2 N. N-None Plasticity: N-Nonplastic, L-Low M-Medium, H-High	14.4
		SPT =	Sample	blows	per 6 i	n.	**Maximum	im, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very particle size is determined by direct observation within the limitations of sampler size, al-manual methods of the USCS as practiced by Haley & Aldrich, Inc.	High

WOR S8 30.0 WOH 24 32.0 Stiff, gray lean CLAY(CL), wet, black streaks, occasional fine sand partings FV2 at 30 ft., Su=1,110 psf CL Stiff, gray lean CLAY(CL) with black streaks to brown lean CLAY(CL), wet, frequent fine sand partings, trace fine gravel, mps=1 36.2 ML SP Brown and gray layered SILT(ML), wet and SILT with SAND(ML), wet 39.0 SM Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 20 20.0 Med	A	LALEY LDRK		·	·			TEST BORING REPORT		F	ile i	No.		3438	B2 3-00 of	00	
WOH S7 25.0		SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation;		3ra	vel	S	and	-	-	Fiel	
WOR S8 30.0 WOH 24 32.0 Stiff, gray lean CLAY(CL), wet, black streaks, occasional fine sand partings FV2 at 30 ft., Su=1,110 psf Stiff, gray lean CLAY(CL) with black streaks to brown lean CLAY(CL), wet, frequent fine sand partings, trace fine gravel, mps=1 SP 36.4 ML Brown and gray layered SILT(ML), wet Layered brown poorly-graded SAND(SP), mps=2 mm, wet 39.0 SILT with SAND(ML), wet SILT with SAND(ML), wet 39.0 SILT with SAND(ML), wet 39.0 SILT with SAND(ML), wet 39.0 SILT with SAND with gravel(SM), mps=1", wet 10 15 10 15 30 20 15 10 Medium dense, brown, well-graded, SAND with silt and gravel(SW-SM), mps=1", wet -16.9 SW-SM Medium dense, brown, well-graded, SAND with silt and gravel(SW-SM), mps=1", wet -16.9 SW-SM -18.4 -18.4 -18.4 -19.6	- 25 - -	4						Medium stiff, gray lean CLAY(CL), wet, black streaks, occasional fine sand partings									_
1	-30 -	WOH 1						partings						100	N	м	
36.4 ML Layered brown poorly-graded SAND(SP), mps=2 mm, wet and SILT with SAND(ML), wet 39.0 SM Medium dense, brown silty SAND with gravel(SM), mps=1", wet 10 15 10 15 30 20 15 10 10 11 14.5 SW Dense, brown, well-graded, SAND with silt and gravel(SW-SM), mps=1", wet	35 -	1 2 5 7				36,2	ML	CLAY(CL), wet, frequent fine sand partings, trace fine gravel, mps=1			-		1			M	-
10 1 1.5 SW Dense, brown, well-graded, SAND with silt and gravel(SW-SM), 10 15 30 20 15 10 15 30 20 15 10 15 30 20 15 10 10 15 10 15 10 10 10 10 15 10 10 10 10 10 10 10 10 10 10 10 10 10	40	6				36.4 -14.4	ML	Layered brown poorly-graded SAND(SP), mps=2 mm, wet and SILT with SAND(ML), wet	10	15	10	15	95 25	5 75			
25/0 S11 44.2 44.2 Bottom of Exploration at 44.2 ft.		10	10	42.0		41.5 -18.4 43.0		mps=1", wet -GLACIAL TILL-	10	15	30	20	15	10		-	_
		2310				44.2		Bottom of Exploration at 44.2 ft. Auger refusal									

	HALE ALDR	y& ICH						TEST	ΓВ	ORING RE	PORT	All dates and a second	- many - warmen	T	В	or	ing	N	о,	<u> </u>	B3((0)	~ (√)
ļc	roject lient ontrac		Comn Unive Maine	ынуч	บเงบ	ume	111 (V)	cility and aine	Park	cing Garage, Bed	ford Stree	et, Portland, Mai	ne	s	ile Shed	et i	No.	1 6	of :	-00(2 lary		02	-
	- m			Casi	ng	San	npler	Barrel		Drilling Equi	pment an	d Procedures		- 1	inis Irille			4 J	anu	агу	200		
Ty	/pe			HS	A	S	S		Ri	g Make & Model:					i&A		ep.			Coff ∠awı		٠,۵	
In	side D	iameter	(in.)	2 1/	2	1 3	3/8			t Type: Cutting	Head			E	lev	atio			27.8	8			
Ha	ammei	r Weigh	t (lb.)	,		14	40	_	Ho	oist/Hammer: Wi	nch/ Safet	y Hammer		-	alu oca		n		NG Pl	VD			· <u>-</u> -
Ha	ammei	Fall (in					0		No	otes: 2" x 7" FV							. ,	500	. 1 1	an			
£		Sample No. & Rec. (in.)			rain f	(ft.)	Symbol	١	Visua	al-Manual Identifi	cation and	d Description		_	ave	+	San	_			T	d Te	∍st
Depth (ft.)	<u></u>	nple Sec.	Sample		veii Olagram		SS					•		Coarse	စ္	Coarse	gica	Φ	SS	<u></u>	less	.≧	,
	SPT	S Sar	Sar	2 3	5 U	1£	nscs	structure, o	odor,	moisture, optional	JOP NAM Jescription	E, max. particle siz is, geologic interpre	e** dation)	8	% Fine	8	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	
- 0	31	SI	0.:	- Pi		7.3				-BITUMINO	JS CONCI	RETE-		Ě	Ě	F				-		a.	: (
ľ	8 7	12	2.			0.5				aded SAND(SW), I				5	15	15	25	- 1			-		T
ļ	8				1.24	1.3		~		dy SILT(ML), mps	Tr.r.							30	70	R		T	T
-				Š	1.21	2.3	l	Very stiff,	, brow	vn gray, lean CLAY	(CL), mps EDEPOSI	s=2 mm, moist						10	90	N	М	М	1
-				0 4	٥														-				
- 5	3	S2	5.0		10 01		CL	Stiff, brow	vn lea	n CLAY(CL), mps	=2 mm m	nist											
-	3 6 8 9	16	7.0	l e	0.	1.8 6.0						=2 mm, moist, free			_				90		М	М	1
-	"	-	-	8	e e		-	fine sand p	parting	gs	ozy, mps-	–2 mm, moist, frec	(uent					10	90	N	М	М	F
-				o.	G																		ļ
-				9	ا م	1	İ													ļ			
- 10 -	4	S3	10.0	- 1	9. .b		cL	Calco															
-	5 7	24	12.0			`		Sun, mone	iea gra	ay brown lean CLA -MARINE	Y(CL), m _I DEPOSIT	ps=2 mm, moist					1	5 8	95	N	М	M	Н
	9	-		掛									ļ			-							
																ŀ							
- 15 -																							
	3 2 5 4	S4 24	15.0 17.0		11	.8 🔼				ive lean CLAY(CL)								11	00	N	м	м	Н
	4			計	16	.0	1	Medium stif	ff, gra	ay lean CLAY(CL)	wet			-}-	- -	- -	- -	- -	- -	-	-+	- +	. —
					1																		
					1																		
				誾	1																		
	WOR WOH	S5 24	20.0 22.0	6 q ,			S	Stiff, gray le	lean C	LAY(CL), mps=2	mm, wet,	frequent fine sand					10	9 9	0 ,	N I	и	м	Н
	2 2	-	22.0	8 0 16			P	partings FV1 at 20.0) ft., §	Su=1,300 psf											"	·	••
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				0 0											İ								
		İ		0 0 0																	ļ	-	
25 _		Weite	er Lev	el Da	ıtə	_!_				monte tel une un					<u>_</u>	<u> </u>	<u>_</u>						
Da	te		Elaps	ed	De		(ft.) to	o:		Imple Identification	n V	Vell Diagram Riser Pipe					mar				_		
a			ime (l	hr ∮ B	otton Casin	1 Bo	ottom Hole	Water	T	Open End Rod Thin Wall Tube	團	Screen	Over Rock						31	.6			
1/4/	02	1005			30.0	1	1.6	20.5	U	Undisturbed Sam	1 5 5	Filter Sand Cuttings	Sam			# (II		(.) 7S					
									S G	Split Spoon		Grout Concrete	Bori			 O-			2//		<u> </u>		-
Field	Tests	<u></u>		Dilata		F	R-Rap	old, S-Slow	w. N-		lasticity:	Bentonite Seal N-Nonplastic, L-L	ow M-N	/edi	um	Н	[_H]	ıb.		OW			_
		'SPT = 5	ample	Toug blows	s per	6 in.		v. M-Mediu **Maximum	n nartir	Ne size is delermine	ry Streng	<u>in: N-None, L-Lo</u>	<u>w. M-M</u>	ediu	ım,	H-	-Hig	h. '	<u>v-v</u>	<u>'ery</u>	Hig	<u>h_</u>	_
		Note	: Sol	<u>ı ider</u>	tific	ation	bas	<u>ed on visu</u>	<u>ual-m</u>	anual methods o	the USC	S as practiced by	Haley	& A	ldri	lch	. Inc	<u>v. </u>					

Section Sect	A	ALEY LDRIC		Ī	1 =	T _	1 =	TEST BORING REPORT		File	٩e	ng I Vo. t No	28	438	3-00	0)	
18	Pepth (ft.)	,Td	ample No Rec. (in.)	ample epth (ft.)	ell Diagram	ev./Depth	CS Symbo				. —	Sause edilin	nd e	nes	1	ele ssaut	T€	
13		18		1					18	\$ %	2 2	S 8	% II	% E	Dilate	Toug	Plasticity	
22 S7 30.0 (1.5 A) SM Very dense, brown silty SAND with gravel(SM), mps = 1.3", wet 20 20 15 15 15 15 50/.1 SM SM Very dense, brown silty SAND with gravel(SM), mps = 1.3", wet 20 20 15 15 15 15 15 15 15 15 15 15 15 15 15	1	10	24	27.0	¦, o ; - ¢	1.8 26.0		Medium dense, brown to gray silty SAND with gravel(SM), mps=1/2", wet, slightly bonded		25	10	0 15	ŀ	l				
-3.6 Bottom of Exploration at 31.6 ft	30 -	22 22 35 50/.1	\$7 24	30.0 31.3		-3.6 31.4	SM	-WRATHERED POCK	20	20	15	15	15	15				
= Sampler blows per 6 in. "Maximum particle size is determined by direct observation within the limitations of sampler size. E: Soil identification based on view has a size in the size																		

	KA	LEY & ORICH						TEST	BORING REPORT Boring No.	B4	
-] (Proje Clien Contr		Com Univ Main						Parking Garage, Bedford Street, Portland, Maine File No. 28438- Sheet No. 1 of 2 Start 2 January		
				C	asing	Sa	mple	r Barrel	Drilling Equipment and Procedures Finish 3 January	ary 2002	
T	уре			I	ISA		SS		Rig Make & Model: Make & Model	offin	
lr	nside	Diamet	er (in.)	2	1/2	1	3/8		Bit Type: Cutting Head Drill Mud: None Elevation 28.2	awrence	
Н	lamm	er Weig	ght (lb.)				140	-	Hoist/Hammer: Winch/ Safety Hammer	/D	
LH	lamm	er Fall ((in.)				30	-	Notes: 2" x 7" FV Location See Pla	n	
(4)	(347)	SPT*	; (in.)	£	Well Diagram	Jepth	lodmys	V	/isual-Manual Identification and Description	Field Tes	it.
O Denth (#)		Samp	& Rec. (in.) Sample	Dept	Well D	Elev./Depth		(Density) structure, or	/consistency, color, GROUP NAME, max. particle size**, dor, moisture, optional descriptions, geologic interpretation)	Dilatancy Toughness Plasticity	
ľ	3			.3		27.9 0.3		Modine	-BITUMINOUS CONCERTE		_
	·	9 2	4 2	.3				Medium de	nse, brown well-graded SAND(SW), mps = 1/2", moist 10 15 30 40 5		
- 5	58	S. 24				23,2 5.0	CL	Very stiff, b	prown, lean CLAY(CL)	N M M	H
- 10	2 2 2	S3 24 S4 24				3.2			I gray brown lean CLAY(CL), moist to wet -MARINE DEPOSIT- olive, lean CLAY(CL), wet		
	WOH WOH WOH	24	20.0 22.0			8.2		Medium stiff, PV1 at 20,0 ft	gray, lean CLAY(CL), mps=2 mm, wet 5 95 N	ммн	
5_			<u> </u>	1	<u> </u>	_ _					
			ter Lev Elaps			epth	(ft.) to	^	Sample Identification Well Diagram Summary		1
Dat	te	Time	Time (hr∜	Botton Casi	m B	ottom	Motor	O Open End Rod		1
1/3/0	02	745			30.0		Hole 30.3		Thin Wall Tube Filter Sand Rock Cored (lin. ft.)		
1/3/0	02	805	0.3				22.7	18.2	S Split Spoon Grout Grout		
Field	Test	l s:		Dila	tancy		R-Par	ld S Slow	Geoprobe Concrete Bentonite Seal Boring No. B4		
				Tou	ohnes	:22	L-Low	id, S-Slow, , M-Medium	N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High	u High	
		Note	e: Soi	lide	ntific	ation	base	Maximum p ed on visual	article size is determined by direct observation within the limitations of sampler size, -manual methods of the USCS as practiced by Haley & Aldrich, Inc.	y ciigis	
									Trainty & Alarich, IIIC.		į

	LDRIC					1	TEST BORING REPORT		F	ile	ring No. et N	2	843	B4 8-00 of)0 2	0	
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		Grą	vel	S	and E	1-	F	Fiel	d Te	1
- 25	9 13 16 25	\$6 24	25.0 27.0	\$	3.2 25.0	SP- SM	Medium dense, brown poorly-graded SAND with silt, mps=0.4 mm, wet, frequent gray silt and clay seams -GLACIAL TILL-		%	H %	0%	_	0 10		Toug	Plasticity	
-30	50/.3	\$7	30.0		-1.9 30.1 -2.1 30.3	SM	Brown silty SAND(SM), mps=1/2", wet, Reddish brown WEATHERED ROCK Note: Hammer bouncing 6" on rock Bottom of Exploration at 30.3 ft. Spoon refusal			0	20 20	35	5 15				
										The state of the s							
T = Sa TE: S	mpter ble	ows per 6	3 In. **M	axime	ım partic İsual-ma	le size	is determined by direct observation within the limitations of sampler size. methods of the USCS as practiced by Haley & Aldrich, Inc.	Вс	orli	ng	No.			B4			

	ALIDR MIDIR	Y& TOTI		Di-			TEST	BORING REP	ORT	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		В	orii	ng	No.	.,,,,,		В5	
C	roject lient ontrac		Comn Unive Maine	nunity rsity c Test	Educ of Sou Borin	ation thern gs, In	Facility and I Maine c.	Parking Garage, Bedfo	ord Street, Portland, Ma	aine	s	ile I hee tart	t N	o. 1	of				
				Casi	ng S	Sample	er Barrel	Drilling Equips	nent and Procedures			tart inisi		3	Jan Jan	uary uary	/ 20 / 20	102 102	
Ту	pe	_		HSA	-	SS		Rig Make & Model:			4	rille				.Cof			
Ins	ide D	iamete	er (in.)	2 1/	2	1 3/8		Bit Type: Cutting H	ead		-		Rep		В.	Law	ren	ce	
- 1			ht (lb.)	2 17	-	140		Drill Mud: None				leva atur	atior n	1	33.	.8 3VD			
		Fall (i				30	-	Hoist/Hammer: Wind Notes:	h/ Safety Hammer				ion	S	ee P				
	T		_ _			7													
Depth (ft.)		Sample No.	Sample	Veli Diagram	ev./Depth	Symbol	V	/isual-Manual Identifica	tion and Description		Gra			and	\top	F		d Te	eşt
l fa	SPT	dug			12	SS			•		% Coarse	ω	% Coarse	% Medium	ه اه	3 3	Toughness	}	5
	S	\overline{\over	8 00 6	5 §	ü	USCS	structure, o	dor, moisture, optional de	JP NAME, max. particle si scriptions, geologic interpi	ze** etation)	Ö	% Fine	Ö	Σį	% Fines	Dilatancy	ş	Placticity	3
	32	SI	0.3	3	33.	E ~~~.		-BITHMINOUS	CONCRETE		-	~	8 3	8 8	8 8		۴	<u> </u>	- 6
	5	12			0. 33.		Very dense moist	, brown well-graded SAN	D with gravel(SW), mps=	1",	10	10	0 2	5 3			E		Ŧ
<u> </u>	10		_	_	0. 31.		41		L.	//				30	70	R			
-					2.		4 omi, gray [orown sandy SILT(ML), n gray brown lean CLAY(C	nps=2 mm, moist		_	_	-	10	90	N	М	М	+ F
-								S V === M. IOM. OEMY(C.	c), mps=2 mm, moist										
- 5 -		- 00		_						-					1				
	6 7 9	S2 24		1		CL	Very stiff, n	nottled, gray brown lean (CLAY(CL), moist					5	95	N	М	м	١.,
	12							-MARINE D	EPOSIT-							``	m	M	H
							}												
-						CL													ĺ
- 10 🕂	7	S3A&	H 10.0	H			Stiff, gray le	Alternating I an CLAY(CL), mps = 2 m	ayers of m. wet					5	95	N	М	м	Н
-	10 13	24	12.0		23,2 10,6		_	hne						95	5	- 1			
.	15	<u> </u>		Ž			Medium dens	se, mottled, brown gray si	AND(SP), mps=2 mm, w ty SAND(SM), mps=1/2	et /	10	10	30	35	15				
				WELL					, , , , , , , , , , , , , , , , , , ,	, ,,,,,,							ı	-	
				NO W				-GLACIAL	TILL-	‡					-				
	ĺ			Z															
15	9	S4	15.0	-		SM	Medium dans	a heaven aller GANTS (G) a											
	15	16	17.0		17.8	$\perp \perp$		e, brown silty SAND(SM)			10	10	15	45	20				
-	22				16.0 17.0	-	Medium dense Coarse to med	e, gray silty SAND(SM), ium sand seam	mps=1/2", wet, occasiona	.1	10	10	15	45	20	- -	+	+	-
					16.8		Augered throu	igh boulder					1	- -	- -	- †	+	+	-
					14.8														ĺ
_					19.0			-WEATHERED	ROCK-		_		\perp	\perp		\perp	_	\perp	
20 - 6	0/.1	S5	20.2		13.5	_													
	1	ĭ	20.3		20.3		Rattom of E	loration at 20.3 ft.		-		\vdash	+		+	+	+	+	\dashv
					1		Auger Refusal	noration at 20.3 ft.											1
	- 1		İ																
			1																
		Wate	er Leve	l Data	<u>=</u>			Sample Identification	Mall Die	_	_				_	<u> </u>	<u> </u>	<u>_</u>	
Date	T	ime .	Elapse	d B	Depth	1 (ft.) t	0:	Open End Rod	Well Diagram Riser Pipe				mai					-	7
- -	-		Time (h	r.) Bol	om asing (Bottom of Hole	184-4	,	Screen	Overbu					20.	3			
1/3/02	- 1	105		20	0.0	_	19.9 t		Cuttings	Rock C		ed (i							
1/3/02		120				16.4	15.7 S	Split Spoon	Grout Concrete					<u>5S</u>		<u>-</u>			-
Field 1	ests:			ilatan		R-Rar	old, S-Slow,	N-None Bloc	Bentonite Seal	Borin	-				B5	5			
		SPT = S	T ampter t	oughn	ess.	L-I.OV	v. M-Medium	H-High Dry	licity: N-Nonplastic, L-L Strength: N-None, L-Lor	A Managari	irm	L	Lin	.h 1	1.11	nn, L	liah		1
		Note	: Soil	ldenti	ficatio	n bas	ed on visual	inicie size is determined by manual methods of the	btrengtn: N-None, L-Lo direct observation within the USCS as practiced by	limitations of	of sa	mpl	er siz	Ze,	Y-V6	ay r	nAI)		_
									TOO NO DISCUSSION DA	natey &	<u> Aldi</u>	rich	, Inc	C					1

17 Jan 02

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	ALDR	feir	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				TEST	BORING REP	ORT			В	ori	ng i	Vo.		B	36	
C	roject lient ontrac				/ Educa of Sout Boring	******	rianne	Parking Garage, Bedfe	rd Street, Portland,	, Maine	S	ile Shee Start	et N	o. i	of	-000 1 Jary		····	_
			_	Cas	ing S	ample	r Barrel	Drilling Equipm	nent and Procedure		-∫F	inis	h	4	Janı	ary	200	2	
Ту	/pe			HS	A	SS		Rig Make & Model: 1			⊸1	rille I 8. A	er Rej	n		Coff			
Ins	side D	iamete	er (in.)	2 1	/2	1 3/8		Bit Type: Cutting He	ead		\vdash		atio		35.	awr	ence	-	_
На	ımmer	Weig	ht (lb.)			140	_	Drill Mud: None Hoist/Hammer: Winc	h/ Safatu Uamma-		D	atu	m		NG	VD			
На	mmer	Fall (i		 -		30	-	Notes:	a calety Halling		L	оса	tion	Se	e Pl	an			
£		Sample No.	(III.)	£	Elev./Depth	Symbol	V	/isual-Manual Identifica	tion and Description	1	-	avel	-	Sand	7		т т	Test	<u>t</u>
Depth (ft.)	SPT	amp	Sample	ebth ebth		USCS S	(Density	Consistency color GROL	ID NAME man and		Coarse	ije ije	Coarse	% Medium	Fines	ancy.	Toughness	\$:
-0	- 0	O a	8 0	2 3	34.		structure, o	dor, moisture, optional de:	scriptions, geologic in	terpretation)	%	% Fine	0%	% Medi	E IE	Dilatancy	Toug	Plasticity	i
-	14 5	Si			0.		Loose brow	-BITUMINOUS n, well-graded SAND(SW	CONCRETE-			10	4.5		E		\exists		_
_	3 7	6	2.	5			1	-FIL	L-	-		10	15 2	25 45	5				
- 5 -	6 13 30	S2 12			29.7 5.3 29.2	SP	Medium der	sandy lean CLAY(CL), n nse, orange poorly-graded -MARINE D	SAND(SP), mps=2 n	11				95	70	N	м	M	H -
					5.8 28.9	SM	Dense, brow	vn gray well-graded SANI	with silt and gravel(SW-SM),	5 1	10 1	5 3	0 30	10		\top	\top	-
					6.1		mps=1 ", m	oist -GLACIAL				1	1				\top	+	-
					28.1 6.9		Auger to 6.9	-WEATHERE	D ROCK										
j							Bottom of E Auger refusa	xploration at 6.9 ft.											
				TAT.			riager retus	ц			l		İ						
	i			Z															
Date		lime	er Lev Elapse Time (I	ed B	Depti ottom	i (ft.) ti	Motor	Sample Identification O Open End Rod	Well Diagram	Overb	urd	len		ft.)	6.5	9			
1/4/0:	2	715	15	" of (of Hole	vvater	T Thin Wall Tube	Filter Sand	Rock					U.3	,			
			13		2.0	6.1		U Undisturbed Sample S Split Spoon	Grout	Sampl				2S					
ield	Tests:			Dilata	псу;	R-Ran	old S-Slow	Geoprobe	Concrete Bentonite Se	Borin					В	6			
	*	SPT = 8	Samoler	Fough	ness:	L-LOW	<u>/. M-Medium</u>	ı <u>, H-High</u> Dry	licity: N-Nonplastic, Strength: N-None,	L-LOW, M-Med	diur	m. I	H-H	iah	V-V	erv F	liah		:
		Note	: Soll	iden	tificatio	n bas	ed on visual	article size is determined by -manual methods of th	unect observation within e USCS as practice	n the limitations d by Haley &	of s	amr drlc	oler s h, lr	ize.				\dashv	

I A	IAUEA UDRI	(& Ciii					TEST	BORING REF	ORT			Во	ring	, No),	В	7
Cli	oject ent intract		Comm Univer Maine					Parking Garage, Bedf	ord Street, Portland,	Maine	SI	e N leet		1 of	38-00 f 1	0 2002	1
				Casing	Sa	mple	r Barrel	Drilling Equip	ment and Procedure		Fir	ish		3 Jai	nuary	2002	
Typ	e			HSA		SS		Rig Make & Model:			1 .	iller A R	١		l.Cof		
Insi	de Dia	meter	(in.)	2 1/2	1	3/8		Bit Type: Cutting H Drill Mud: None	ead		_	vat		_	.Law 3.6	rence	:
Har	nmer l	Weigh	(lb.)			140	-	Hoist/Hammer: Wind	h/ Safety Hammer		Da	tum		N	GVD	1	
Har	nmer I	Fall (in	.)			30	-	Notes:	outery manning		Lo	catio	on	See 1	Plan		
£		N. (.		E E	ŧ	8					Grav	ااه	San	 1			
Depth (ft.)	*	De C	ple t	Jiag) Det	Symbol	V	isual-Manual Identifica	ition and Description	, ì						Field	Test
Dep	SPT*	Sample No. & Rec. (in.)	Sample Depth (#)	Well Diagram	Elev./Depth (ft.)	USCS	(Density/	consistency, color, GRO for, moisture, optional de	UP NAME, max. partic	le size**,	Coarse	% Coarso	% Medium	Fine	% Fines Dilatancy	Toughness	ficit
- 0 -					43.3					erpretation)	8	8 %	8	8	Oilai	ğ	Plasticity
-	62 65 31	S1 12	0.3		0.3	sw	Very dense,	-BITUMINOUS brown well-graded SAN	CONCRETE-	oist (frozon)	1	- 0 20	30	35 5			7
+ 1	22							-FII	L-	Olst (HOZEII)							
 		·		7			Brown 80%	fine cand 200									
-					00.1		-10112070	fine sand, 20% coarse to	medium sand in auger	cuttings							
5	90/.2]]	39.1 4.5		Gray concre	te cuttings, dry				L					
	907.2	\$2 2	5.0 5.2] [38.6 5.0		(old foundati	ion)		/	+	+	\vdash	+		-	1
]		37.5 6.1		Note: Durab	-WEATHER! le angular gravel up to 2"	ED ROCK- in auger cuttings		+		-	+			\perp
					0.1		Auger refusa	at 6.1 ft.									
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D-/		Water	Level lapsed		epth (ft) to		Sample Identification	Well Diagram	<u>F_</u>	<u>-</u> Sı	imn	nary			1 1	=
Date	Ti		ne (hr.	Botto	m Bo	ttom	Motor		Riser Pipe Screen	Overbu			-	6.	1		\neg
		_		or cas	10 Ken	H0(6)	vvaler T	The stant 1000	Filter Sand	Rock C	ored						
							s		Grout	Sample		-	28	-			_
Field T	ests:	L.	Di	latancy	, D	. Dani	G C Claus	Geoprobe	Concrete Bentonite Sea	Boring				В	7		
		PT = Sa	To	uahne	ee l	-Low.	d, S-Slow, I M-Medium	H-High D-	licity: N-Nonplastic,	L-Low, M-Med	lium	, H	High				-
		Note:	Solli	ientific	cation	base	Maximum pa d on visual-	rticle size is determined by manual methods of th	direct observation within	the limitations of	uti). Í sar	npler	ngn, size.	V-V	ery i	igh	\exists
							······		us practice(<u>гих цяје</u> А 🛠 🥂	<u> viari</u>	¢h,	ınc.				



CITY OF PORTLAND, MAINE

Department of Building Inspections

Received from AMMASCH 3/2 MARCH
Location of Work /5 5/05/2/157
Cost of Construction \$ Permit Fee \$
Building (IL) Plumbing (I5) Electrical (I2) Site Plan (U2)
Other 9/500 permit # 03.0011
CBL: 114 A OO 4 Check #: 716357 Total Collected \$ 75.00
Check #: 71/357 Total Collected \$ 75.00

THIS IS NOT A PERMIT

No work is to be started until PERMIT CARD is actually posted upon the premises. Acceptance of fee is no guarantee that permit will be granted. PRESERVE THIS RECEIPT. In case permit cannot be granted the amount of the fee will be refunded upon return of the receipt less \$10.00 or 10% whichever is greater.

WHITE - Applicant's Copy YELLOW - Office Copy PINK - Permit Copy

APPENDIX C

Observation Well Installation and Groundwater Monitoring Report



HALEY & ALDRICH			ATION WELL Observation	n Well MW1
			ATION REPORT Test Boring	
Project	Commu	nity Education Facility	and Parking Garage Installation	
City/State	Bedford	Street, USM, Portland,	Maine Location	See See
Cilent		ty of Southern Maine		Plan
Contractor	Maine To	est Borings, Inc.	H&A File No	
Foreman	M.Coffin		H&A Rep.	B.Lawrence
Ground El.	27.8	ft.		
El. Datum			Type of protective cover:	Hex Nut
SOIL/RC	OCK	BOREHOLE	Height of top of roadway box above grou	
CONDITIO		BACKFILL	The state of the s	und surface 0.0 ft
frantiners telet to el	evation/depth f not to sca	rom ground surface in feet)		
BITUMIN		COLD	Depth of top of riser pipe below ground s	surface0.2 ft
CONCRE	ETE	PATCH	Type of protective casing:	
0.5		0.5	Length	1.0 ft
		BENTONITE	inside diameter	7.0 in
FILL		CHIPS1.0	Depth of bottom of roadway box	1.0 ft
2.3			Seals: Depth to T	hickness
		j	Type top (ft)	(ft)
		NATURAL	Cold Patch 0.0	0.5
		BACKFILL	Bentonite Seal 0.5	0.5
] [Type of riser pipe:	Schedule 40 PVC
MARINE DEPOSIT		12.0	Inside diameter of riser pipe	1.0 in
	-		Type of backfill around riser:	Natural Backfill
		, ! !	Diameter of borehole	8.0_in
		į	Depth of top of wellpoint	10.2 ft
		NATURAL,	Type of point or manufacturer;	Schedule 40 Slotted
26.0		GRANULAR BACKFILL	Screen gauge or size of openings	0.010 in
GLACIAL TILL		BACKFILE	Diameter of wellpoint	1.0 in
		Ī	Type of backfill around point:	Natural/Sand Backfill
.4			Depth of bottom of wellpoint	20.2 ft
WEATHERE			Silt trap	ft
ROCK			Depth of bottom of borehole	31.6 ft
Date	tom of Exp	oration	(Depths refer to ground su	

GROUNDWATER MONITORING **REPORT**

OW/PZ	NUMBEI
]	B3

1 of

PROJECT LOCATION

Community Education Facility and Parking Garage Bedford Street, Portland Campus, USM

H&A FILE NO. PROJECT MGR.

Page 28438-000

CLIENT

University of Southern Maine

FIELD REP.

DATE

K. Recker B. Lawrence 1/4/2002

CONTRACTOR Maine Test Borings, Inc. ELEVATION SUBTRAHEND

Date	Time	Elapsed Time (days)	Depth of Water from Ground Surface	Elevation of Water	Remarks	Read By
1/4/2002	1535	-	13.1	14.7		BKL
1/7/2002	815	3	5.6	22.2		BKL
				THE RESERVE THE PARTY OF THE PA		
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			170			

APPENDIX C

Observation Well Installation and Groundwater Monitoring Report

