TRANSMITTAL LETTER

6F3

STROUDWATER CONSTRUCTION COMPANY, INC.
96 Ocean Street Unit 1
South Portland, ME 04106
TEL 207-767-9111 FAX 207-767-9110

PROJECT: Waynflete Arts Center Phase 2
PO Box 8239
Portland, Maine 04104

PROJECT #

DATE: 12/20/07

TO: City of Portland
Code Enforcement Office
389 Congress St
Portland, ME 04101

ATTN: Mike Nugent

DEC 21 2007

If enclosures are not as noted, please inform us immediately.

If checked below, please:
( ) Acknowledge receipt.
( ) Return enclosures to us.

WE TRANSMIT:
(X) herewith
( ) in accordance with your request

FOR YOUR:
( ) approval
( ) review & comment
(X) use
( ) distribution to parties
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( ) Drawings
( ) Specifications
( ) Change Order
( ) Shop Drawing Prints
( ) Shop Drawing Reproducible
( )
( ) Samples
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COPIES	DATE	REV. #	DESCRIPTION	ACTION CODE
1	12/20/07		Compliance Statement COM CHECK	

ACTION CODE
A. Action indicated on item transmitted
B. No action required
C. For signature and return to this office
D. for signature and forwarding as noted below under REMARKS
E. See REMARKS below

REMARKS

COPIES TO: (with enclosures)

BY: David A. Cimino

Generated by COM*check* Package Generator

Envelope Compliance Certificate

2003 IECC

Report Date: 12/18/07

Section 1: Project Information

Project Title: Waynflete Arts Center

Construction Site:
16 Storer Street
Portland, maine 04102
Permit No. 07-1324
Permit Date: 10-2207

Owner/Agent:
David Cimino
Stroudwater Construction Company
96 Ocean Street Unit 1
South Portland, Maine 04107
207-767-9111
David@stroudwaterconstruction.com

Designer/Contractor:

Section 2: General Information

Building Location (for weather data):	**Portland, Maine**
Climate Zone:	**15**
Heating Degree Days (base 65 degrees F):	**7378**
Cooling Degree Days (base 65 degrees F):	**268**
Project Type:	**New Construction**
Vertical Glazing / Wall Area Pct.:	**11%**

DEC 21 2007

Building Type	Floor Area
School	17197

Section 3: Requirements Checklist

Envelope PASSES

Climate-Specific Requirements:

Component Name/Description	Cavity R-Value	Cont. R-Value	Glazing U-Factor
Ceiling: Nonwood Joist/Truss	25.0	0.0	
Wall: Other Masonry, Metal Frame, Furring: Metal	11.0	0.0	
Window: Other, Other, SHGC 0.70	---	---	0.700
Slab-on-Grade: No Basement Comments: Unheated 48 inch depth	---	22.0	

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

Air Leakage, Component Certification, and Vapor Retarder Requirements:

- ☐ 1. All joints and penetrations are caulked, gasketed or covered with a moisture vapor-permeable wrapping material installed in accordance with the manufacturer's installation instructions.
- ☐ 2. Windows, doors, and skylights certified as meeting leakage requirements.
- ☐ 3. Component R-values & U-factors labeled as certified.
- ☐ 4. Insulation installed according to manufacturer's instructions, in substantial contact with the surface being insulated, and in a manner that achieves the rated R-value without compressing the insulation.
- ☐ 5. Stair, elevator shaft vents, and other dampers integral to the building envelope are equipped with motorized dampers.
- ☐ 6. Cargo doors and loading dock doors are weather sealed.
- ☐ 7. Recessed lighting fixtures are: (i) Type IC rated and sealed or gasketed; or (ii) installed inside an appropriate air-tight assembly with a 0.5 inch clearance from combustible materials and with 3 inches clearance from insulation material.

☐ 8. Building entrance doors have a vestibule and equipped with closing devices.
Exceptions:

Building entrances with revolving doors.

Doors that open directly from a space less than 3000 sq. ft. in area.

☐ 9. Vapor retarder installed.

Section 4: Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the 2003 IECC requirements in COM*check* Package Generator and to comply with the mandatory requirements in the Requirements Checklist.

DAVID A. CIMINO - PRESIDENT
STROUDWATER CONST. CO.
Name - Title

[signature]
Signature

12 - 20 - 07
Date

(Responsible Individual) (Company Name)

I, Vamshi Gooje, from Fore Solutions
verify that the information provided below is accurate, to the best of my knowledge.

CREDIT COMPLIANCE

(Please complete the color coded criteria(s) based on the option path selected)

Please select the appropriate compliance path option

- (●) Option 1 (Pg 2): Performance Rating Method, ASHRAE 90.1-2004 Appendix G or equivalent (up to 10 points possible)
- ( ) Option 2 (Pg 14): ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004 (4 points)
- ( ) Option 3 (Pg 14): Advanced Buildings Benchmark™ Version 1.1, Basic Criteria & Prescriptive Measures (1 point)

OPTION 1: PERFORMANCE RATING METHOD

☒ I confirm that the energy simulation software used for this project has all capabilities described in EITHER section `G2 Simulation General Requirements' in Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

☒ I confirm that the baseline building and proposed building in this project's energy simulation runs use the assumptions and modeling methodology described in EITHER Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

Complete the following sections to document compliance using Option 1:

- Section 1.1 - General Information
- Section 1.2 - Space Summary
- Section 1.3 - Advisory Messages
- Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs
- Section 1.5 - Energy Type Summary
- Section 1.6 - On-Site Renewable Energy (if applicable)
- Section 1.7 - Exceptional Calculation Measure Summary (if applicable)
- Section 1.8 - Performance Rating Method Compliance Report

Section 1.1 - General Information

Provide the following data for your project

Simulation Program:	eQUEST 3.6	Quantity of Stories:	2
Principal Heating Source:	Fossil Fuel	Weather File:	TMY\PORTLANDME.bin
Energy Code Used:	ASHRAE 90.1-2004 Appendix G	Climate Zone:	6A
New Construction Percent:	80 %	Existing Renovation Percent:	20 %

Enter the Target Finder score for your building from the Energy Star website (http://www.energystar.gov/index.cfm?fuseaction=target_finder.&CFID=154897). The score has no bearing on the number of EAc1 points earned. Use the following process to evaluate the Target Finder score:

1. Enter the facility information
2. Enter the facility characteristics. Select each primary and secondary space type that applies to the project. Then complete the required information for each space type.
4. Enter the total energy use per energy source for your project based on the totals reflected in the Proposed Design energy simulation output report.

Target Finder Score: 29

Section 1.2 - Space Summary

Provide the space summary for your project
(click "CLEAR" to clear the contents of any row All numeric entries must be entered as whole numbers without commas):

Table 1.2 - Space Summary

Building Use (Occupancy Type)	Conditioned Area (sf)	Unconditioned Area (sf)	Total Area (sf)	
Theater	4,290		4,290	CLEAR
Gym	3,281		3,281	CLEAR
Workshop/drama/music	3,018		3,018	CLEAR
Office/Control/Tech room	534		534	CLEAR
Storage	1,055		1,055	CLEAR
Stairs	562		562	CLEAR
Toilets	506		506	CLEAR
Storage/Mechanical	1,787		1,787	CLEAR
Circulation	2,164		2,164	CLEAR
				CLEAR
				CLEAR
Total:	17,197		17,197	

Section 1.3 - Advisory Messages

Complete the following information from the simulation output files (all entries should be entered as whole numbers, without commas)

TABLE 1.3 - Advisory Messages	Proposed Building	Baseline Building (0 deg. rotation)	Difference
Number of hours heating loads not met:	14	15	1
Number of hours cooling loads not met:	191	146	45
Number of warning messages:	10	7	3
Number of error messages:	0	0	0
Number of defaults overridden:	0	0	0

Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs

Use Table 1.4 to document the Baseline and Proposed design energy model inputs for your project. Include descriptions for:

1. Exterior wall, underground wall, roof, floor, and slab assemblies including framing type, assembly R-values, assembly U-factors, and roof reflectivity when modeling cool roofs. (Refer to ASHRAE 90.1 Appendix A)
2. Fenestration types, assembly U-factors (including the impact of the frame on the assembly), SHGCs, and visual light transmittances, overall window-to-gross wall ratio, fixed shading devices, and automated movable shading devices.
3. Interior lighting power densities, exterior lighting power, process lighting power, and lighting controls modeled for credit.
4. Receptacle equipment, elevators or escalators, refrigeration equipment, and other process loads.
5. HVAC system information including types and efficiencies, fan control, fan supply air volume, fan power, economizer control, demand control ventilation, exhaust heat recovery, pump power and controls, and any other pertinent system information. (Include the ASHRAE 90.1-2004 Table G.3.1.1B Baseline System Number).
6. Domestic hot water system type, efficiency and storage tank volume.
7. General schedule information

Documentation should be sufficient to justify the energy and cost savings numbers reported in the Performance Rating Table.

(Click "CLEAR" to clear the contents of any row.)

TABLE 1.4 - Comparison of Proposed Design Versus Baseline Design

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Exterior Wall Construction	exterior insulation & finish system (EFIS) with moisture management system; on 5/8 exterior plywood; on 8" steel stud framing; with	Above grade steel frame wall, U-value: 0.084 Btu/h-ft2-F; Below grade wall C-factor: 1.14 Btu/h-ft2-F. ASHRAE table 5.5-6 for climate zone 6a	CLEAR
Roof Construction	theater architectural grade asphalt shingles; on #15 felt; on venting nail board; on rigid insulation; on	U-value: 0.063 Btu/h-ft2-F. ASHRAE table 5.5-6 for climate zone 6a	CLEAR
Floor/Slab Construction	ground floor 4" concrete slab on grade; on ½ "slab shield" vapor barrier & insulation; on 8" crushed stone;	Slab-on-grade: F-0.155 Btu/h-ft2-F (no min. R-value). ASHRAE table 5.5-6 for climate zone 6a	CLEAR
Window-to-gross wall ratio	11 %	11%	CLEAR
Fenestration type	low-e Insulating glass - Overall unit thickness - 25 mm Interspace content: Air	For north glass: (ASHRAE table 5.5-6 for climate zone 6a)	CLEAR
Fenestration U-factor	0.38 (including frame)	0.57	CLEAR
Fenestration SHGC - North	0.51	0.49	CLEAR
Fenestration SHGC - Non-North	0.51	0.39	CLEAR
Fenestration Visual Light Transmittance	0.7	0.7	CLEAR
Shading Devices	none	none	CLEAR
			CLEAR
Interior Lighting Power Density (W/sf)	theater-2.6 w/sf; gym 1.4; corridors-0.5 w/sf; workshops/music/drama -0.6 w/sf	ashrae 90.1 2004 from table 9.3.1.1 (theater-2.6 w/sf; gym 1.4; corridors-0.5 w/sf; workshops/music/drama -0.6 w/sf)	CLEAR

TABLE 1.4 - Comparison of Proposed Design Versus Baseline Design

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Daylighting Controls	Programmable lighting switches used via occupancy schedule. Dimmable sensors used in Music room/ drama room and offices	Same lighting schedule as the proposed design case. Daylight sensors not simulated.	CLEAR
Other Lighting Control Credits			CLEAR
Exterior Lighting Power (kW)	5 KW (total exterior street/walkway lighting)	same as design case	CLEAR
Process Lighting (kW)	See supporting document	same as design case	CLEAR
Receptacle Equipment Power Density (W/sf)	0.5 W/SF average estimate (space by space)	same as design case	CLEAR
			CLEAR
Primary HVAC System Type	packaged vav with zonal reheating, includes outside air economizer and variable speed fans. dx cooling type. The ventilation for the	Table G3.1.1B System # 3 - Packaged unitary air-conditioning. Dx cooling and constant volume systems. Purchased steam heating used	CLEAR
Other HVAC System Type			CLEAR
Fan Supply Volume	RTU HVAC#1 - 10,700 cfm (2150 outdoor cfm) VAV1- 1830 cfm VAV2- 370 cfm	Autosized	CLEAR
Fan Power	20 HP supply & 5 HP return w/ VFD	Calculated fan power values from Appendix -G, table G3.1.2.9.; 0.00706 kw/cfm	CLEAR
Economizer Control	at Outdoor Dry Air temperature of 65 deg f	Economizers controls from ASHRAE 90.1 2004 Appendix G (Tables G.3.1.2.6A through G.3.1.2.6C): High limit shut-off at 70 deg F and d	CLEAR
Demand Control Ventilation	Co2 controlled ventilation to Theater space only.	No	CLEAR
Unitary Equipment Cooling Efficiency	11.6 SEER - HVAC#1	12 SEER (ASHRAE Table 6.8.1A air cooled a/c's)	CLEAR
Unitary Equipment Heating Efficiency		80 % efficiency from ASHRAE 6.8.1E; Category warm-air furnace, gas fired.	CLEAR
Chiller parameters			CLEAR
Chilled water loop & pump parameters			CLEAR
Boiler parameters	3 boilers, thermal solutions, #EVH-B 2000, 88% thermal efficiency		CLEAR
Hot water loop & pump parameters	Premium motors, Taco CE307, 2 pumps 450 GPM @ 7 1/2 HP; Others- 3 pumps, 7 GPM @ 1/25 HP		CLEAR
Cooling tower parameters			CLEAR
Condenser water loop & pump parameters			CLEAR
			CLEAR

Section 1.5 - Energy Type Summary

List the energy types used by your project (i.e. electricity, natural gas, purchased chilled water or steam, etc.) for either the Baseline or Proposed design. Also describe the utility rate used for each energy type (i.e. Feswick County Electric LG-S), as well as the units of energy used, and the units of demand used. (Click "CLEAR" to clear the contents of any row):

TABLE 1.5 - Energy Type Summary

Energy Type	Utility Rate Description	Units of Energy	Units of demand	
Electricity	$0.161	kWh	kW	CLEAR
Natural Gas	$13.0	MBtu	MBH	CLEAR
				CLEAR
				CLEAR

<u>Energy Units:</u>

1 kBtu = 1,000 Btu
1 kWh = 3.412 kBtu
1 therm = 100 kBtu
1 MBtu = 1,000 kBtu
1 MWh = 3,412 kBtu
1 ton hr = 12 kBtu

<u>Demand Units</u>

1 MBH = 1,000 Btu/h
1 kW = 3.412 MBH
1 MMBtuh = 1,000 MBH
1 ton = 12 MBH

Section 1.6 - On-Site Renewable Energy

If the project does not include on-site renewable energy, skip to Section 1.7

☐ The project includes On-Site Renewable Energy

How is the on-site renewable energy cost calculated?

- (●) This form will automatically calculate the Renewable Energy Cost based on the "virtual" energy rate from the proposed design energy model results. This form will subtract the Renewable Energy Cost from the proposed design energy model results to calculate the Proposed Building Performance Rating. (You do NOT need to fill out the "Renewable Energy Cost" field in Table 1.6 below)
- ( ) Renewable Energy Cost for each on-site renewable source is analyzed separately from the energy model based on local utility rate structures. The Renewable Energy Cost for each renewable source is reported in Table 1.6 below, This form will subtract the reported Renewable Energy Cost from the proposed design energy model results to calculate the Proposed Building Performance Rating.
- ( ) On-site renewable energy is modeled directly in the energy model. Renewable Energy Cost is already credited in the proposed design energy model results (i.e. the energy model already reflects zero cost for on-site renewable energy, and this form will NOT subtract the Renewable Energy Cost a second time).

Indicate the on-site renewable energy source(s) used, the backup energy type for each source (i.e. the fuel that is used when the renewable energy source is unavailable - ASHRAE 90.1-2004, Section G2.4), the rated capacity for the source, and the annual energy generated from each source.

TABLE 1.6 - Renewable Energy Source Summary

Renewable Source	Backup Energy Type	Annual Energy Generated	Rated Capacity	Renewable Energy Cost	
					CLEAR
					CLEAR

Section 1.7 - Exceptional Calculation Measure Summary

(If the energy analysis does not include exceptional calculation methods, skip to Section 1.8)

☐ The energy analysis includes exceptional calculation method(s) (ASHRAE 90.1-2004, G2.5)

How is the exceptional calculation measure cost savings determined?

(•) This form will automatically calculate the exceptional calculation measure cost savings based on the "virtual" energy rate from the proposed design energy model results. This form will subtract this cost savings from the proposed design energy model results to calculate the Proposed Building Performance Rating.

( ) Exceptional calculation measure cost for each exceptional calculation measure is analyzed based on local utility rate structures. The cost savings for each exceptional calculation is reported below, This form will subtract the reported exceptional calculation cost savings from the proposed design energy model results to calculate the Proposed Building Performance Rating.

For each exceptional calculation method employed, document the predicted energy savings by energy type , the energy cost savings (if option 2 above is selected), and a narrative explaining the exceptional calculation method performed, and theoretical or empirical information supporting the accuracy of the method. Reference any applicable Credit Interpretation Rulings. [Note: if an end-use has an energy loss rather than an energy savings, enter it as a negative number]

Exceptional Calculation Measure Short Description: CLEAR

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings	Exceptional Calculation Measure Narrative:

Exceptional Calculation Measure Short Description: CLEAR

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings	Exceptional Calculation Measure Narrative:

Section 1.8 - Performance Rating Method Compliance Report (Option 1 Compliance Only)

In Table 1.8.1, list each energy end use for your project (including all end uses reflected in the baseline and proposed designs). Then check whether the end-use is a process load, select the energy type, and list the energy consumption and peak demand for each end-use for all four Baseline Design orientations. In Table 1.8.1(b) indicate the total baseline energy cost for each energy type for all four Baseline Design orientations. If either the baseline or proposed design uses more than one energy type for a single end use (i.e. electric resistance reheat, and central natural gas heating), enter each energy type as a separate end use (i.e. Heating - Electric, and Heating, NG).

Fill out the Proposed Design energy consumption and peak demand for each end use in Table 1.8.2. In Table 1.8.2 (b) indicate the total proposed energy cost for each energy type. [Note: Process loads for the proposed design must equal those listed in the Baseline design. Any process load energy savings for the project must be reported in Section 1.7.]

(Click "CLEAR" to clear the contents of any end use)

Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
Interior Lighting	☐	Electricity	Energy Use (kWh)	32,110	32,110	32,110	32,110	32,110	CLEAR
			Demand (kW)	9	9	9	9	9	
Exterior Lighting	☐	Electricity	Energy Use (kWh)	19,620	19,620	19,620	19,620	19,620	CLEAR
			Demand (kW)	5	5	5	5	5	
Space Heating	☐	Natural Gas	Energy Use (MBtu)	1,079.4	1,104.2	1,123.3	1,087.3	1,098.6	CLEAR
			Demand (MBH)	696.6	711.2	718.9	699.4	706.5	
Space Cooling	☐	Electricity	Energy Use (kWh)	7,970	8,270	8,600	7,810	8,162.5	CLEAR
			Demand (kW)	26	24.9	27.6	27.3	26.5	
Pumps	☐	Electricity	Energy Use (kWh)	2,510	2,490	2,510	2,520	2,507.5	CLEAR
			Demand (kW)	.5	.5	.5	.5	.5	
Heat Rejection	☐	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Fans - Interior	☐	Electricity	Energy Use (kWh)	64,980	64,700	65,590	64,330	64,900	CLEAR
			Demand (kW)	14.5	15.1	14.8	14.3	14.7	
Fans - Parking Garage	☐	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Service Water Heating	☐	Natural Gas	Energy Use (MBtu)	71.4	71.4	71.4	71.4	71.4	CLEAR
			Demand (MBH)	2.5	2.6	2.6	2.5	2.6	
Receptacle Equipment	☒	Electricity	Energy Use (kWh)	6,380	6,380	6,380	6,380	6,380	CLEAR
			Demand (kW)	2.5	2.5	2.5	2.5	2.5	

Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
Interior Lighting (Process)	☒	Electricity	Energy Use (kWh)	570	570	570	570	570	CLEAR
			Demand (kW)	.7	.7	.7	.7	.7	
Refrigeration	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Data Center Equipment	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
Cooking	☒		Energy Use						CLEAR
			Demand						
Elevators & Escalators	☒	Electricity	Energy Use (kWh)						CLEAR
			Demand (kW)						
	☐		Energy Use						CLEAR
			Demand						
Baseline Energy Totals:		Total Annual Energy Use	(MBtu/year)	1,608	1,633	1,657	1,614	1,628	
		Annual Process Energy	(MBtu/year)					24	

Note: Process Cost accounts for 5% of Baseline Performance. Process cost must equal at least 25% of Baseline Performance, or the narrative at the end of this form must document why this building's process costs are less than 25%

Table 1.8.1(b) - Baseline Energy Costs

Energy Type	Baseline Cost (0° rotation)	Baseline Cost (90° rotation)	Baseline Cost (180° rotation)	Baseline Cost (270° rotation)	Baseline Building Performance
Electricity	$21,595	$21,596	$21,795	$21,467	$21,613
Natural Gas	$16,410	$16,810	$17,064	$16,552	$16,709
Total Baseline Costs:	$38,005	$38,406	$38,859	$38,019	$38,322

Table 1.8.2 - Performance Rating Table - Performance Rating Method Compliance

End Use	Process?	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Building Units	Baseline Building Results	Percent Savings
Interior Lighting		Electricity	Energy Use (kWh)	17,180	Energy Use (kWh)	32,110	46.5 %
			Demand (kW)	13	Demand (kW)	9	-46.7 %

Exterior Lighting		Electricity	Energy Use (kWh)	19,620	Energy Use (kWh)	19,620	0	%
			Demand (kW)	5	Demand (kW)	5	0	%
Space Heating		Natural Gas	Energy Use (MBtu)	710	Energy Use (MBtu)	1,098.6	35.4	%
			Demand (MBH)	611	Demand (MBH)	706.5	13.5	%
Space Cooling		Electricity	Energy Use (kWh)	13,060	Energy Use (kWh)	8,162.5	-60	%
			Demand (kW)	17.7	Demand (kW)	26.5	33.3	%
Pumps		Electricity	Energy Use (kWh)	11,360	Energy Use (kWh)	2,507.5	-353.1	%
			Demand (kW)	1.1	Demand (kW)	.5	-200	%
Heat Rejection		Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Fans - Interior		Electricity	Energy Use (kWh)	50,240	Energy Use (kWh)	64,900	22.6	%
			Demand (kW)	37	Demand (kW)	14.7	-152	%
Fans - Parking Garage		Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Service Water Heating		Natural Gas	Energy Use (MBtu)	78	Energy Use (MBtu)	71.4	-9.2	%
			Demand (MBH)	16.5	Demand (MBH)	2.6	-700	%
Receptacle Equipment	X	Electricity	Energy Use (kWh)	6,380	Energy Use (kWh)	6,380	0	%
			Demand (kW)	3.2	Demand (kW)	2.5	-37.5	%
Interior Lighting (Process)	X	Electricity	Energy Use (kWh)	570	Energy Use (kWh)	570	0	%
			Demand (kW)	.7	Demand (kW)	.7	0	%
Refrigeration	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Data Center Equipment	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
Cooking	X		Energy Use		Energy Use		0	%
			Demand		Demand		0	%
Elevators & Escalators	X	Electricity	Energy Use (kWh)		Energy Use (kWh)		0	%
			Demand (kW)		Demand (kW)		0	%
			Energy Use		Energy Use		0	%
			Demand		Demand		0	%
Energy Totals:		Total Annual Energy Use (MBtu/year)		1,192		1,628	26.8	%
		Annual Process Energy (MBtu/year)		24		24	0	%

Table 1.8.2(b) - Energy Cost and Consumption by Energy Type - Performance Rating Method Compliance

	Proposed Design			Baseline Design			Percent Savings	
Energy Type	Energy Use		Cost	Energy Use		Cost	Energy Use	Cost
Electricity	118,410	kWh	$19,064	134,249	kWh	$21,613	11.8 %	11.8 %
Natural Gas	786	MBtu	$11,728	1,169	MBtu	$16,709	32.8 %	29.8 %
	0			0			0 %	0 %
	0			0			0 %	0 %
Subtotal (Model Outputs):	1,192	(MBtu/year)	$30,792	1,628	(MBtu/year)	$38,322	26.8 %	19.6 %

On-Site Renewable Energy	Energy Generated	Renewable Energy Cost

Exceptional Calculations	Energy Savings	Cost Savings

	Proposed Design			Baseline Design			Percent Savings	
	Energy Use		Cost	Energy Use		Cost	Energy	Cost
Total:	1,192	(MBtu/year)	$30,792	1,628	(MBtu/year)	$38,322	26.8 %	19.6 %

DOCUMENTATION DESCRIPTION LOG

Please upload the compliance summaries for ASHRAE 90.1-2004 (or qualifying local energy code) and/or LEED if available from the energy simulation software used. Please also upload the energy rate tariff from the project's energy providers if the project is not using the default rates in the LEED-NC v2.2 Reference Guide.

If the software is incapable of producing the energy code or LEED compliance summaries please provide output summaries and example input summaries for both the baseline and proposed buildings that support the data entered in the template tables above.

* Output summaries must include simulated energy consumption by end use as well as total building energy consumption and cost by energy type used in the building.
* Example input summaries must be a sampling of model input assumptions, focusing on the most common systems present in the building. The example input summaries should be taken from the simulation software's standard input reports if available; if the software will not produce input summary reports then screen captures of representative inputs are acceptable. The example input summaries must include samples of the following input information:

1. Occupancy and usage patterns
2. Assumed envelope component sizes and traits (area, R-value, U-value, etc.)
3. Assumed mechanical equipment types and traits (capacity, efficiency, etc.)

Please note that uploaded documents should be SUMMARIES, and not large quantities of detailed data

Documentation Description Log

In the text box below, please reference the file name of each uploaded file (e.g. simulationsummary.pdf)

WAC_occupancy.pdf
baseline summaries.pdf
proposed summaries.pdf
process equipment.pdf

☒ I have provided the appropriate supporting documentation in the document upload section of LEED Online. Please refer to the above sheets.

OPTION 2: ASHRAE ADVANCED ENERGY DESIGN GUIDE FOR SMALL OFFICE BUILDINGS, 2004

The building complies with all the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions are applicable:

☐ The project is less than 20,000 square feet.

☐ The project is office occupancy.

☐ The project has fully complied with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located

Climate zone

OPTION 3: ADVANCED BUILDINGS BENCHMARK ™ VERSION 1.1

☐ The project fully complies with the Basic Criteria and Prescriptive Measures of the Advanced Buildings Benchmark™ Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control.

Climate zone

NARRATIVE (Optional)

Please provide any additional comments or notes regarding special circumstances or considerations regarding the project's credit approach.

Error messages:
The number of errors messages in proposed case are more than the baseline case. All the warnings caution the user indicating the time of occurrence of frost on the exhaust outlet. The number of energy recovery ventilators in the proposed case is greater than the baseline case.

Energy Star:
The online target finder does not have any space type closely representing theater so we have used K-12 as the space type since this will be part of a school facility.

Process energy:
The process energy for this type of building cannot be 25% of the total baseline energy cost. The spaces are used mostly for performances and other workshop events. A detailed list of the process equipment going into the project is attached.

☐ The project is seeking point(s) for this credit using an alternate compliance approach. The compliance approach, including references to any applicable Credit Interpretation Rulings is fully documented in the narrative above. (Indicate the number of points documented in the "Alternative Compliance Points Documented" field below).

Alternative Compliance Points Documented

Project Name: Waynflete School Art Center Addition

Credit: EA Credit 1: Optimize Energy Performance

Points Documented:

READY TO SAVE THIS TEMPLATE TO LEED-ONLINE? Please enter your first name, last name and today's date below, followed by your LEED-Online Username and Password associated with the Project listed above to confirm submission of this template.

First Name	Last Name	Date	Username (Email Address)	Password
Gunnar	Hubbard	2007-10-24	GUNNAR@FORE-SOLUTION	*******

SAVE TEMPLATE TO LEED-ONLINE | PRINT TEMPLATE

Letter Template Version A1

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED ADDITION - WAYNFLETE SCHOOL
360 SPRING STREET
PORTLAND, MAINE

01-0120 S April 18, 2001

TABLE OF CONTENTS

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

01-0120 S
April 18, 2001

Scott Simons Architects
Attn: Austin Smith
15 Franklin Street
Portland, Maine 04101-4169

Subject: Geotechnical Engineering Services
Proposed Building Addition-Waynflete School
360 Spring Street
Portland, Maine

Dear Mr. Smith:

In accordance with our Proposal dated February 27, 2001, we have made a subsurface investigation for the proposed Building Addition to Davies Hall at the Waynflete School Facility. This report summarizes our findings and its contents are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope of Work

The purpose of the investigation was to explore the subsurface conditions and provide recommendations relative to foundation design and earthwork associated with the proposed building addition. The investigation included the making of seven test boring explorations, two test pit explorations, laboratory testing, and a geotechnical evaluation of the findings as they relate to the proposed building construction. This report covers geotechnical aspects for construction of the building structure only.

1.2 Proposed Construction

Based on the site plan you provided, we understand that a three level addition will cover a footprint of about 12,000 square feet. The new addition will be attached to the southerly side of Davies Hall and will house an auditorium, classroom and storage space. The proposed finish floor elevation for the lower level of the addition will be 127.5 feet with a depressed slab in the auditorium at an elevation of 125.5 feet. We understand that the structure will be steel framed with masonry veneer. The lower level understand that the structure will be steel framed with masonry veneer. The lower level will be a day-lighted basement with foundation walls supporting up to about 10 feet of soil. A hydraulic elevator with and underlying 4± foot deep pit is also proposed. The elevator will likely be controlled by hydraulic piston drilled into the underlying soil. Current grades within the proposed building addition area vary from about elevation 125 feet at the southerly side, near Danforth Street, up to 138 feet at the northerly side, adjacent to the existing Davies Hall structure. Thus, tapered fills of about 2 feet and cuts of about 11 feet will be needed to achieve floor grade. Deeper cuts will be needed for foundation and elevator pit areas. It also appears that cuts adjacent to the existing school will extend below existing floor and foundation elevations. Details regarding the proposed and existing site features are shown on Exploration Location Plan" attached as sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Exploration

Great Works Test Boring, Inc. of Rollinsford, NH made seven test borings at the site on March 16, 2001. Shaw Brothers Construction of Gorham, Maine, made two backhoe-dug test pit explorations on March 16, 2001. The exploration locations were selected and located at the site by personnel from S.W.COLE ENGINEERING, INC. based on a plan provided by Scott Simons Architects. The approximate exploration locations are shown on the "Exploration Location Plan", attached as Sheet 1. Sheet 1 is based on a site plan provided by Scott Simons Architects. Logs of the explorations, based on our observations and testing of samples are attached as Sheets 2 through 9. A key to the notes and symbols used on the logs is attached as Sheet 10. The elevations noted on the logs were estimated from topographic contours shown on the site plan.

2.2 Laboratory Testing

Samples recovered from the explorations were visually examined and classified in our laboratory. Laboratory testing was performed on selected samples recovered from the explorations. Moisture content test results are noted on the logs. The results of five grain size analyses are presented graphically on Sheet 11.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Location and Surficial Conditions

The site is located on the northwesterly corner of the intersection of Danforth and Storer Streets in Portland, Maine. The addition will be attached to the southerly side of the existing Davies Hall. The site is currently open with grass or gravel at the surface. A contractor is currently using a portion of the site as a construction storage yard. The site is benched with a relatively flat upper bench at a about elevation 137 feet adjacent to the southerly side of Davies Hall. About ten feet south of Davies Hall, surface grades slope steeply downward to the lower bench over the southerly portion of the site. The lower bench slopes gently downward to the south from about elevation 128 to 125.

3.2 Subsurface Conditions

In general, the test boring explorations encountered loose to medium dense granular fill soils overlying native medium dense to very dense glacial till. The fill varied from about 3.5 to 6.0 in thickness at the explorations. A 1.5± foot thick layer of sand with some silt and gravel was found below the fill at boring B-2 which may also be a fill layer. The explorations were terminated in the till soils at depths ranging from 12 to 17 feet below the existing ground surface. Refusal surfaces (possible bedrock) were encountered in borings B-3, B-4 and B-7 at depths of 15.7, 15.8 and 16.5 feet.

Test pits TP-1 and TP-2 were made adjacent to the southerly side of the existing structure to assess the existing foundation configuration. The explorations encountered 4 to 5± feet of foundation backfill overlying native gray glacial till. Test pit TP-1, made adjacent to the older section of Davies Hall, encountered a stone and mortar foundation wall to a depth of about 3 feet below the ground surface. The stone and mortar wall appears to be founded on a 1± foot layer of rock, cobbles and mortar overlying glacial till. Test pit TP-2, made adjacent to the newer portion of the structure encountered a cast-in-place concrete foundation wall with a footing depth of about 5 feet below the existing ground surface overlying glacial till. Foundation underdrains were not observed at the test pit explorations. Photographs of the existing foundation configurations observed at the test pit locations are presented in Appendix A. Refer to the attached exploration logs for a more detailed description of the findings.

3.3 Groundwater

Groundwater was observed in the open boreholes at the completion of drilling at depths varying from about 7 to 10 feet at borings B-1, B-4 and B-5. The remainder of the explorations encountered moist to wet soils. Seepage was also observed at test pit TP-2 at a depth of about 5 feet. It should be noted that due to the slow draining characteristics of the existing soils, accurate water levels could not be obtained during drilling. A ground water monitoring well was installed at boring B-6. The groundwater was measured to be at a depth of 2 feet below the existing ground surface on April 16, 2001. Long-term groundwater levels are not known, but it should be anticipated that levels would fluctuate seasonally and during periods of heavy precipitation and/or snowmelt.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the findings at the explorations and our knowledge of the proposed construction, it appears that the site is suitable for the proposed construction from a geotechnical standpoint. Spread footing foundation and on-grade floor slabs are suitable for the proposed construction. Perimeter foundation underdrains as well as sub-slab underdrains will be needed.

The principal geotechinical concerns relative to the design, construction and long-term performance of the proposed construction are moisture sensitive and frost susceptible existing soils, an apparent shallow groundwater depth and loose existing fill soils. Additionally, excavation work adjacent to the existing building will likely require braced sheeting or underpinning to preclude undermining existing foundations. A clean imported granular fill will be needed for backfill adjacent to foundations. Groundwater will need to be controlled long term with perimeter and sub-slab underdrains as well as a crushed stone drainage layer directly below the slab. The existing fills will need to be removed from beneath all foundation areas and existing fill beneath slab areas will need to be densified prior to placing the sub-slab crushed stone.

4.2 Subgrade Preparation

Subgrade preparation should include removal of all existing topsoil, and organics and existing structures (retaining wall, stairways, etc.) from beneath areas of construction.

All existing fill soils should be removed from beneath proposed foundation areas. Existing soils should be removed to a depth of at least 8 inches below bottom of all slab areas to allow for a layer of compacted crushed stone fill. Geotextile fabric should be placed beneath the crushed stone layer. The elevator pit area should be overexcavated by at least 8 inches and replaced with 8 inches of crushed stone.

Based on the information obtained at the exploration locations, it appears that the existing fill is granular (silty sands), but generally loose. Considering this, we recommend that the slab subgrade be densified using a vibrator roller compactor weighing at least 8 tons prior to placing the crushed stone layer. A S.W. COLE ENGINEERING Technician should make at least 5 passes with observation. Any areas that continue to yield should be overexcavated and the soil replaced with compacted select fill.

4.3 Foundation Design

The design freezing index for the Portland, Maine area is approximately 1250 Fahrenheit degree-days. Thus, all perimeter foundations should be placed at least 4.5 feet below exterior finish grade to provide frost protection.

All wall footings should be at least 18 inches in width. Column footings should be at least 24 inches in their smallest dimension. Footing and foundation wall design should consider the following soil parameters:

Net Allowable Bearing Pressure = 4.0 ksf (compacted granular fill or undisturbed native till)
Design Frost Depth = 4.5 feet below exterior finish grade
Base Friction Factor = 0.40
(K_p) Passive Lateral Earth Pressure Coefficient = 3.0 (compacted select fill)
(K_o) At-Rest Lateral Earth Pressure Coefficient = 0.50 (restrained wall)
(K_a) Active Lateral Earth Pressure Coefficient = 0.33 (restrained wall)
(γ_T) Unit Weight of Backfill = 125 pcf (compacted select fill)

Relative to seismic design evaluation, we recommend that design consider soil profile type S_1 with a site coefficient of 1.0. We anticipate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades should not exceed 1/2-inch. Foundation wall design will also need to consider surcharge loads from construction activity and compaction equipment.

4.4 Slab-on-Grade Floors

Concrete slab-on-grade floors may be designed using a subgrade reaction modulus of 300 pci (pounds per cubic inch) provided the floor is underlain by at least 8 inches of compacted crushed stone over densified fills.

A vapor retarder to limit the upward migration of moisture vapors should be considered beneath floor slabs covered with moisture sensitive flooring. The vapor retarder should have a permeance that is less than the floor covering being applied on the slab. Vapor retarders should be installed according to the manufacturer's requirements. Flooring suppliers should be consulted relative to acceptable vapor retarder systems for use with their products.

We recommend that control joints be installed within floor slabs to accommodate shrinkage in the concrete as it cures. In general, joints are typically installed at 10 to 15 foot spacing, but should be determined by the structural engineer with consideration to slab thickness. Floor slabs should be wet-cured for a period of least 7 days after casting as a measure to reduce the potential for curling of the concrete and excessive drying/shrinkage. We recommend that consideration be given to using curing paper or curing compound over concrete slabs to further improve the quality of the completed floor.

4.5 Foundation Drainage

We recommend that an interior and exterior perimeter underdrain system be provided at footing grade for the lower floor level. We also recommend that sub-slab underdrains be provided beneath the lower level slab at a spacing of about 20 feet on the center. An underdrain should also be provided within the crushed stone layer below the proposed elevator pit and the proposed depressed slab area in the auditorium area.

Rigid underdrain pipe, 4 inches in diameter, should be utilized. The underdrain pipes should have perforations of 1/4 to 5/8 inch. We recommend that at least 6 inches of 3/4 inch crushed stone bedding be provided around the foundation underdrains and that the stone be wrapped with a geotextile filter fabric having an apparent opening size of at least 70. The underdrain system must have a positive gravity outlet. Exterior foundation backfill should be sealed with a surficial layer of clayey or loamy soil in areas that are not to be paved or occupied by entrance slabs or pavements. This is to reduce direct surface water infiltration into the backfill. Exterior grades should be sloped to promote drainage away from the building. A general underdrain detail is provided on Sheet 12.

We also recommend that all below grade concrete walls be damp proofed. Consideration should be given to placing a layer of rigid insulation adjacent to the exterior side of all basement walls. This would help reduce thermal conductivity and the potential for condensation.

4.6 Excavation Work

Excavation work will encounter topsoil, existing granular fill soils, silty sands with varying amounts of gravel and possibly cobbles, (glacial till). Groundwater should be expected in excavations depending upon the time of year of construction and recent precipitation amounts. Sloping of excavation sidewalls or shoring may likely be needed to control slumping and sloughing. A layer of geotextile fabric and crushed stone may also be appropriate on some subgrades to provide a drainage layer and stable subgrade. Ditching with sumping and pumping dewatering methods should be adequate to dewater excavations.

Care must be exercised during construction to minimize disturbance of subgrade soils. Should the subgrade become loose, or difficult to work, we recommend that the unsuitable soils be removed and replaced with compacted select fill or crushed stone. Construction equipment should not operate directly on the silty sand fill or glacial till subgrades, if wet.

Based on our conversations and the plan you provided, the lower level of the new addition will extend below existing foundations by about 7 feet. Observations made at test pits TP-1 and TP-2 indicate that the existing foundations are likely founded on the native glacial till. Excavation in these areas will likely require underpinning or braced sheeting to support the existing foundation walls. S.W.COLE ENGINEERING, INC. is available to assist with the assessment of underpinning or braced sheeting options, as needed. In any case, excavations must be properly shored and/or sloped in accordance with OSHA trenching regulations to prevent sloughing and caving of the sidewalls during construction.

4.7 Backfill and Compaction

The native soils are frost susceptible, and therefore not suitable for foundation backfill. We recommend that fill placed adjacent to the foundation walls (both inside and out) meet the gradation for Select Fill given below.

Sieve Size	Percent Finer By Weight	
	Select Fill	**Crushed Stone**
4 inch	100	---
3 inch	90-100	---
2 inch	---	100
1½ -inch	---	95-100
¾ -inch	---	35-70
¼-inch	25-90	---
$^{3}/_{8}$-inch	---	10-30
#4	---	0-5
#40	0-30	---
#200	0-5	---

Sub-slab fill and fill placed below foundations should be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Basement wall backfill (above slab elevation) should be compacted between 92 and 95 percent beneath paved areas, entrance slabs and adjacent sidewalk areas. Hand operated compaction equipment should be utilized adjacent to basement walls. This is to help reduce lateral pressures on the basement level walls. Crushed stone should be compacted to 100 percent of its maximum dry rodded unit weight in accordance with ASTM C-29.

4.8 Entrances and Sidewalks

The existing site soils are susceptible to frost heaving. Entrances and sidewalks should be designed to reduce the effects of differential frost action. We recommend excavation beneath entrances and sidewalks continue to 4.5 feet below finish grade. The 4.5 foot depth should extend from the building outward to the full width of the entrance slabs and sidewalks. The entrance and sidewalk areas should be backfilled with compacted select fill. Alternatively, the entrance sidewalk or exterior slab may be underlain with a combination of compacted select fill and rigid, extruded, closed-cell polystyrene insulation. We can assist with design aspects of an insulation option as needed. Subgrades beneath entrances and sidewalks should be sloped to promote water movement toward the underdrain system. The zone of select fill should transition up to any adjacent pavement sub-base at a 1V to 3H slope or flatter from the 4.5 foot depth (see sheet 12).

4.9 Weather Considerations

If foundation construction takes place during cold weather, subgrades, foundations, and floor slabs must be protected during freezing conditions. Fill and concrete not be placed on frozen soil and once placed, the soil and concrete must be protected from freezing. Further, the native soils are slow draining, and as such subgrades will be susceptible to disturbance during wet or freezing conditions. Consequently, site work and construction activities should take appropriate measures to protect exposed subgrades, particularly when wet. This may require the use of temporary haul roads and staging areas to preclude subgrade damage due to construction traffic. Geotextile fabric may also be needed below construction haul roads and/or proposed paved areas to help stabilize subgrades.

4.10 Plan Review and Construction Testing

We request that S. W. COLE ENGINEERING, INC. be provided the opportunity to review the final design and specifications to determine that our earthwork and foundation recommendations have been properly interpreted and implemented. It is important that a S. W. COLE ENGINEERING, INC. representative be on-site to observe subgrade soils, installation of underdrains, compaction of fill soils and placement of concrete and asphalt. This is to observe compliance with the design concepts, specifications, and design recommendations and to allow changes in the design if subsurface conditions are found to differ from those anticipated. We would be pleased to assist in developing a scope of services for construction materials testing services.

5.0 CLOSURE

We look forward to providing continued assistance during the design review and construction phases of this project. If you have any questions or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,

S. W. COLE ENGINEERING, INC.

Paul F. Kohler, P.E.
Vice President

STATE OF MAINE
PAUL F. KOHLER
No. 7145
REGISTERED
PROFESSIONAL ENGINEER

G:\Files\Projects\2001\01-0120_Scott Simons_Portland_Waynflete School Add\01-0120_REPORT.doc

cc: Dan Burne-Becker Structural Engineers, Inc.

ATTACHMENT A
LIMITATIONS

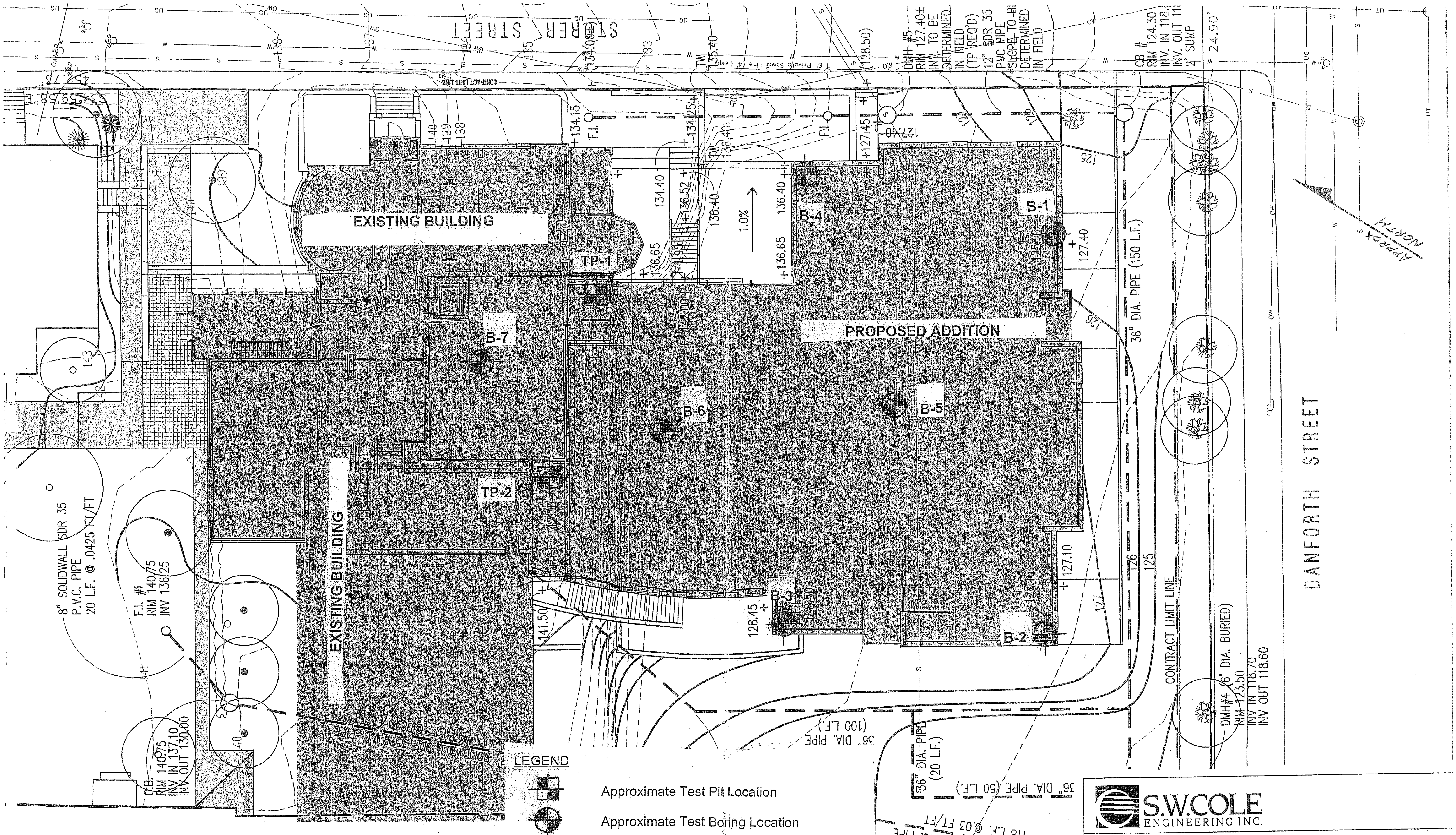
This report has been prepared for the exclusive use of Scott Simons Architects for specific application to the proposed Building Addition to the existing Davies Hall at the Waynflete School in Portland Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

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

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

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

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



NOTES

1. Base plan provided by Scott Simons Architects
2. Exploration locations were determined in the field by taped measurements from existing site features.

S.W.COLE ENGINEERING, INC.

Scott Simons Architecture

EXPLORATION LOCATION PLAN

WAYNFLETE SCHOOL ADDITION
360 SPRING STREET
PORTLAND, MAINE

PROJECT NO. 01-0120	SCALE: 1" = 20'
DATE: FEB 23, 2001	SHEET: 1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-1
SHEET:	1 OF 1
PROJECT NO.:	01-0120
DATE START:	3/16/01
DATE FINISH:	3/16/01
ELEVATION:	126.5 +/-
SWC REP.:	MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL

LOCATION: PORTLAND, MAINE

DRILLING FIRM: GREAT WORKS TEST BORINGS DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION

Water Observed @ 10' +/- in open borehole

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	24"	24"	2.0'	7	10	9	6	3.5'	DARK BROWN GRAVELLY SILTY SAND, TRACE ORGANICS AND BRICK (FILL) ~ MEDIUM DENSE ~
	2D	24"	20"	7.0'	12	14	13	11		BROWN SILTY SAND WITH SOME GRAVEL (TILL) ~ MEDIUM DENSE ~
	3D	24"	18"	12.0'	10	14	15	15	15.0'	
	4D	24"	12"	17.0'	11	50	48	23	17.0'	GRAY SILTY SAND WITH TRACE GRAVEL (TILL) ~ VERY DENSE ~
										BOTTOM OF EXPLORATION @ 17.0'
										NOTE: APPROXIMATE 2' OF FROST AT SURFACE

SAMPLES:

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

SOIL CLASSIFIED BY:

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

REMARKS:

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

2

BORING NO.: B-1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-2
SHEET: 1 OF 1
PROJECT NO.: 01-0120
DATE START: 3/16/01
DATE FINISH: 3/16/01
ELEVATION: 125 +/-
SWC REP.: MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL
LOCATION: PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORINGS
DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION
Soils Wet/Saturated @ 10' +/-

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.4'	BROWN ORGANIC TOPSOIL
	1D	24"	16"	2.0'	3	7	10	10		w = 22.0% DARK BROWN SILTY SAND TRACE ORGANICS AND GRAVEL (FILL) ~ MEDIUM DENSE ~
									5.5'	
	2D	24"	16"	7.0'	2	6	9	22	7.0'	BROWN GRAVELLY SAND WITH SOME SILT (PROBABLE FILL) w = 7.5% ~MEDIUM DENSE~
	3D	24"	18"	12.0'	8	16	21	24	14.0'	~DENSE~ BROWN GRAVELLY SILTY SAND (TILL) w = 9.6%
	4D	24"	21"	17.0"	5	4	5	17	17.0'	~ MEDIUM DENSE ~ GRAY SILTY SAND WITH TRACE GRAVEL (TILL) w = 12.9%
										BOTTOM OF EXPLORATION @ 17.0'
										NOTE: APPROXIMATE 1' FROST AT SURFACE

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

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:

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

3

BORING NO.: B-2

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-3
SHEET:	1 OF 1
PROJECT NO.:	01-0120
DATE START:	3/16/01
DATE FINISH:	3/16/01
ELEVATION:	126.5 +/-
SWC REP.:	MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL

LOCATION: PORTLAND, MAINE

DRILLING FIRM: GREAT WORKS TEST BORINGS DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION

No Free Water Observed

Soils Moist to Wet

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.5'	BROWN ORGANIC TOPSOIL
	1D	24"	16"	2.0'	1	2	1	4	4.5'	~ LOOSE ~ BROWN SAND WITH SOME SILT, TRACE GRAVEL (FILL)
	2D	24"	20"	7.0'	18	23	19	30	9.0'	~ DENSE ~ BROWN GRAVELLY SILTY SAND (TILL)
	3D	24"	24"	12.0'	8	38	45	50	15.7'	~ VERY DENSE ~ GRAY SILTY SAND WITH TRACE GRAVEL (TILL)
	4D	8"	8"	15.7'	45	50/0"				BOTTOM OF EXPLORATION @ 15.7' PRACTICAL REFUSAL - POSSIBLE BEDROCK

SAMPLES:

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

SOIL CLASSIFIED BY:

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

REMARKS:

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

4

BORING NO.: B-3

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-4
SHEET:	1 OF 1
PROJECT NO.:	01-0120
DATE START:	3/16/01
DATE FINISH:	3/16/01
ELEVATION:	127.5 +/-
SWC REP.:	MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL

LOCATION: PORTLAND, MAINE

DRILLING FIRM: GREAT WORKS TEST BORINGS   DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION

Water Observed @ 7' +/-

In Open Borehole

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	24"	18"	2.0'	5	7	15	19	3.5'	~ MEDIUM DENSE ~ BROWN SILTY SAND WITH SOME GRAVEL (FILL)
	2D	24"	17"	7.0'	27	27	37	40		~ VERY DENSE ~ GRAY SILTY SAND WITH SOME GRAVEL (TILL)
	3D	24"	18"	12.0'	17	31	24	29		
	4D	9"	3"	15.8'	33	50/3"			15.8'	
										REFUSAL @ 15.8' PRACTICAL REFUSAL - POSSIBLE BEDROCK
										NOTE: APPROXIMATE 2' FROST AT SURFACE

SAMPLES:

D = SPLIT SPOON

C = 3" SHELBY TUBE

U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:

[ ] DRILLER - VISUALLY

[X] SOIL TECH. - VISUALLY

[ ] LABORATORY TEST

REMARKS:

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

5

BORING NO.: B-4

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-5
SHEET:	1 OF 1
PROJECT NO.:	01-0120
DATE START:	3/16/01
DATE FINISH:	3/16/01
ELEVATION:	126.5 +/-
SWC REP.:	MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL
LOCATION: PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORINGS DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION
Water Observed @ 10.0' +/-
In Open Borehole

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
	1D	24"	18"	2.0'	7	15	26	20	3.5'	~ MEDIUM DENSE ~ DARK BROWN SILTY SAND WITH SOME GRAVEL, TRACE ORGANICS (FILL) w = 13.3%
	2D	24"	18"	7.0'	4	8	11	15		~ MEDIUM DENSE ~ BROWN SILTY SAND WITH SOME GRAVEL (TILL) w = 10.9%
	3D	24"	16"	12.0'	9	17	18	22	12.0'	w = 10.5%
										BOTTOM OF EXPLORATION @ 12.0'
										NOTE: APPROXIMATELY 2' FROST AT SURFACE

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

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:

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

6

BORING NO.: B-5

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.:	B-6
SHEET:	1 OF 1
PROJECT NO.:	01-0120
DATE START:	3/16/01
DATE FINISH:	3/16/01
ELEVATION:	127.5 +/-
SWC REP.:	MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL
LOCATION: PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORINGS   DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION
No Free Water Observed
Soils Moist to Wet

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.4'	BROWN ORGANIC TOPSOIL
	1D	18"	16"	1.5'	1	3	8			~ LOOSE ~ BROWN SILTY SAND SOME GRAVEL (FILL)
									4.5'	
	2D	24"	20"	7.0'	26	39	33	37		~ VERY DENSE ~ BROWN SILTY SAND WITH SOME GRAVEL (TILL)
									9.0'	
	3D	24"	24"	12.0'	10	19	27	44		~ DENSE TO VERY DENSE ~ GRAY SILTY SAND WITH TRACE GRAVEL (TILL)
	4D	24"	24"	17.0'	8	18	20	27	17.0'	
										BOTTOM OF EXPLORATION @ 17.0'
										NOTE: 1" DIAMETER PVC GROUNDWATER MONITORING WELL INSTALLED AT 15.0' WITH 5.0' SCREEN GROUNDWATER MEASURED AT 2.0 FEET BELOW THE EXISTING GROUND SURFACE ON 4/16/01.

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

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS:

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

7

BORING NO.: B-6

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-7
SHEET: 1 OF 1
PROJECT NO.: 01-0120
DATE START: 3/16/01
DATE FINISH: 3/16/01
ELEVATION: 138 +/-
SWC REP.: MTT

PROJECT / CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL
LOCATION: PORTLAND, MAINE
DRILLING FIRM: GREAT WORKS TEST BORINGS . DRILLER: JEFF LEE

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	4 1/4"		
SAMPLER:	SS	1 3/8"	140 lb	30"
CORE BARREL:				

WATER LEVEL INFORMATION
No Free Water Observed Soils Moist to Wet

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.4'	BROWN ORGANIC TOPSOIL
	1D	24"	6"	2.0'	1	1	2	4		~ LOOSE ~ BROWN SILTY SANDY GRAVEL, TRACE ORGANICS (FILL)
									6.0'	
	2D	24"	18"	7.0'	2	2	13	21		~DENSE~ BROWN SILTY SAND WITH SOME GRAVEL (TILL) w=9.4%
									9.0'	
	3D	24"	24"	12.0'	11	25	38	53		GRAY SILTY SAND WITH TRACE GRAVEL (TILL) w = 10.1% ~ VERY DENSE ~ w = 9.1%
									16.5'	
	4D	24"	16"	16.5'	16	17	50/5"			BOTTOM OF EXPLORATION @ 16.5' PRACTICAL REFUSAL - POSSIBLE BEDROCK

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

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[X] LABORATORY TEST

REMARKS:

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

8

BORING NO.: B-7

S.W.COLE ENGINEERING, INC.

TEST PIT LOGS

PROJECT/CLIENT: PROPOSED DAVIES HALL ADDITION / WAYNFLETE SCHOOL
LOCATION: 360 SPRING STREET, PORTLAND, MAINE

PROJECT NO. 01-0120

TEST PIT TP-1

DATE: 3/16/01 SURFACE ELEVATION: 136 +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		1.0'	BROWN ORGANIC TOPSOIL	
		3.0'	BROWN SILTY SAND WITH WOOD, ROCK AND BRICK (FILL)	
		4.0'	FRACTURED ROCK AND COBBLES (FILL)	
		4.5'	GRAY SILTY SAND WITH SOME GRAVEL (TILL)	
			BOTTOM OF EXPLORATION @ 4.5'	

COMPLETION DEPTH: 4.5' DEPTH TO WATER: NO WATER OBSERVED

TEST PIT TP-2

DATE: 3/16/01 SURFACE ELEVATION: 135 +/- LOCATION: SEE SHEET 1

SAMPLE NO.	SAMPLE DEPTH	DEPTH (FT)	STRATUM DESCRIPTION	TEST RESULTS
		1.0'	BROWN ORGANIC TOPSOIL	
		4.9'	BROWN SILTY SAND TRACE TO SOME GRAVEL (FILL)	
		5.2'	GRAY SILTY SAND WITH SOME GRAVEL (TILL)	
			BOTTOM OF EXPLORATION @ 5.2'	

COMPLETION DEPTH: 5.2' DEPTH TO WATER: SEEPAGE OBSERVED @ 4.9'

KEY TO THE NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

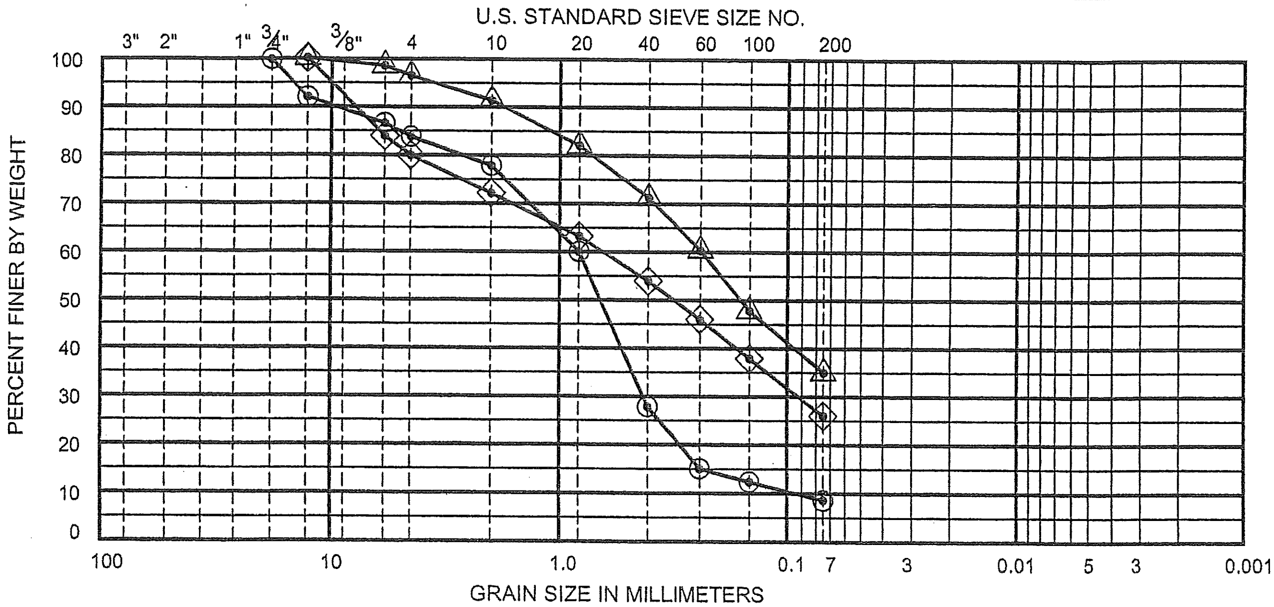
REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

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

JOB NO. 01-0120 S

S.W.COLE ENGINEERING, INC. — GRAIN SIZE ANALYSIS

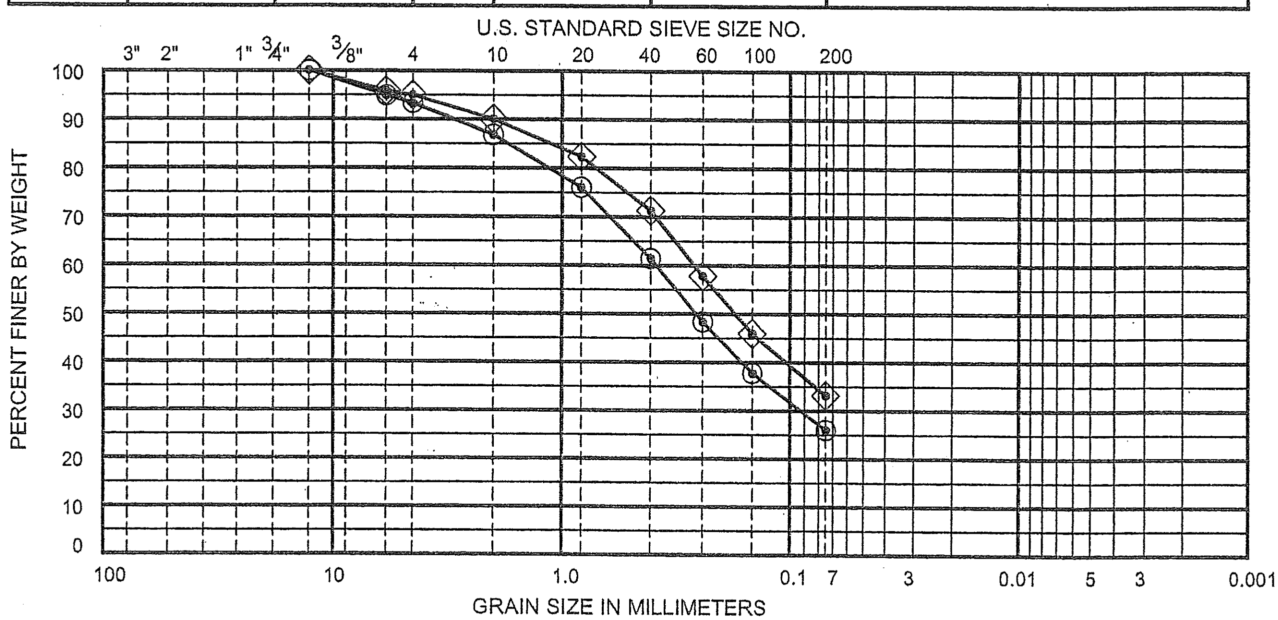
COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COA.	MEDIUM	FINE	



PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	W %
⊙	B-2	S-2	5'-7'	GRAVELLY SAND WITH SOME SILT	7.5%
◇	B-2	S-3	10'-12'	GRAVELLY SILTY SAND	9.6%
△	B-2	S-4	15'-17'	SILTY SAND WITH TRACE OF GRAVEL	12.9%

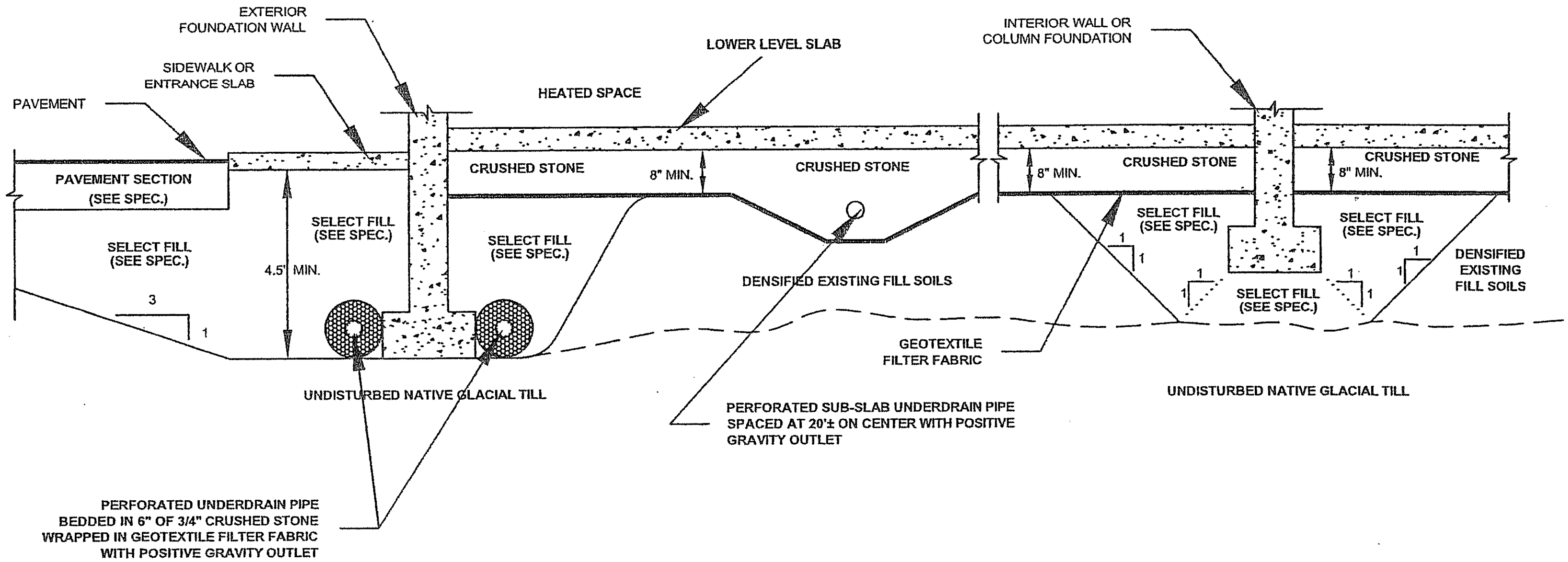
S.W.COLE ENGINEERING, INC. — GRAIN SIZE ANALYSIS

COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COA.	MEDIUM	FINE	



PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	W %
⊙	B-5	S-1	0-2'	SILTY SAND WITH SOME GRAVEL	13.3%
◇	B-5	S-2	5'-7'	SILTY SAND WITH TRACE OF GRAVEL	10.9%

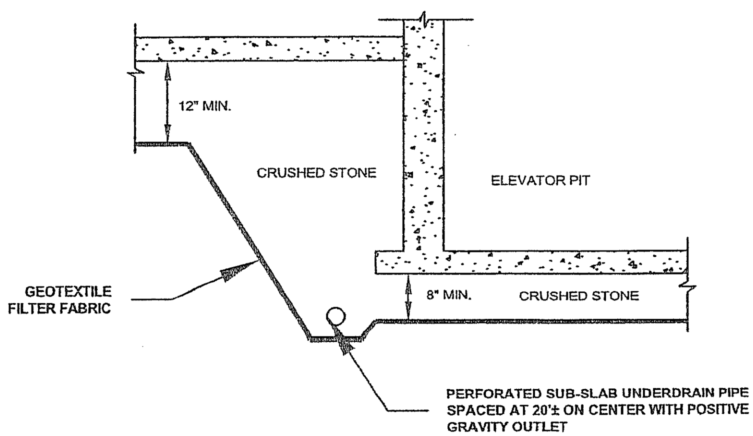
01-0120 GS.dwg 04-12-01 12:42 PM D.A.R., S. W. Cole Engineering, Inc.



NOTES :

1.) All existing fill should be removed from beneath foundations.

2.) Suitable existing fill can remain below slab areas (see report).



S.W.COLE ENGINEERING, INC.

SCOTT SIMONS ARCHITECTS

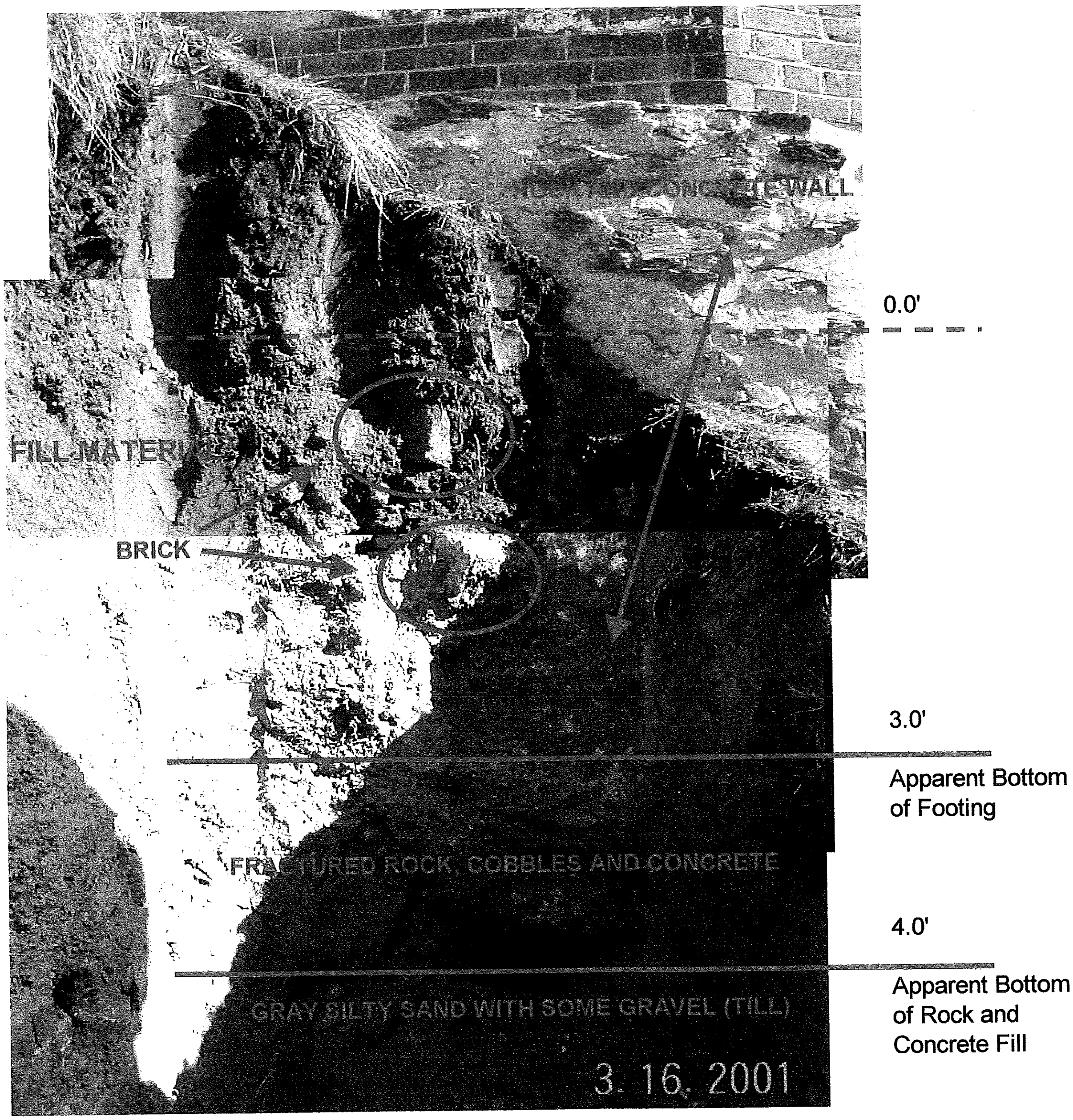
UNDERDRAIN DETAIL

Proposed Building Addition
Waynflete School
360 Spring Street
Portland, Maine

Job No.	01-0120 S	Scale	Not to Scale
Date :	04/17/01	Sheet	12

APPENDIX A

TP-1

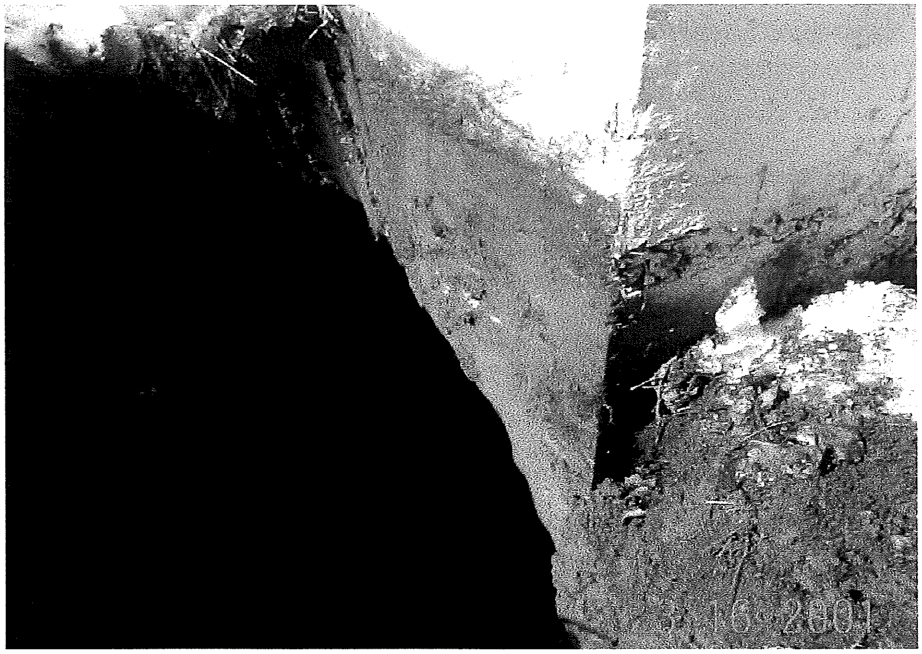


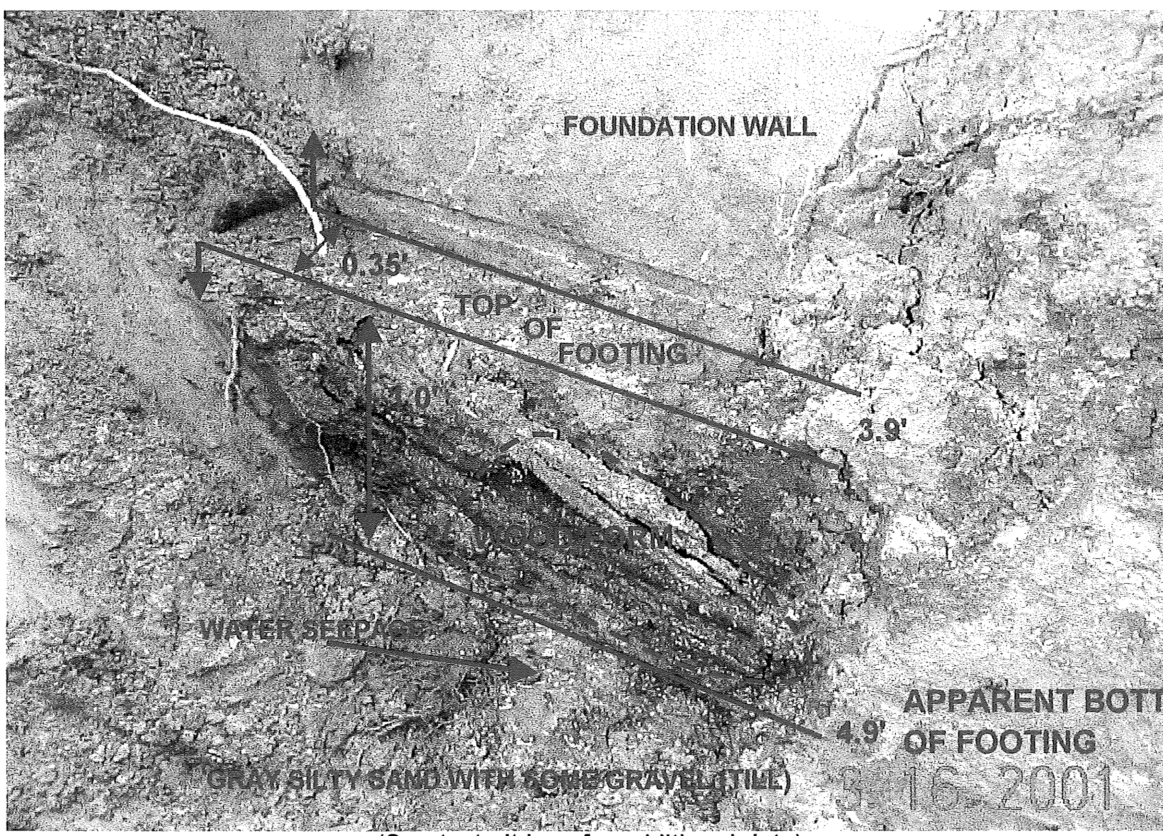
(See test pit logs for additional data)

Note: measurements taken from existing ground surface

01-0120
Waynflete School

TP-2





(See test pit logs for additional data)

Note: measurements taken from existing ground surface

01-0120
Waynflete School