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

01-0120 S April 18, 2001

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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

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cc: Dan Burne-Becker Structural Engineers, Inc.

ATTACHMENT A
LIMITATIONS

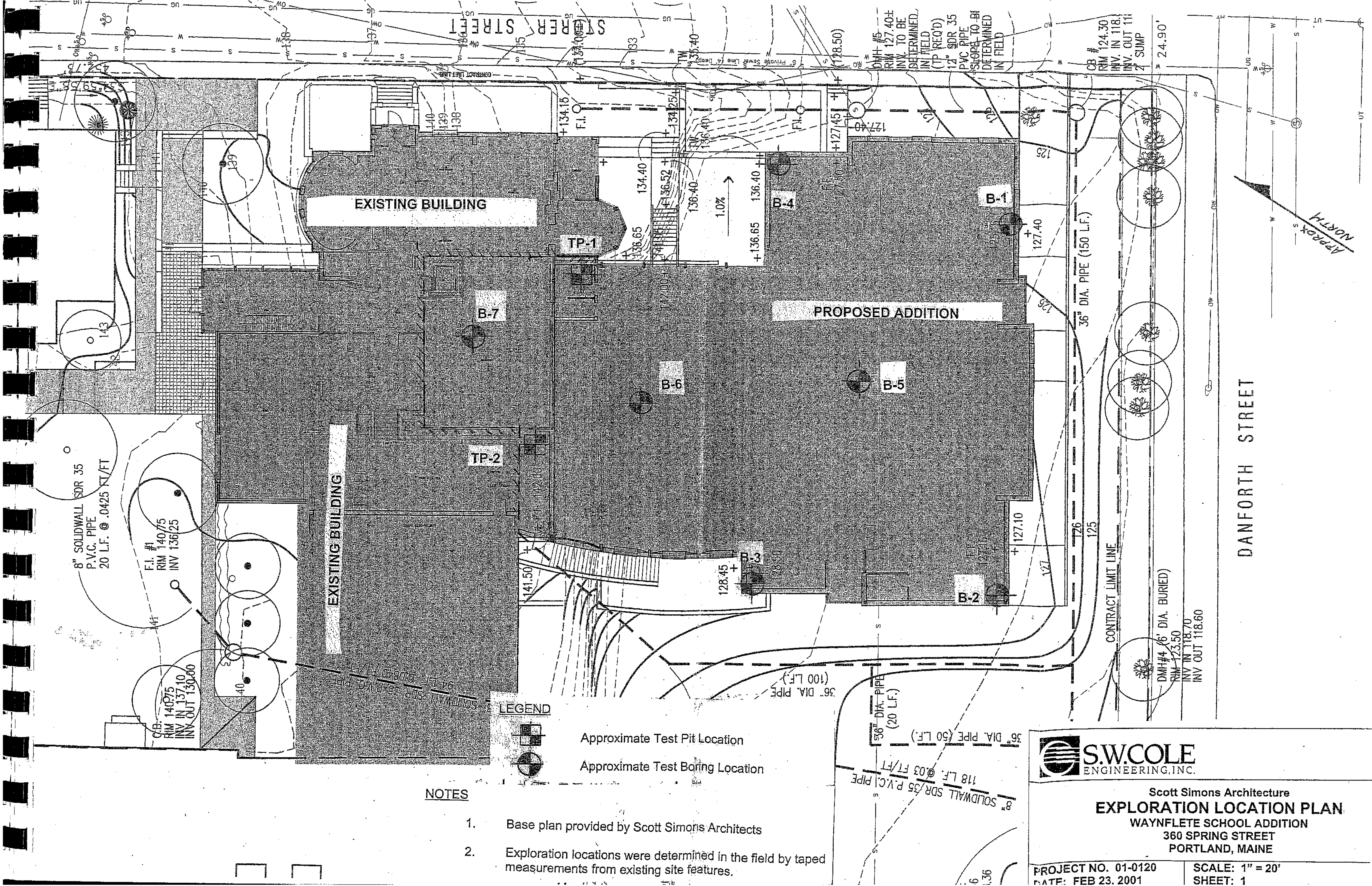
This report has been prepared for the exclusive use of Scott Simons Architects for specific application to the proposed Building Addition to the existing Davies Hall at the Waynflete School in Portland Maine. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally 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.



LEGEND

Approximate Test Pit Location

Approximate Test Boring Location

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		~DENSE~ BROWN GRAVELLY SILTY SAND (TILL) w = 9.6%
									14.0'	
	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		~ LOOSE ~ BROWN SAND WITH SOME SILT, TRACE GRAVEL (FILL)
									4.5'	
	2D	24"	20"	7.0'	18	23	19	30		~ DENSE ~ BROWN GRAVELLY SILTY SAND (TILL)
									9.0'	
	3D	24"	24"	12.0'	8	38	45	50		~ VERY DENSE ~ GRAY SILTY SAND WITH TRACE GRAVEL (TILL)
									15.7'	
	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'	
										~ VERY DENSE ~
	2D	24"	20"	7.0'	26	39	33	37		BROWN SILTY SAND WITH SOME GRAVEL (TILL)
									9.0'	
										~ DENSE TO VERY DENSE ~
	3D	24"	24"	12.0'	10	19	27	44		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	SAMPLER BLOWS PER 6" 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'

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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

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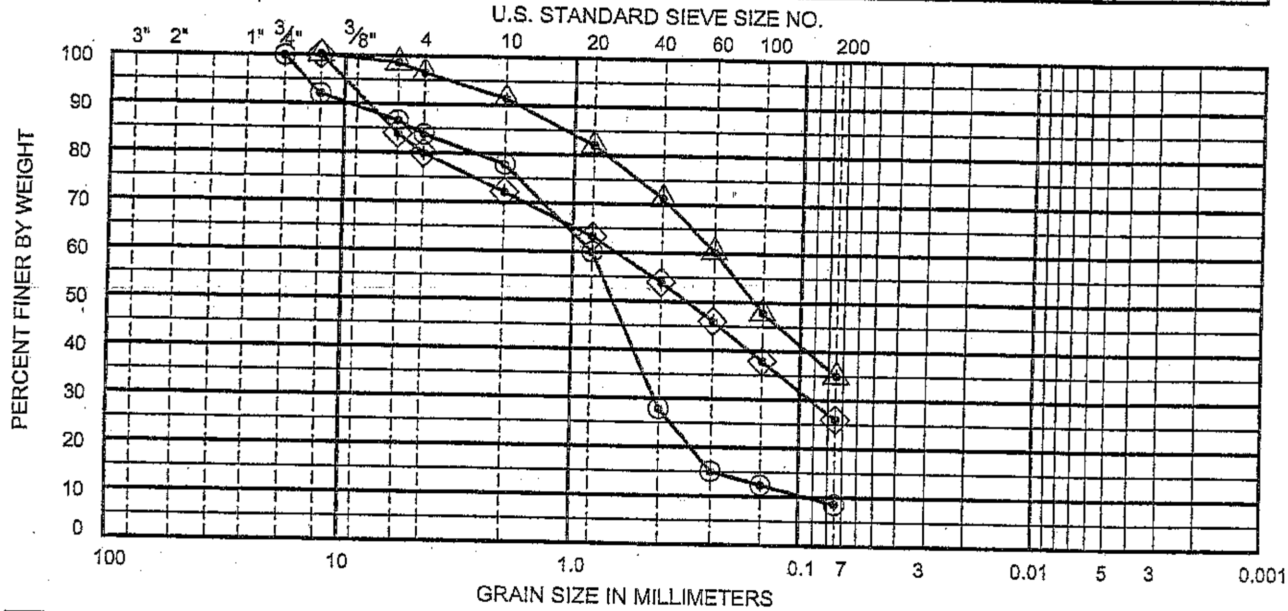
GRAIN SIZE ANALYSIS

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

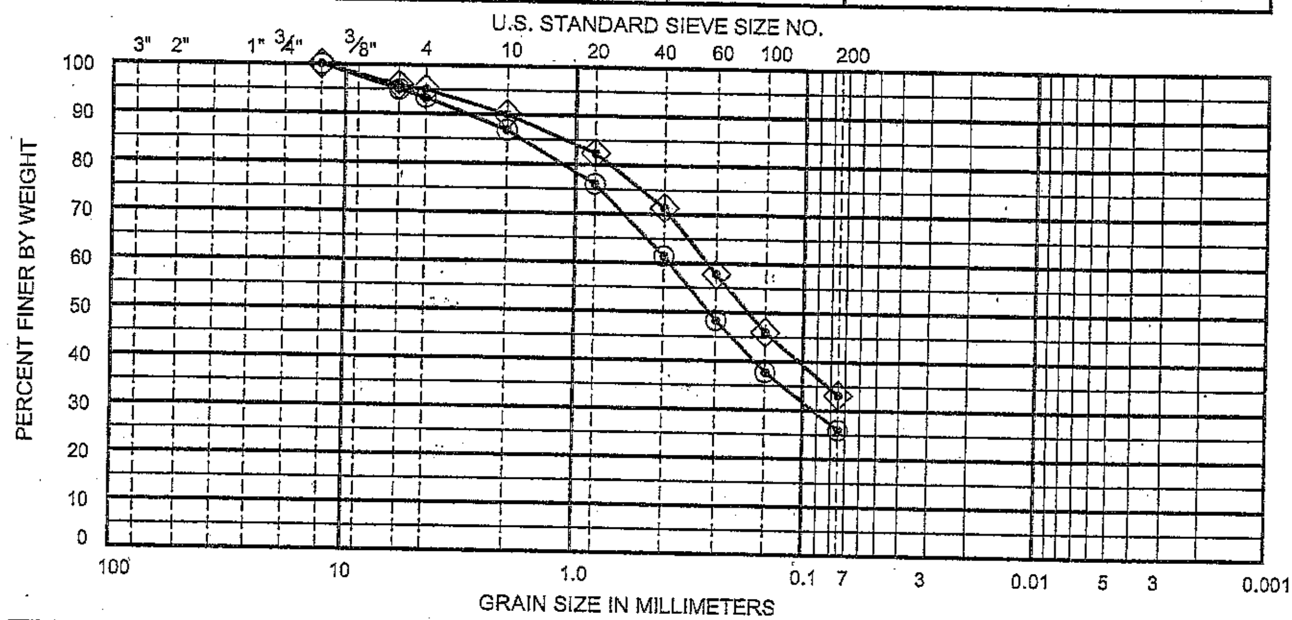


PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	W %
⊙	B-2	S-2	5'-7'	GRAVELLY SAND WITH SOME SILT	7.5%
◈	B-2	S-3	10'-12'	GRAVELLY SILTY SAND	9.6%
△	B-2	S-4	15'-17'	SILTY SAND WITH TRACE OF GRAVEL	12.9%

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%

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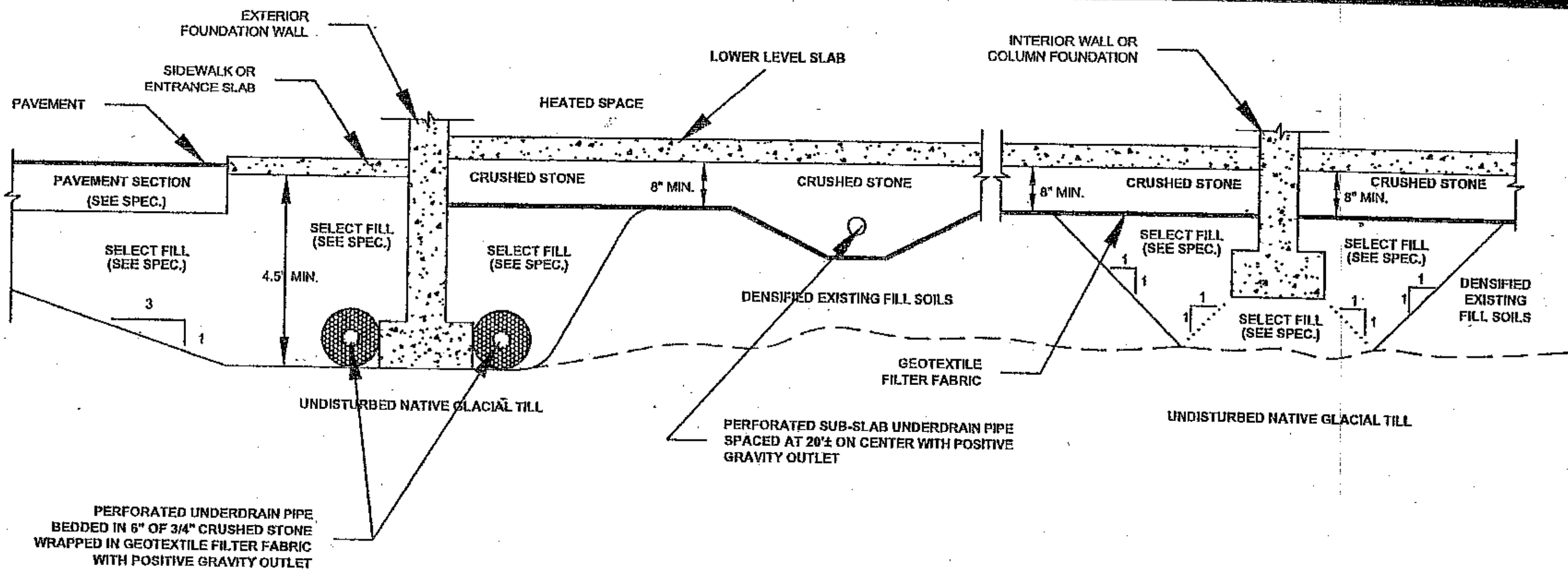
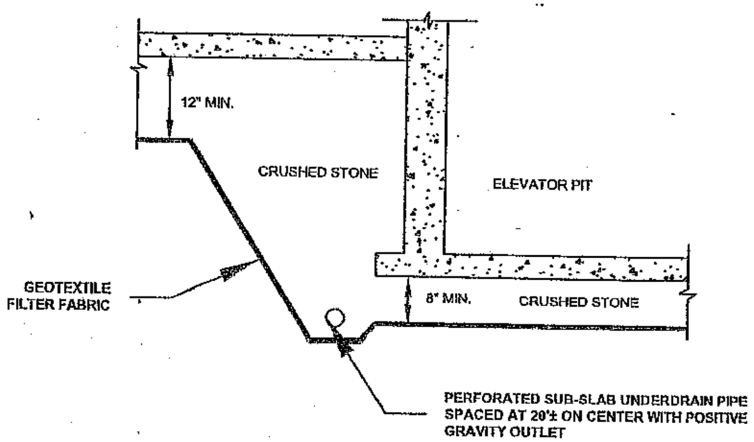
04-12-01 12:42 PM

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.

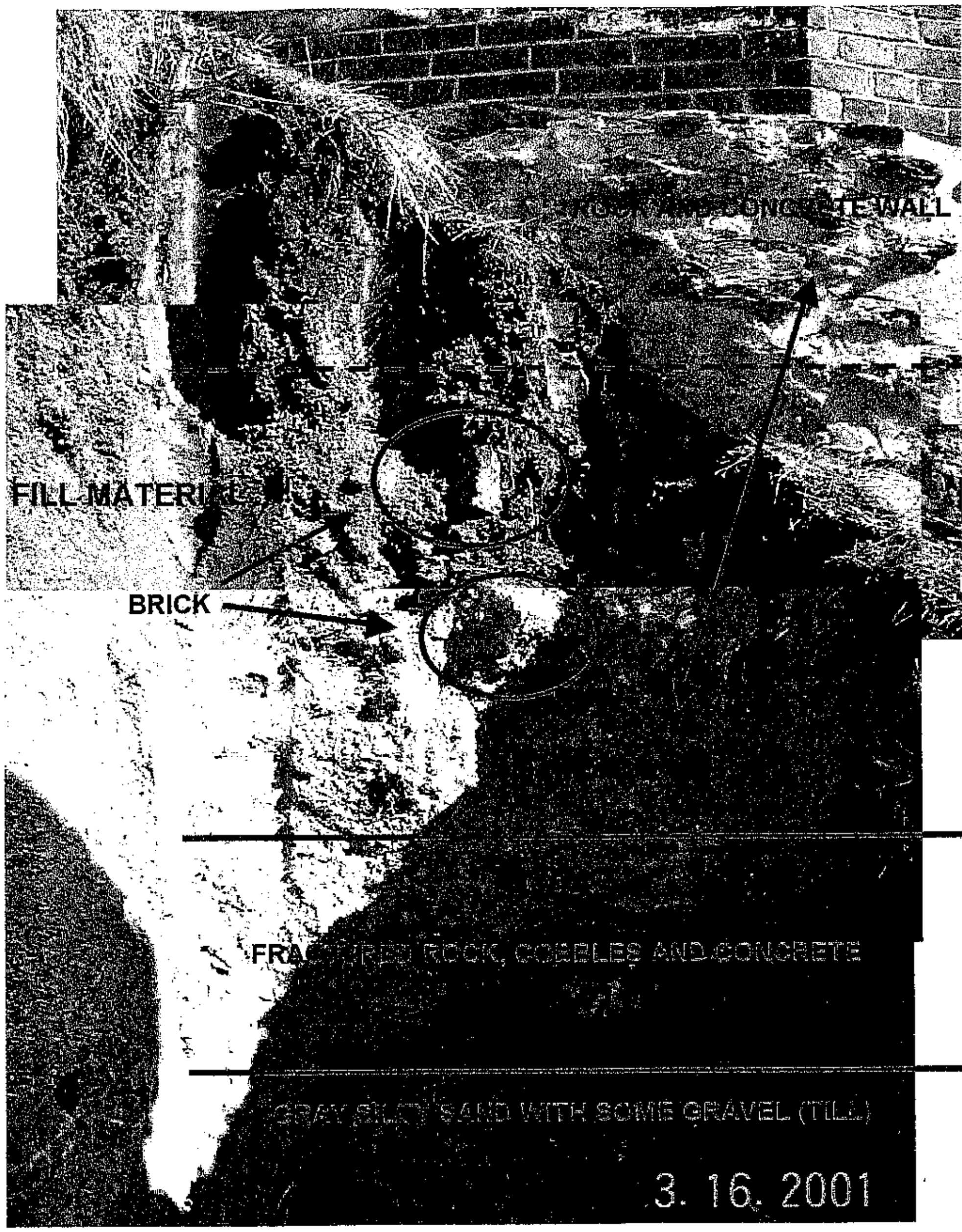
SCOTT SIMONS ARCHITECTS

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

TP-1



0.0'

3.0'

Apparent Bottom of Footing

4.0'

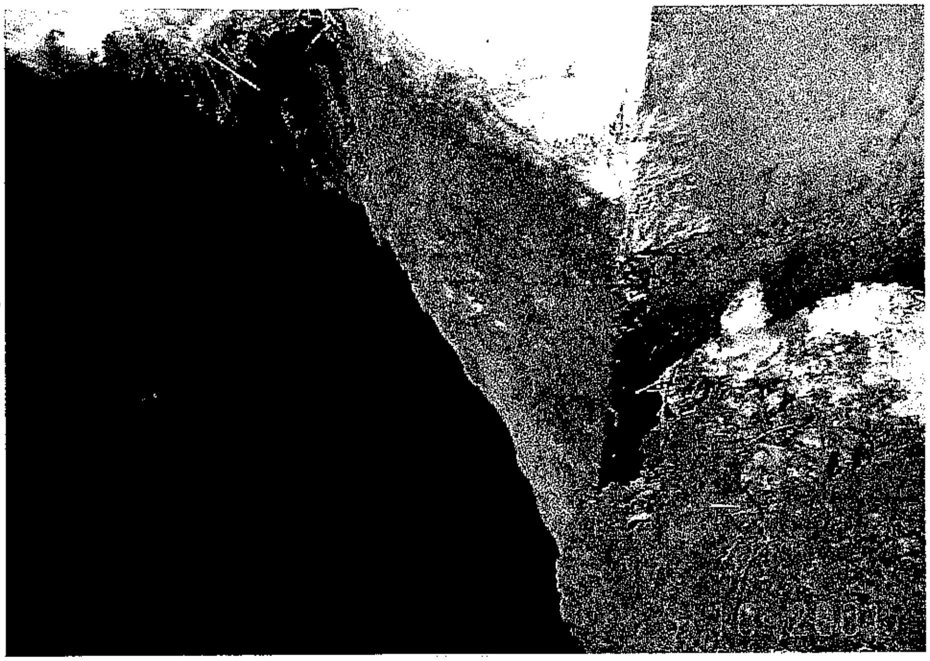
Apparent Bottom of Rock and Concrete Fill

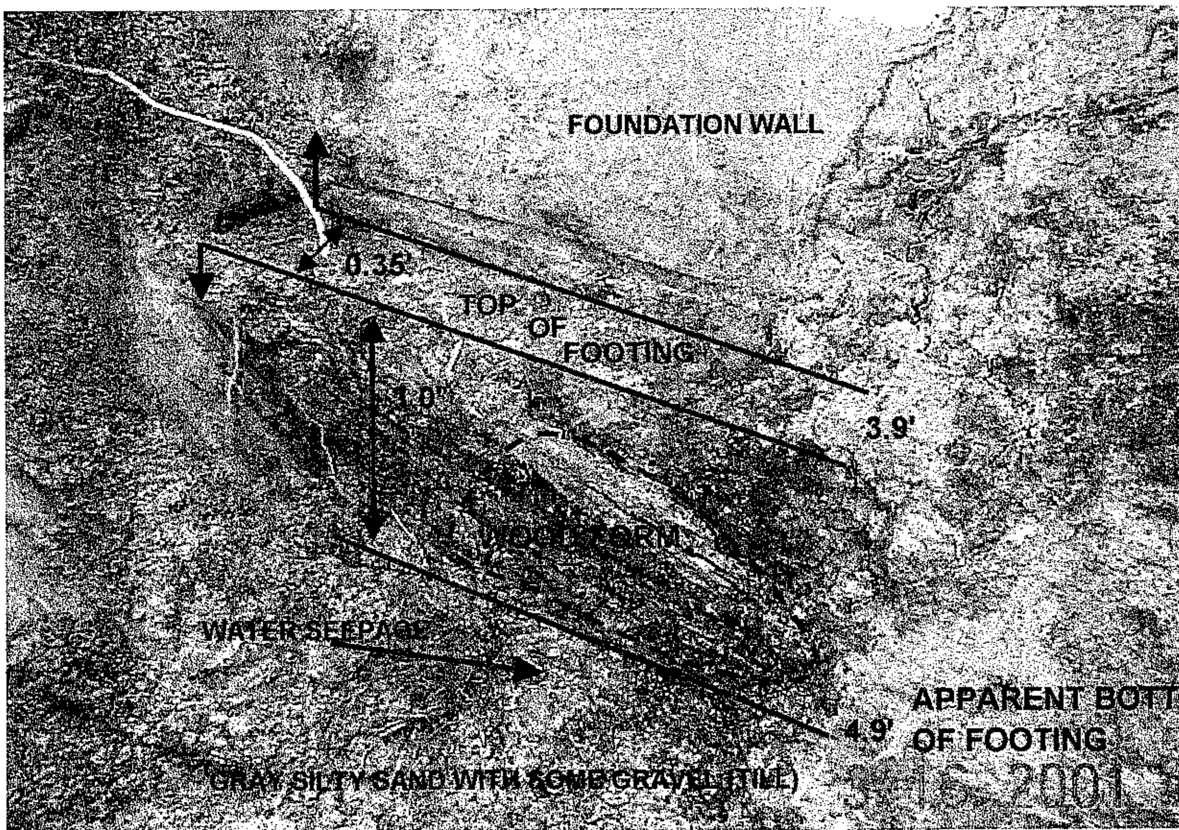
(See test pit logs for additional data)

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