GEOTECHNICAL ENGINEERING SERVICES
PROPOSED CAMP BOW WOW
49-63 BLUEBERRY ROAD
PORTLAND, MAINE

07-0875 S September 10, 2007

PREPARED FOR:

Patco Construction, Inc.
Attention: Greg Patterson
1293 Main Street
Sanford, Maine 04073

PREPARED BY:

S.W.COLE ENGINEERING, INC.

Robert E. Chaput, Jr., P.E.
Senior Geotechnical Engineer
555 Eastern Avenue
Augusta, Maine 04330

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07-0875 S

September 10, 2007

Patco Construction, Inc.
Attention: Greg Patterson
1293 Main Street
Sanford, ME 04073

Subject: Geotechnical Engineering Services
Proposed Camp Bow Wow
49-63 Blueberry Road
Portland, Maine

Dear Mr. Patterson:

In accordance with our Agreement dated August 30, 2007, we have reviewed the previous subsurface information as it relates to the proposed Camp Bow Wow at 49-63 Blueberry Road in Portland, Maine. This report summarizes our findings and recommendations and the contents of this report are subject to the limitations set forth in Attachment A.

1.0 INTRODUCTION

1.1 Scope of Work

The purpose of the work was to review previously made subsurface explorations performed at the site and provide recommendations relative to foundation design and earthwork associated with construction of the proposed building and retaining wall areas. Our investigation of the site has included review of 5 test borings and associated laboratory testing and a geotechnical evaluation of the findings as they relate to the proposed construction.

1.2 Existing Conditions and Proposed Construction

The site is located on the east side of Blueberry Road in Portland, Maine. The site is bordered to the north by Sturbridge Yankee Workshop, Inc.; to the east by the Maine Turnpike and; to the south by Unum Corporation. Two underground utility easements are located in the southeast and south portions of the site. The site is currently open and has recently been cleared. The site slopes generally downward from south to north from about elevation 71 to 59 feet. A drainage swale is located in the north central portion of the site.

A low lying wet area bisects the northeast corner of the site. The ground surface within the proposed building footprint slopes downward from south to north from about elevation 79 to 68.5 feet.

Based on information you provided, we understand development plans call for construction of a 80 X 100 foot building with associated paved areas. We understand the building will be a one-story structure with a one bay truck dock located on the north side. We understand that paved access drives and parking will be located primarily on the west side of the structure. We understand that the proposed finished floor elevation is currently planned at 79.2 feet, which will require a tapered fill of 0.5 to 10 feet from the southeast to northwest corner of the structure, respectively, to achieve bottom of slab grade. The east side of the building will have a fenced in area surfaced with pea stone as part of the facility. The north side of this area will have a cast-in-place concrete retaining wall, which will retain as much as 8 feet of soil.

2.0 EXPLORATION AND TESTING

2.1 Exploration

Five test boring explorations were made at the site by Northern Test Boring, Inc. of Gorham, Maine on May 22, 2002 for a previously proposed project. The test boring locations are shown on the "Exploration Location Plan" attached as Sheet 1. Logs of the test borings and key to the notes and symbols are attached as Appendix A.

2.2 Laboratory Testing

Utilizing a pocket penetrometer, unconfined compressive strength data was obtained for clay samples recovered from the borings. The results of the moisture content and strength testing are noted on the test boring logs. The results of a one-dimensional consolidation test are shown graphically in Appendix A.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Subsurface Conditions

The borings generally encountered forest duff overlying loose to medium dense fine sand with varying amounts of silt overlying stiff brown silty clay, which overlies medium stiff gray silty clay over glacial till over bedrock.

Borings B-1 and B-1A through B-4 were made at locations shown on Sheet 1 and fall generally within the footprint of the proposed structure. The borings encountered about 3.5 to 6.3 feet of loose to medium dense sand with varying amounts of silt. Below the sand, the borings encountered 10.0 to 11.7 feet of stiff to very stiff brown silty clay. Borings B-1, B-1A, B-3 and B-4 encountered soft to medium gray silty clay at depths varying from about 13.0 to 15.0 feet below the ground surface. The gray silty clay appears to be about 7 to 14 feet in thickness. Test Boring B-2 did not encounter the gray silty clay. Each boring encountered granular soil below the gray silty clay. Test Borings B-1 and B-1A were terminated in the granular soils at depths of 25.0 and 33.0 feet, respectively. Test Borings B-2 through B-4 were terminated at refusal surfaces (probable bedrock) at depths of 20.3, 34.3, and 31.0 feet, respectively.

For a more detailed description of the explorations, please refer to the attached boring logs.

3.2 Groundwater

Free groundwater was observed in test boring B-3 at a depth of 14.9 feet at the time of drilling work in May 2002. Free groundwater was not observed in the remaining test borings. The soil samples obtained from the explorations appeared wet at a depth of about 15 feet. Due to the short time period of drilling work and relatively impermeable native silty clay, accurate groundwater level information was not available. It is likely that groundwater is perched upon the silty clay seasonally and during periods of heavy precipitation and snowmelt. Long term groundwater fluctuation information is not available.

3.3 Seismic and Frost Conditions

According to IBC 2006, we interpret the subsurface conditions to correspond to a seismic site class E. The design-freezing index for the Portland, Maine area is approximately 1250 Fahrenheit degree-days, which corresponds to a frost penetration on the order of 4.5 feet.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the findings at the exploration locations and our knowledge of the proposed construction, it appears that the site is suitable for the proposed construction from a geotechnical standpoint.

The structure is underlain by compressible gray silty clay and our settlement analysis indicates that post-construction consolidation should result in about ½ inch of settlement beneath the northwest corner of the structure (location of deepest new fill).

The stiff silty clay and densified silty sand will provide adequate support for the proposed structure on a shallow spread footing foundation system provided the subgrade soils are not disturbed and are properly prepared.

The site has soil limitations that must be considered in design and construction. Much of the site soil is damp and easily disturbed by construction activity. Moist silty clayey soils lose strength when disturbed. Construction subgrades are anticipated to be silty clay soils. Groundwater will need to be controlled during construction and long term.

Based on a finished floor elevation of 79.2 feet, it appears that the construction site will require a cut in the southeast corner of the site on the order of 2 feet and a tapered fill beginning in the southeast corner of the structure and heading northwest from 1 to as much as 10 feet to achieve finish grades. Consequently, a large volume of imported borrow will be needed.

The site soils encountered are frost susceptible. Thus, clean backfill is needed adjacent to foundations that are exposed to freezing temperatures. These limitations must be considered in the planning and design of this project.

4.2 Settlement Analysis

We have made an analysis of the post-construction consolidation of the underlying compressible gray clay beneath the northwesterly corner (deepest fill) of the structure. Our analysis has been based upon the following:

1. The existing and proposed grading information provided by Patco Construction, Inc.
2. A finish floor elevation of 79.2 feet
3. The consolidation information from Boring B-4, sample 1-U
4. Assumed ground floor live load = 100 psf
5. An allowable soil bearing capacity = 3000 psf

Based on the above, we have calculated that post-construction settlement due to consolidation of the underlying gray silty clay should be on the order of a ½ inch or less.

4.3 Site Preparation

An erosion control system should be installed prior to clearing and grubbing activity at the site to help protect adjacent drainageways and properties. Construction and fill areas should be cleared and grubbed of all organics. Topsoil and root matter should be stripped from beneath all building and paved areas. Although it appeared the topsoil was generally about 4 to 8 inches at the explorations, the methods used by the contractor for removal and the moisture condition of the site will affect the volume of material removal required.

For areas of the building footprint (southern 2/3 of footprint) underlain by loose sand, we recommend densification utilizing a vibratory roller compactor capable of imposing a dynamic load on the order of 15 kips. Further, we recommend that footing subgrades consisting of the native loose sand be densified using a walk behind vibrator compactor. An S. W. COLE ENGINEERING, INC. representative should be on-site to observe proof-rolling and densification operations.

4.4 Excavation Work

Excavation work will generally encounter topsoil, loose sand fill and very stiff to stiff silty clay. Care must be exercised during construction to minimize disturbance of the bearing soils. We recommend that a smooth edged bucket be utilized to excavate to footing subgrade in order to reduce disturbance of the bearing soils. An SWCE representative should observe all subgrades prior to placement of any new fill or concrete. Subgrades which become disturbed should be overexcavated and replaced with Crushed Stone underlain by a non-woven geotextile fabric. The Crushed Stone will help provide a stable base from which to work and will provide a drainage media for sumping and pumping. A non-woven geotextile fabric having

an apparent opening size (AOS) of at least 70 should be utilized directly on the soil subgrade prior to placing the Crushed Stone.

Groundwater may be encountered during excavation work. Sumping and pumping dewatering techniques should be adequate to control groundwater below footing subgrade elevation. Controlling the water levels to at least one foot below soil subgrade elevations will help stabilize the subgrade and help provide a more firm working surface during construction.

Excavations must be properly shored and/or sloped to prevent sloughing and caving of the sidewalls during construction. Temporary, unsupported soil excavations should be sloped back to 1½H to 1V or flatter. All excavations should be consistent with the OSHA trenching regulations.

4.5 Exterior Retaining Walls

An exterior retaining wall and truckdock are proposed near the northeast corner of the proposed structure. We understand that the retaining wall and truck dock walls will be cast-in-place concrete walls. We recommend that retaining walls be designed using the following design parameters:

Soil backfill unit weight:	130 pcf (Structural Fill)
Active soil pressure coefficient	0.30 (Level Backslope)
Passive soil pressure coefficient	3.3 (Level Backslope)
At-rest soil pressure coefficient	0.5 (Level Backslope)
Allowable bearing pressure	3.0 ksf
Base friction factor	0.45

Retaining wall design must account for construction surcharge loads and future live load conditions. Lateral wall loads can be resisted by passive soil pressure acting against below grade foundations and frictional resistance at the base of foundations. We recommend that the retaining walls be backfilled with 4.5 feet (horizontal measure) of Structural Fill (see section 4.8). We recommend the base of the wall be supported on 12 inches of compacted Crushed Stone. We recommend that an underdrain be provided in the crushed stone bedding beneath the toe of the wall along the length of the structure.

4.6 Foundation Design

The proposed structure can derive support from spread footings founded on 12 inches of crushed stone placed on a geotextile fabric placed on the undisturbed native silty clay or densified sand.

The design freezing index for the Portland, Maine area is approximately 1250 Fahrenheit degree-days. Thus, exterior perimeter footings will need to be placed at least 4.5 feet below exterior finish grade to provide frost protection. For footings bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design of spread footings and foundation walls:

- Allowable Soil Bearing Pressure = 3.0 ksf
- Design Frost Depth = 4.5 feet
- Base Friction Factor (tan δ) = 0.45 (concrete to crushed stone)
- Passive Lateral Earth Pressure Coeff. (K_p) = 3.0 (compacted Structural Fill)
- Equivalent Fluid Pressure (Passive) = 390 psf/ft
- Active Lateral Earth Pressure Coeff. (K_a) = 0.3 (compacted Structural Fill)
- Equivalent Fluid Pressure (Active) = 40 psf/ft
- At-Rest Lateral Earth Pressure Coeff. (K_o) = 0.5 (compacted Structural Fill)
- Equivalent Fluid Pressure (At-Rest) = 60 psf/ft
- Total unit weight of backfill (γ_t) = 130 pcf (compacted Structural Fill)
- Internal Friction Angle (ϕ)= 30 degrees (compacted Structural Fill)
- Seismic Soil Profile Type E (IBC 2006 N-Value Method)

Wall and column footings should be at least 18 and 24 inches in width, respectively, regardless of bearing pressure.

4.7 Slab-on-Grade Floors

Slab-on-grade floors in heated areas may be designed using a subgrade reaction modulus of 170 pci (pounds per cubic inch) provided the slab is underlain by at least 12 inches of compacted Structural Fill placed on a properly prepared subgrade. We recommend that slab subgrades be sloped toward the building perimeter to help shed water to the perimeter footing drains during construction. We recommend that control joints be installed within floor slabs to accommodate shrinkage in the concrete as it cures.

In general, contraction joints are typically installed at 10 to 15 foot spacing, but design spacing should be determined by the structural engineer with consideration to slab thickness.

A vapor retarder should underlie floor slabs covered with moisture sensitive flooring to reduce the potential for the upward migration of moisture vapors. The vapor retarder should have a permeance that is less than the floor covering being applied on the slab. We recommend consulting flooring manufacturers relative to selection and installation of acceptable vapor retarder systems for use with their products.

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 installed over the cast-in-place concrete and that the curing paper remain in place as long as possible to improve the quality of the completed floor. In lieu of curing paper, a curing compound may be utilized; however, care must be taken to prevent scuffing of the compound from the floor during the curing period.

4.8 Backfill and Compaction

The silty sand and silty clay soils are frost susceptible and not suitable for foundation backfill. Crushed stone surrounding underdrains should meet the requirements for MeDOT Standard Specification 703.22 "Underdrain Backfill Type C". Compacted fill for use against perimeter foundation walls (both inside and out), as well as exterior sign or pole foundations should meet the gradation requirements for Structural Fill given below. Slab base material should also meet the requirements for Structural Fill.

Percent Finer by Weight	
Sieve Size	**Structural Fill**
4-inch	100
3-inch	90-100
1/4-inch	25-90
No. 40	0-30
No. 200	0-5

We recommend that granular fill placed within the proposed building area, below the Structural Fill and below the subbase gravel in paved areas meet the following gradation:

Percent Finer by Weight	
Sieve Size	**Granular Fill**
6 inch	100
1/4 inch	25 to 90
No. 40	0 to 50
No. 200	0 to 20

All fills should be placed in horizontal lifts and be compacted such that desired density is achieved throughout the lift thickness. We recommend that loose lift thickness for soil fills not exceed 12 inches.

Sub-slab fill and any fill placed below foundations should be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Foundation backfill should be compacted to at least 95 percent beneath paved areas and entrance slab areas. Crushed stone should be compacted to 100 percent of its dry rodded unit weight as determined by ASTM C-29 if utilized below foundations.

4.9 Entrances and Exterior Slabs

Entrance approaches and exterior slabs should be designed to reduce the effects of differential frost action. We recommend at least 4.5 feet of Structural Fill be provided below these structures where differential frost heaving will be detrimental. The Structural Fill should extend beneath the entire length and width of entrances and exterior slabs. The thickness of Structural Fill adjacent to exterior foundations, below entrance slabs, sidewalks, and exterior slabs should transition up to any adjacent pavement subbase at a 1V to 3H slope or flatter. The lower layer of Structural Fill should be hydraulically connected to the foundation drainage system. In any case, all adjacent paved and grassed areas should be sloped to promote drainage away from the building periphery. Details are shown on Sheet 2.

4.10 Foundation Drainage

We recommend that a perimeter foundation drainage system be provided for the structure. Foundation drains should be placed adjacent to the exterior side of perimeter wall footings. The foundation walls should have weepholes at footing elevation spaced at 10 feet on center or less. Rigid, SDR-25 foundation drainpipe should be utilized. The foundation drain pipe should be enveloped with at least 6 inches of ¾ inch crushed stone bedding and the entire crushed stone layer should be wrapped in a non-woven geotextile filter fabric having an apparent opening size (AOS) of 70. The crushed stone should meet the gradation requirements of Maine DOT (MeDOT) Standard Specification 703.22 "Underdrain Backfill Type C". The foundation drains should have a positive gravity outlet. Details of the recommended foundation drainage system are presented on the attached Sheet 2.

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. This is to reduce direct surface water infiltration into the backfill. Ideally, surface grades should be sloped away from the building for positive surface water drainage.

4.11 Surficial Slope Stability

We recommend that the proposed 1.25H:1V fill slope along the north side of the proposed construction be surfaced with rip-rap in lieu of a UV resistant erosion control mesh as currently proposed. Due to the steepness of the proposed slope and the time of year of construction (late fall) rip-rap over the slope will be more resistant to surficial erosion. Fill slopes should be constructed as level benches, which are overbuilt to facilitate compaction. The benches should be cut into the native ground surface to key the new fill to the existing slope. Slope fills should be placed in loose lifts not greater than 12 inches and be compacted. The final slope face should be constructed by cutting back into the compacted core. The toe of rip-rap should be keyed into the existing ground surface a minimum of 24 inches. Further, lateral edges where the riprap terminates along the face of the embankment should be similarly keyed into the ground surface. The rip-rap layer should be about 24 inches thick. We recommend that the rip-rap consist of MDOT 703.25 "Stone Fill" with a maximum size of 18 inches with a d_{50}=12 inches.

4.12 Weather Considerations

It should be anticipated that relatively dry or wet conditions might occur at any time during the year. Minimizing construction traffic and excavation activities during wet weather conditions may be required due to the silty nature of the site soils. Temporary haul roads may need to be constructed at the site to help protect subgrades from disturbance due to construction activity. Moisture "conditioning" of the fill will likely be required to achieve the required compaction.

If foundation construction takes place during freezing times of the year, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and pavement must not be placed on frozen soil. Once placed, the soil beneath structures must be protected from freezing.

4.13 Quality Control

It is recommended that an S. W. COLE ENGINEERING, INC. representative be retained on-site to observe to provide supplemental geotechnical engineering and testing services during the excavation and foundation phases of the work. This is to observe compliance with the design concepts, specifications, and design recommendations and to allow design changes in the event that subsurface conditions are found to differ from those anticipated prior to the start of construction. We would be pleased to provide a scope of services and proposal for materials testing services at the appropriate time.

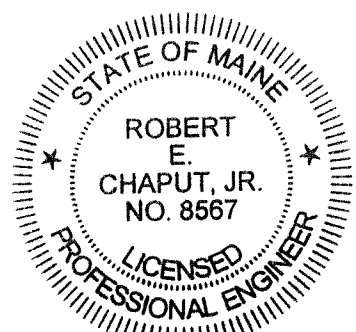
5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you as the design progresses and during the construction phase.

Very truly yours,

S. W. COLE ENGINEERING, INC.

Robert E. Chaput, Jr., PE
Senior Geotechnical Engineer



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Attachment A

Limitations

This report has been prepared for the exclusive use of Patco Construction, Inc. for specific application to the Proposed Camp Bow Wow at 49-63 Blueberry Road 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.

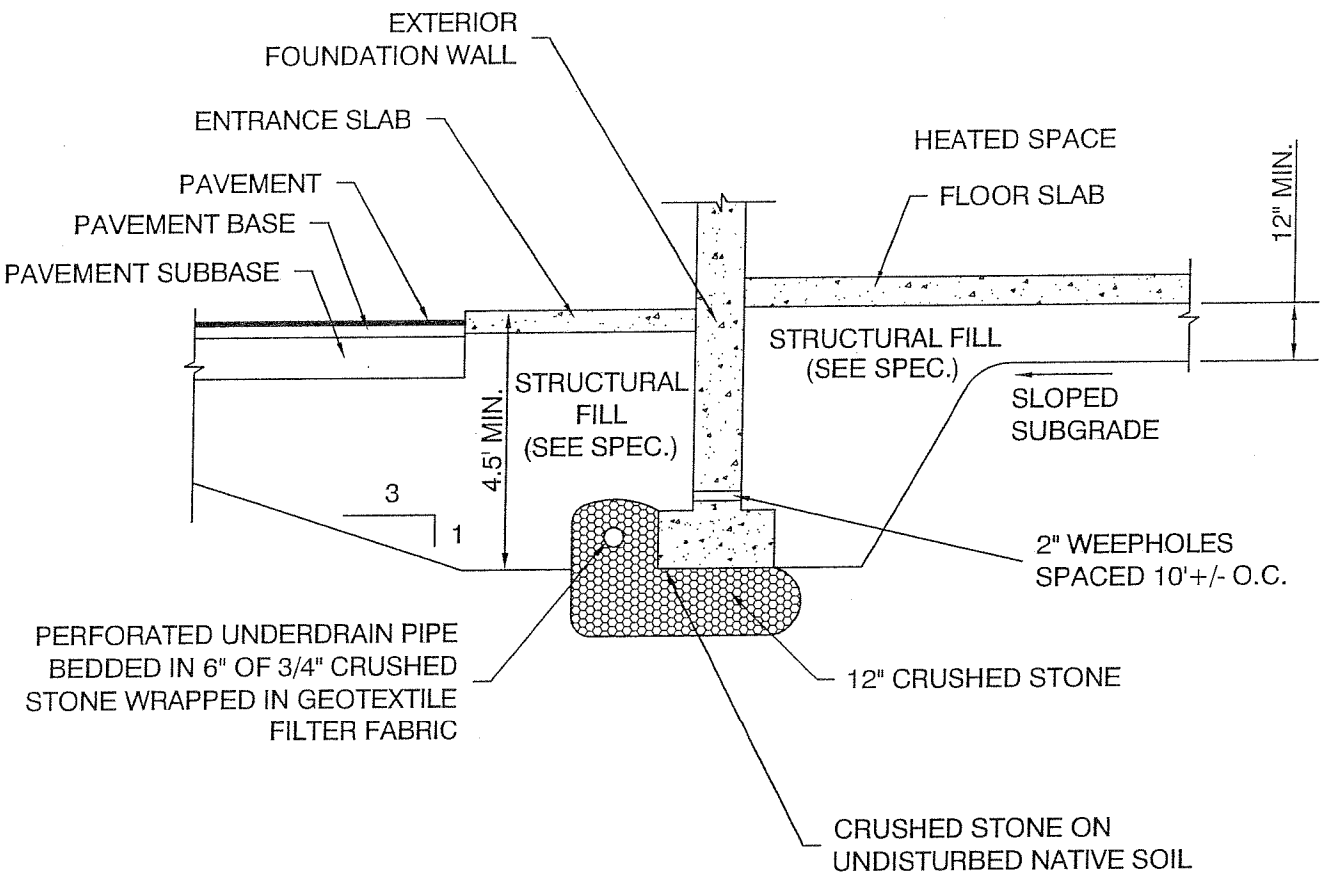
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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.

S. W. COLE ENGINEERING, INC.'s scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

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.



NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION REQUIREMENTS ARE CONTAINED WITHIN THIS REPORT.

S.W.COLE ENGINEERING, INC.

PATCO CONSTRUCTION, INC.

UNDERDRAIN DETAIL

PROPOSED CAMP BOW WOW
49-63 BLUEBERRY ROAD
PORTLAND, MAINE

Job No.	07-0875	Scale	Not to Scale
Date :	09/10/07	Sheet	2

APPENDIX A

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-1
SHEET: 1 OF 1
PROJECT NO.: 02-0357
DATE START: 5/22/2002
DATE FINISH: 5/22/2002
ELEVATION: 75.5'±
SWC REP.: C. MORRISON

PROJECT / CLIENT: KD LANDSCAPING FACILITY / OEST ASSOCIATES, INC.
LOCATION: BLUEBERRY ROAD / PORTLAND, MAINE
DRILLING CO. : NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH AT BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									1.0'	FOREST DUFF - DARK BROWN SILTY SAND
	S-1	24"	16"	2.0'	1	1	1	1		BROWN SILTY FINE SAND ~LOOSE~
									5.2'	
	S-2	24"	24"	7.0'	4	5	7	9		BROWN MOTTLED - SILTY CLAY qp = 5.0 - 7.0 ksf ~VERY STIFF~
	S-3	24"	24"	12.0'	2	3	3	4		qp = 2.5 - 4.0 ksf ~STIFF~
									15.1'	
	S-4	24"	24"	17.0'	2	1	1	2		~MEDIUM~
									17.0'	GRAY SILTY CLAY qp = .34 ksf
ROD										PROBABLE GRAY SILTY CLAY
ROBE										
HYD										
PUSH									22.0'	
										PROBABLE GRANULAR SOIL
									25.0'	
										BOTTOM OF EXPLORATION AT 25.0'

MPLES:
= SPLIT SPOON
= 3" SHELBY TUBE
= 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.

BORING NO.: B-1

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-1A
SHEET: 1 OF 1
PROJECT NO.: 02-0357
DATE START: 5/22/2002
DATE FINISH: 5/22/2002
ELEVATION: 75.5'±
SWC REP.: C. MORRISON

PROJECT / CLIENT: KD LANDSCAPING FACILITY / OEST ASSOCIATES, INC.
LOCATION: BLUEBERRY ROAD / PORTLAND, MAINE
DRILLING CO. : NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

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

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH AT BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
PUSH										SET CASING AT 5.0'
OPEN HOLE										NO SAMPLING
									15.0'	
	1U	24"	22"	18.0'	HYD PUSH					GRAY SILTY CLAY
										qu = 1.8 ksf w = 39.4% qp = .5 - 1.5 ksf
	2 1/2 X 5" VANE			18.6'						Sv = .71/.31 ksf
	2 1/2 X 5" VANE			19.2'						Sv = .78/.25 ksf ~MEDIUM~
									21.0'	
	S-1	24"	24"	22.0'	WOM	WOM	WOM	4	21.7'	BROWN SILTY CLAY ~STIFF~
									24.0'	BROWN SAND WITH SOME SILT
	S-2	24"	14"	27.0'	6	5	6	7	28.0'	BROWN FINE TO MEDIUM SAND WITH TRACE SILT ~MEDIUM DENSE~
	S-3	24"	12"	32.0'	9	7	13	15	33.0'	BROWN SILTY SAND WITH SOME GRAVEL INTERBEDDED WITH FINE TO COARSE SAND ~MEDIUM DENSE~
										BOTTOM OF EXPLORATION AT 33.0'

AMPLES:
= SPLIT SPOON
= 3" SHELBY TUBE
= 3.5" SHELBY TUBE

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

REMARKS: 3' NORTH OF B-1

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

BORING NO.: B-1A

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-2
SHEET: 1 OF 1
PROJECT NO.: 02-0357
DATE START: 5/22/2002
DATE FINISH: 5/22/2002
ELEVATION: 78.0'±
SWC REP.: C. MORRISON

PROJECT / CLIENT: KD LANDSCAPING FACILITY / OEST ASSOCIATES, INC.
LOCATION: BLUEBERRY ROAD / PORTLAND, MAINE
DRILLING CO. : NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED
CAVED AT 7.0'

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH AT BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									0.5'	FOREST DUFF
	S-1	24"	14"	2.0'	2	1	1	3		BROWN FINE SAND WITH TRACE SILT ~LOOSE TO MEDIUM DENSE~
	S-2	24"	22"	7.0'	7	7	9	7	6.8'	
	S-3	24"	24"	12.0'	2	2	3	4		BROWN SILTY CLAY qp = 3.0 - 4.5 ksf ~STIFF~
	S-4	24"	24"	17.0'	2	3	2	6		BROWN SILTY CLAY qp = .5 - 1.0 ksf INTERBEDED WITH FINE TO MEDIUM SAND SEAMS
									18.5'	BROWN SILTY SAND WITH SOME WEATHERED ROCK
	S-5	4"	3"	20.3'	50/4"				20.3'	REFUSAL AT 20.3' (PROBABLE BEDROCK)

SAMPLES:
S: SPLIT SPOON
3: 3" SHELBY TUBE
3.5: 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.

BORING NO.: B-2

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-3
SHEET: 1 OF 1
PROJECT NO.: 02-0357
DATE START: 5/22/2002
DATE FINISH: 5/22/2002
ELEVATION: 67.5'±
SWC REP.: C. MORRISON

PROJECT / CLIENT: KD LANDSCAPING FACILITY / OEST ASSOCIATES, INC.
LOCATION: BLUEBERRY ROAD / PORTLAND, MAINE
DRILLING CO. : NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HSA	2 1/4"		
SAMPLER:	SS	1 3/8"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
WATER LEVEL AT 14.9' IN HSA AT COMPLETION
CAVED AT 4.0'

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH AT BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24
	S-1	24"	18"	2.0'	1	1	2	3
	S-2	24"	24"	7.0'	4	6	7	8
	S-3	24"	24"	12.0'	2	3	2	3
	S-4	24"	27"	17.0'	2	1	1	1
ROD								
ROBE								
19								
16								
17								
17								
35								
28								
18								
20								
17								
21								
23								
28								
59								
00-4"								

DEPTH	STRATA & TEST DATA
0.7'	FOREST DUFF
	BROWN MOTTLED SILTY CLAY qp = 5.0 - 6.5 ksf
	~STIFF TO VERY STIFF~
13.0'	qp = 1.5 - 2.5 ksf
	GRAY SILTY CLAY qp = .2 - .3 ksf
	~MEDIUM~
21.0'	
	PROBABLE GRANULAR MATERIAL
34.3'	
	REFUSAL AT 34.3' (PROBABLE BEDROCK)

AMPLES:
= SPLIT SPOON
= 3" SHELBY TUBE
= 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.

BORING NO.: B-3

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-4
SHEET: 1 OF 1
PROJECT NO.: 02-0357
DATE START: 5/22/2002
DATE FINISH: 5/22/2002
ELEVATION: 73.5'±
SWC REP.: C. MORRISON

PROJECT / CLIENT: KD LANDSCAPING FACILITY / OEST ASSOCIATES, INC.
LOCATION: BLUEBERRY ROAD / PORTLAND, MAINE
DRILLING CO. : NORTHERN TEST BORING, INC. DRILLER: MIKE NADEAU

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4"	300 lbs	16"
SAMPLER:	SS	1 3/8"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
NO FREE WATER OBSERVED

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH AT BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA
									.5'	FOREST DUFF
	S-1	24"	18"	2.0'	1	1	1	2	4.0'	BROWN FINE SAND TRACE SILT
	S-2	24"	18"	7.0'	4	5	5	6		BROWN SILTY CLAY ~VERY STIFF~ qp = 4.5"- 6.0 ksf
	S-3	24"	14"	12.0'	3	4	23	5	14.0'	qp = 3.0 - 3.5"ksf
	1U	24"	22"	17.0'						qu = 2.0 ksf w = 41.7% qp = 1.6 - 3.5 ksf
	2 1/2 X 5"VANE			17.6'						Sv = .87/.25 ksf
	S-4	24"	24"	22.0'	1	1	1	2		GRAY SILTY CLAY WITH BLACK STAINING ~MEDIUM~
	2 1/2 X 5"VANE			25.7'						Sv = .78/.22 ksf
	2 1/2 X 5"VANE			26.3'					28.0'	Sv = .78/.22 ksf
									30.0'	BROWN SILTY CLAY
	S-5	3"	3"	30.3'	50-3"				31.0'	BROWN SILTY SAND AND GRAVEL (TILL) ~DENSE~
										REFUSAL AT 31.0' (PROBABE BEDROCK)

SAMPLES:
= SPLIT SPOON
= 3" SHELBY TUBE
= 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.

BORING NO.: B-4

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
f	-	fines content (percent by weight passing U.S. No. 200 Sieve)

Description of Proportions:

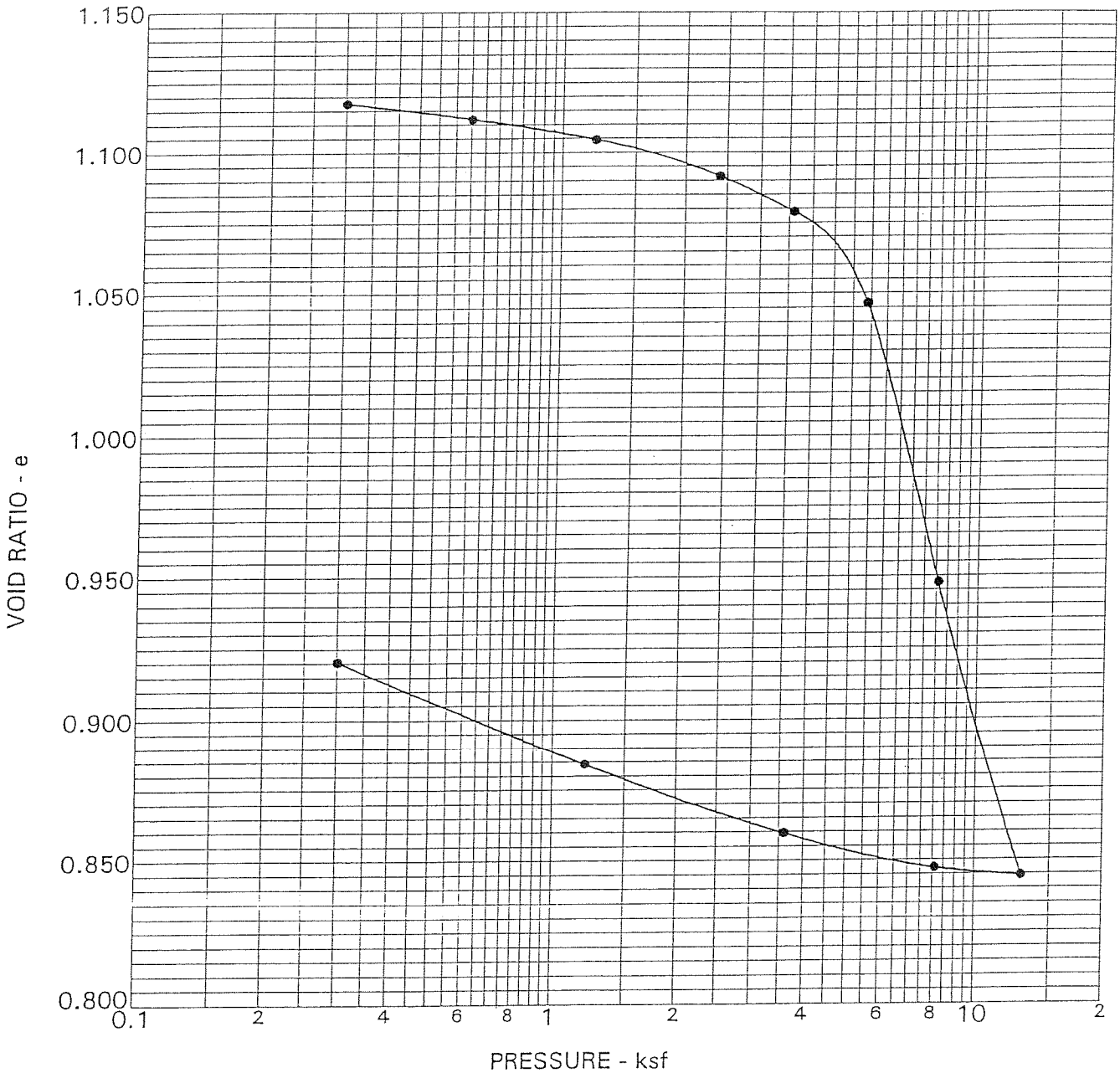
0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

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.

Consolidation Test



B-4, 1U 15-17'

Pc= 5.0 +/- ksf

Cc= 0.58

Cr= 0.03

w= 41.7%

S.W. Cole Engineering, Inc.

Project Name:

KD Landscaping

Job No. : 02-0357

Boring : B- 4

Sheet : 8