ADDENDUM NO. 2

TO

City of Rochester
Rochester, New Hampshire

BIDDING AND CONTRACT REQUIREMENTS AND SPECIFICATIONS

FOR

WWTF ALUM RESIDUAL LAGOON MODIFICATIONS
ROCHESTER, NH

OCTOBER 28, 2010

PREPARED BY:
WRIGHT-PIERCE ENGINEERS
230 Commerce Way, Suite 302
Portsmouth, NH 03801
Tel. 603-430-3728
Fax 603-430-4083

ADDENDUM NO. 2

CITY OF ROCHESTER
ROCHESTER, NEW HAMPSHIRE
WWTF ALUM RESIDUAL LAGOON MODIFICATIONS

This addendum amends and/or supplements the bid documents as indicated below. Only these items alter the Bid Documents; any verbal discussions or responses are hereby declared null and void.

PLANS

1. On sheet C-13, **DELETE** "Lagoon Berm Detail" located in upper left hand corner **ADD** "Lagoon Berm Detail" as per attached. In addition to adding an impervious key, on this detail 6" crushed stone changed to 6" gravel.
2. On sheet PR-1, Alum Sludge Decant Pump Chambers B and C; In section views, Left Hand Slide Gate is removed, Middle Slide Gate is reconstructed as a downward opening weir gate, Right Hand Slide Gate to remain "as is".

SPECIFICATIONS

1. In SECTION 02617 UNDERDRAIN PIPE, **DELETE** paragraph 3.2.A "Do not install underdrains nor backfill between December 15 and April 1 without the written permission of the Engineer."
2. Specification SECTION 02200 EARTHWORK, **ADD** 2.1 F Gravel: Gravel shall conform to NHDOT Specification 304.2.

CLARIFICATIONS

1) Bid Award Criteria: The bid award criteria will be as listed in DIVISION 0, INFORMATION FOR BIDDERS, A-2.1, "The Owner reserves the right to accept or reject any and all BIDS, and award any BID on the basis of being in the best interest of the OWNER."

2) Geotechnical Report: See attached S.W. Cole Geotechnical Report Dated March 12, 2010 attached. Report includes boring log (B-1) conducted approximately in the middle of Lagoon 1 on February 19, 2010. Report consists of 15 pages.

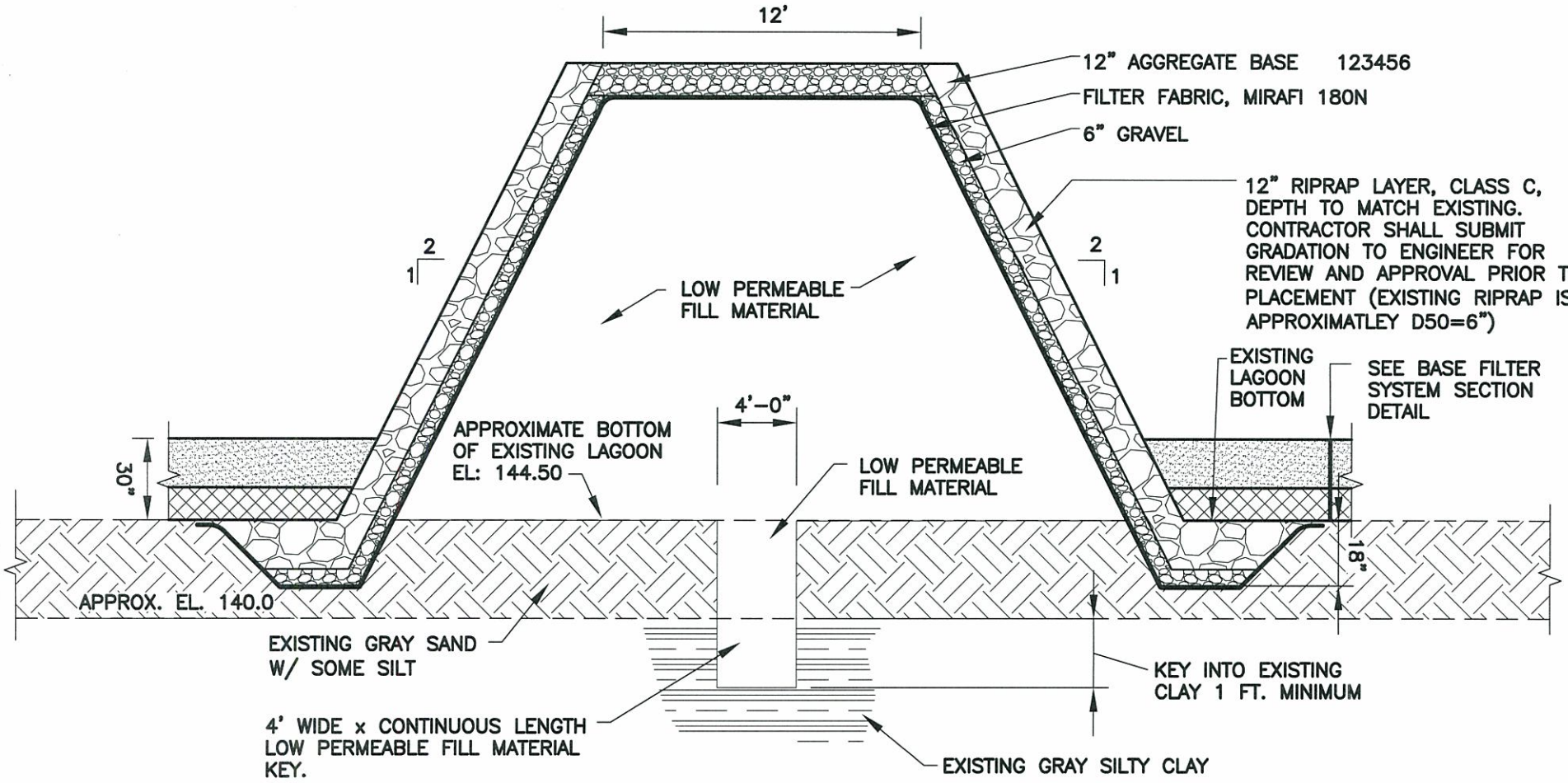
3) Low Permeable Fill: The EARTHWORK Specification SECTION 02200 lists a gradation and permeability requirements. As noted, the fill permeability characteristics (1×10^{-6} cm/sec or slower) supersedes gradation requirements. The laboratory results of low permeable fill permeability tests shall be submitted with shop drawings.

4) Cut-Off Wall Connection Detail Sheet C-13: DELETE note in lower left hand corner: "*Existing cutoff wall low permeable material located on north and south walls of existing alum sludge lagoon 1. Existing Embankment material to be removed prior to installation of new low permeable fill for new bisecting berm.*"

ADD note: "*Low permeable material is present in the north and south walls of existing alum sludge lagoon 1. Existing embankment material located on top of the low permeability material on the north and south wall is to be removed prior to installation of new low permeable fill for new bisecting berm. The low permeable material of the new berm is to intersect with the existing low permeability for the full height of the berm. Low permeability material shall not be placed below the access ramps and shall be a minimum of 20 feet wide at the intersection of the existing low permeability cut-off wall. "*

5) Contractors attending Pre-Bid Meeting: See attached sign-in sheet.

6) The project layout coordinates are based on plans prepared by Camp, Dresser and McKee dated April, 2002. Contractor shall coordinate, with his construction layout personnel, the establishment of new control points for construction layout based on the location of the existing decant structures and other existing features. Based on the results of this effort, site layout contractor is to review results of horizontal and vertical layout with Engineer prior to construction. Site lay-out information in electronic CAD format will be made available to the contractor that is awarded the project. This CAD layout information may need to be modified by contractor based on confirmation of field conditions.



LAGOON BERM DETAIL

NTS

CITY OF ROCHESTER, NEW HAMPSHIRE WASTEWATER TREATMENT FACILITY ALUM RESIDUALS LAGOON UPGRADE BERM KEY DETAIL		
PROJ NO: 11636A	DATE: OCT. 2010	FIGURE: 1
WRIGHT-PIERCE Engineering a Better Environment		

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED ALUM SLUDGE LAGOON MODIFICATIONS
WASTEWATER TREATMENT FACILITY
ROCHESTER, NEW HAMPSHIRE

10-0103 S MARCH 12, 2010

PREPARED FOR:

Wright-Pierce
Attention: Mr. Jim Hewitt
230 Commerce Way, Suite 302
Portsmouth, NH 03801

PREPARED BY:

Attention: Chad B. Michaud, P.E.
Senior Geotechnical Engineer
10 Centre Road
Somersworth, NH 03878

TABLE OF CONTENTS

10-0103 S

March 12, 2010

Wright-Pierce
Attention: Mr. Jim Hewitt
230 Commerce Way, Suite 302
Portsmouth, NH 03801

Subject: Geotechnical Engineering Services
Proposed Alum Sludge Lagoon Modifications
Wastewater Treatment Facility
Rochester, New Hampshire

1.0 INTRODUCTION

1.1 Scope of Work

In accordance with our Proposal with a revision date of February 24, 2010, we have observed subsurface explorations and have made a geotechnical evaluation for the proposed Alum Sludge Lagoon Modifications at the Wastewater Treatment Facility (WWTF) in Rochester, New Hampshire. The purpose of our work was to obtain subsurface information and provide a geotechnical engineering evaluation of the proposed earth berm. The investigation has included the making of one test boring, laboratory testing, and a geotechnical evaluation of the findings as they relate to the proposed earth berm. Our evaluation has included an assessment of potential post-construction settlement and deep-seated global stability of the soft clay foundation soils below the new berm. We have developed recommendations for specifications and placement of new embankment fill and for embankment subgrade preparation. Our evaluation and laboratory testing results are included in this report. The contents of this report are subject to the limitations set forth in Attachment A.

1.2 Site Conditions

The City of Rochester, New Hampshire WWTF currently includes two alum sludge lagoons used for treatment of wastewater generated from water treatment at the Water Treatment Plant. The perimeters of the two lagoons consist of earth containment berms that are about 10 feet from the top of the berms to the bottom of the lagoons. At the

time of exploration work, Lagoon No. 1 contained about 6.5 feet of liquid below 12 inches of ice. Based on information provided by the WWTF personnel during our February 10, 2010 site visit, Lagoon No. 2 contains about 9 feet of liquid below ice of similar thickness.

1.3 Proposed Construction

We understand that the conceptual plan is to construct a new 10-foot high earth berm in a north-south direction through the center of the two lagoons to create four lagoons. Based on the conceptual design plan provided by Wright-Pierce, the top of the new berm will be at elevation 158 feet with an overall length of about 575 feet, including its intersection with an east-west access road between the lagoons. The conceptual plan depicts the new berm to have 2H:1V slopes extending to the bottoms of the lagoons at elevation 148 feet.

As part of the proposed lagoon modifications, an alum sludge decant pump box is planned for construction adjacent to the toe of the new berm. According to a plan detail sheet titled "Yard Structures II" and provided by Wright-Pierce, the pump box consists of a 10-foot by 8-foot footprint concrete structure with 8-inch thick walls, floor and roof to house miscellaneous pump equipment and appurtenant piping.

The general site vicinity is shown on the "Site Location Map" attached as Sheet 1. Existing conditions are shown on the "Exploration Location Plan," attached as Sheet 1A.

2.0 EXPLORATION AND TESTING

2.1 Exploration

One test boring (B-1) was made at the site on the ice surface within Lagoon No. 1 on February 19, 2010 by Northern Test Borings, Inc. of Gorham, Maine working under subcontract to S. W. COLE ENGINEERING, INC. The exploration location was selected by Wright-Pierce. Boring depths discussed in this report and in the provided boring log are relative to the surface of the ice within Lagoon No. 1. The active influent into Lagoon No. 2 resulted in poor quality ice and did not allow for further subsurface exploration at its location. The location of the exploration is shown on the "Exploration Location Plan" attached as Sheet 1A.

The exploration was advanced to a depth of 37.0 feet using cased drive and wash techniques, and soil samples were generally obtained at 5-foot intervals using Standard Penetration Testing methods. Rod probing was performed to a depth of 111.0 feet to identify the extent of the encountered clay layer, but no samples were obtained below a depth of 37.0 feet. Vane shear strength testing in the clay was performed at regular intervals, and one undisturbed Shelby tube sample of the relatively softer clay was obtained at the exploration for laboratory strength and consolidation testing.

2.2 Laboratory Testing

Soil samples recovered from the test borings were visually examined and classified during exploration work. Laboratory testing was performed on the obtained Shelby tube sample of soft clay and included one moisture content test (ASTM D-2216), one unconfined compression test (ASTM D-2166) and one consolidation test (ASTM C-2435). Results of the consolidation test are presented on Sheet 4. Results of the moisture content test and unconfined compression test are shown on the exploration log.

3.0 SUBSURFACE CONDITIONS

The boring encountered the bottom of Lagoon No. 1 at 6.5 feet below the ice surface. Below this depth, the boring encountered sand with some silt to a depth of 11.0 feet, overlying gray silty clay with intermittent sand seams. Rod probing was performed to identify the extent of the encountered clay layer at a depth of 111.0 feet where dense probable granular soils were encountered.

A log of the exploration is attached as Sheet 2. A key to the notes and symbols used on the log is attached as Sheet 3.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 Embankment Construction

The predominant soils encountered in the exploration were sand with some silt overlying soft to medium gray silty clay. Given the presence of sand to a depth of about 4.5 feet below the existing bottom of Lagoon No. 1 at Boring B-1, seepage below the berm may be a concern. Therefore, we recommend a 4-foot wide cutoff trench be constructed along the centerline of the new berm to key the low permeability

embankment fill into the underlying native clay. The cutoff trench should consist of the same soil material used for construction of the berm.

Where the new berm will interface with the existing east-west access road between the lagoons, we recommend that the new berm be benched into the existing roadway sideslopes. The existing slope should be cleared of all vegetation and topsoil and sandy subsoil at the interface location. The existing sideslope should then be benched horizontally allowing for placement of new compacted berm materials.

Alum sludge decant pump boxes are planned for construction and to be positioned adjacent to the toe of the proposed berm. We anticipate that these pump boxes will serve buried piping that may run perpendicular to the proposed berm. The passage of these pipes through the berm foundation creates a potential seepage path. We recommend consideration of anti-seep collars for any pipes passing through the berm.

We recommend consideration of low-permeable fill materials containing greater than 25 percent fines (silts and clays) passing the No. 200 sieve, having a maximum particle size of 6 inches, and having a hydraulic conductivity of less than 1×10^{-6} cm per second. The slopes of the berm should be covered with rip rap stone for surficial protection against erosion or water action.

Fill should be placed in loose horizontal lifts no greater than 12 inches in thickness and be compacted. We recommend that berm fill be placed slightly wet of optimum and be compacted to at least 95 percent of maximum dry density as determined by ASTM D-698.

4.2 Settlement and Bearing Capacity Analyses

We have evaluated the soil bearing capacity of the soils below the decant pump box and have determined that their bearing capacity is greater than an anticipated load of 900 psf that would be imposed by construction of a concrete decant pump box.

We have also made analyses of the post-construction consolidation of the underlying compressible gray clay. Our analyses have been based upon the following:

1) A top of berm elevation of 158 feet

2) A bottom of berm (lagoon bottom) elevation of 148 feet
3) Unit weight of berm fill = 125 pcf
4) A 900 psf load from an individual concrete decant pump box over a 10' x 10' area at the toe of the new berm
5) Slope of 2H:1V
6) The consolidation information from Boring B-1

Based on the above, we have calculated that post-construction settlement of the berm structure due to consolidation of the underlying gray silty clay should be on the order of 3 inches or less. We also considered settlement of a concrete decant pump box to be constructed near the toe of the berm and have calculated post-construction settlement of an individual pump box to be on the order of 2 inches or less.

4.3 Global Slope Stability Analyses

We modeled sections and soil profiles to analyze the global stability of the proposed berm using the computer program SLOPE/W 2007. Our slope stability analyses were based on: 1) our current understanding of the project; 2) visual observations of the site and laboratory testing; 3) information obtained at the explorations; and 4) existing site topography, anticipated maximum water levels, and proposed conceptual construction. The new 10-foot high berm was modeled as having a 15-foot wide crest and 2H:1V sideslopes.

We modeled the proposed conceptual construction and the results indicate factors of safety greater than 1.3. Generally, a safety factor of greater than 1.3 is considered acceptable for long term global stability of an earth berm.

4.4 Surficial Slope Stability Analyses and Treatment

Slopes with inclinations of 2H:1V should be armored with rip rap face treatments. Where rip rap is used, the prepared slope subgrades should be covered with a minimum of 6 inches of New Hampshire Department of Transportation (NHDOT) Item 304.2 Gravel. The gravel should then be covered with a 12-inch layer of rip rap having a maximum stone size of 9 inches and a D_{50} of 6 inches. The rip rap/NHDOT Gravel layer should be toed into the bottom of the slope a minimum 18 inches vertically to provide resistance to slope failure.

4.5 Subgrade Preparation

Existing loose or disturbed surficial soils and residual alum sediment at the bottom of the lagoons should be removed from beneath the proposed berm.

The site soils can undergo substantial strength loss when subjected to construction traffic and excavation activities, particularly during periods of precipitation. Care must be exercised during construction to reduce disturbance of the bearing soils. The lagoons should be dewatered to a level at least 1 foot below the subgrade soil to reduce the potential for its disturbance. Should the subgrade become yielding or difficult to work, disturbed areas should be excavated and backfilled with suitable compacted, dry workable materials. We recommend that excavation occur utilizing a smooth-edge excavator bucket to reduce the potential for soil disturbance.

4.6 Weather Considerations

If construction takes place during fall or winter, during the duration of filling operations, new soil must not be placed on frozen soil. Additionally, freezing temperatures will make proper compaction of soil materials difficult to achieve.

The site soils are moisture sensitive and subgrades will be susceptible to disturbance during wet conditions. Site work and construction activities should take appropriate measures to protect exposed subgrades.

4.7 Construction Testing

S. W. COLE ENGINEERING, INC. should be retained to provide soils engineering and testing services during the construction of the berm. This is to observe compliance with the design concepts, specifications, and design recommendations and to allow design changes in the event that soil conditions are found to differ from those anticipated prior to the start of construction.

5.0 CLOSURE

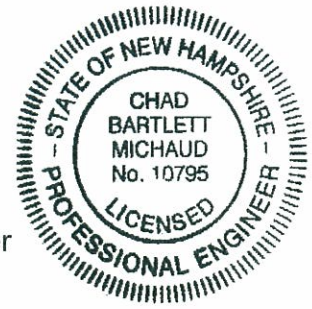
It has been a pleasure to be of assistance to you with this phase of your project. Please do not hesitate to contact us if you have any questions or if we may be of further assistance.

Very truly yours,

S. W. COLE ENGINEERING, INC.

Nathan B. Seguin, E.I.
Geotechnical Engineer

Chad B. Michaud, P.E.
Senior Geotechnical Engineer



Attachment A
Limitations

This report has been prepared for the exclusive use of Wright-Pierce for specific application to the proposed Alum Sludge Lagoon Modifications at the Wastewater Treatment Facility in Rochester, New Hampshire. S. W. COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

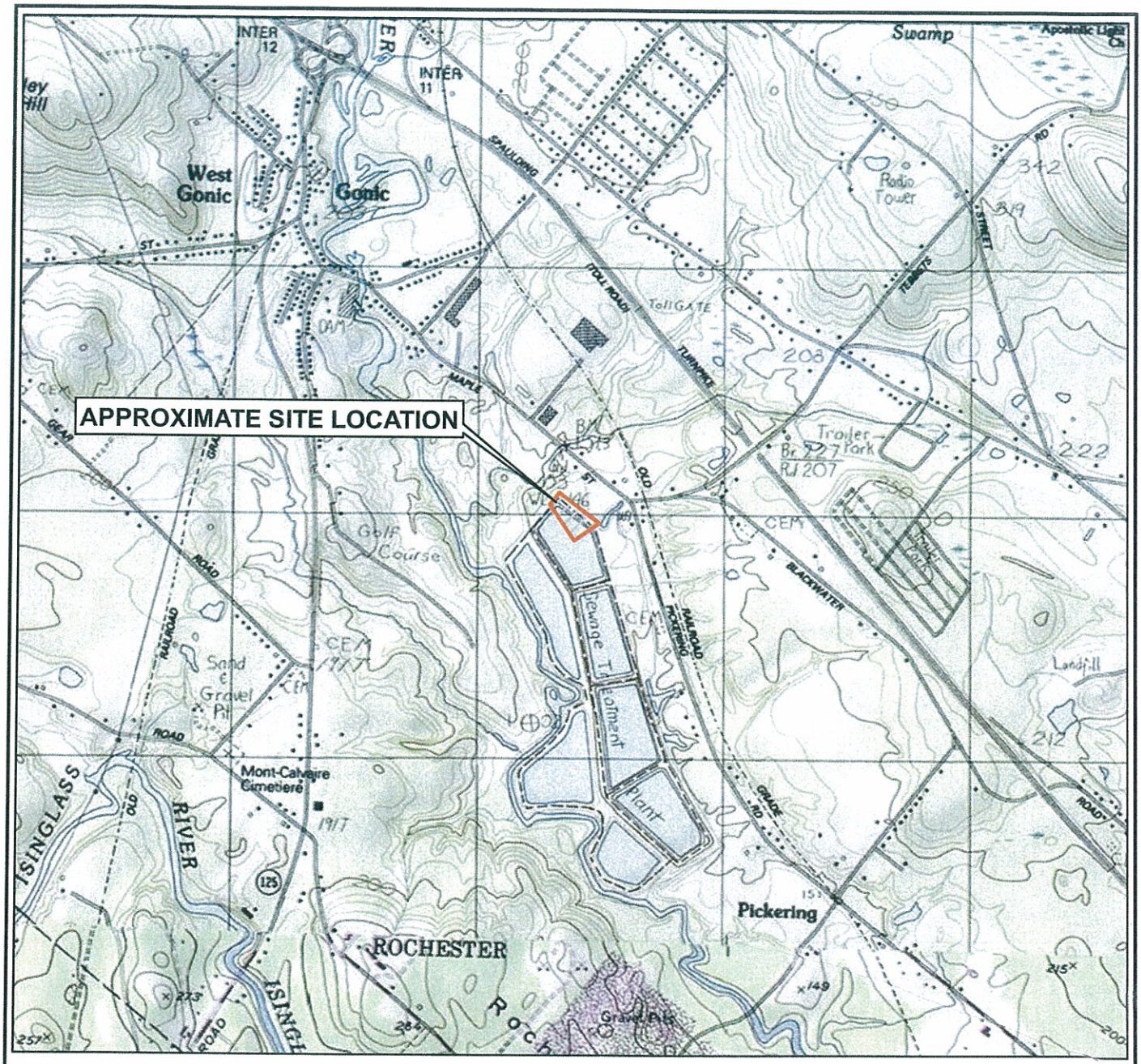
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

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:
SITE LOCATION MAP PREPARED FROM ESRI ArcGIS ONLINE AND DATA PARTNERS INCLUDING USGS AND © 2007 NATIONAL GEOGRAPHIC SOCIETY.

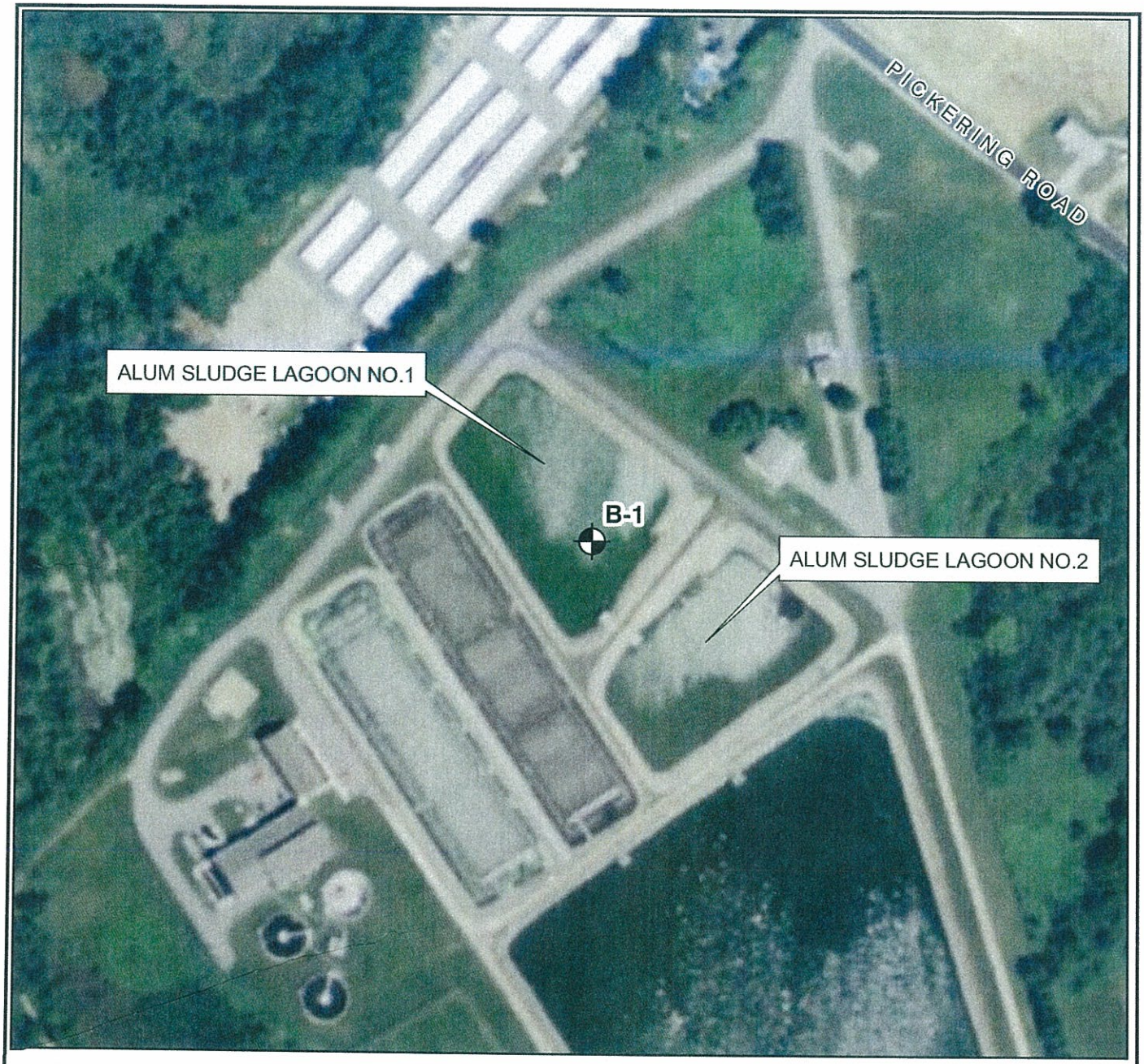
S.W.COLE ENGINEERING, INC.

WRIGHT-PIERCE

SITE LOCATION MAP

PROPOSED ALUM SLUDGE LAGON MODIFICATIONS
PICKERING ROAD
ROCHESTER, NEW HAMPSHIRE

Job No.	10-0103	Scale	1:24000
Date:	03/12/2010	Sheet	1



N
W E
S

200 0 200 400
Scale in Feet

LEGEND:

APPROXIMATE BORING LOCATION

NOTE:

1. EXPLORATION LOCATION PLAN PREPARED FROM ESRI ArcGIS ONLINE AND DATA PARTNERS INCLUDING USGS AND © 2007 NATIONAL GEOGRAPHIC SOCIETY.

2. THE LOCATION OF BORING B-1 IS APPROXIMATE.

S.W.COLE ENGINEERING, INC.

WRIGHT-PIERCE

EXPLORATION LOCATION PLAN

PROPOSED ALUM SLUDGE LAGON MODIFICATIONS
PICKERING ROAD
ROCHESTER, NEW HAMPSHIRE

Job No.	10-0103	Scale	1"=200'
Date:	03/12/2010	Sheet	1A

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: B-1
SHEET: 1 OF 1
PROJECT NO.: 10-0103
DATE START: 2/19/2010
DATE FINISH: 2/19/2010
ELEVATION:

PROJECT / CLIENT: PROPOSED ALUM SLUDGE LAGOON MODIFICATION / WRIGHT-PIERCE
LOCATION: WASTEWATER TREATMENT FACILITY - ROCHESTER, NEW HAMPSHIRE
DRILLING CO. : NORTHERN TEST BORINGS, INC. DRILLER: MIKE NADEAU

SWC REP.: NBS

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

WATER LEVEL INFORMATION

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
									1.0'	ICE
										FREE WATER
									6.5'	BOTTOM OF LAGOON @ 6.5' FROM ICE SURFACE
									7.3'	BROWN SAND WITH SOME SILT AND TRACE GRAVEL
	1D	24"	11"	9.0'	5	7	9	11		GRAY SAND WITH SOME SILT
									11.0'	
	2D	24"	24"	15.0'	WOH	WOH	1	1		q_p = 0.5 ksf
										GRAY SILTY CLAY WITH INTERMITTENT SAND SEAMS
	3 5/8" x 7" VANE			20.7'						S_{uv} = 0.299 ksf / 0.047 ksf ~SOFT~
	3 5/8" x 7" VANE			21.4'						S_{uv} = 0.448 ksf / 0.047 ksf
	1U	24"	24"	25.0'						q_u = 0.444 ksf w = 35.9%
	3 5/8" x 7" VANE			30.7'						S_{uv} = 0.485 ksf / 0.0 ksf
	3 5/8" x 7" VANE			31.4'						S_{uv} = 0.569 ksf / 0.0 ksf
	3D	24"	24"	37.0'	WOR →					
	3 5/8" x 7" VANE			38.7'						S_{uv} = 0.467 ksf / 0.0 ksf NO SAMPLING - ROD PROBE THROUGH CLAY TO 111'
	3 5/8" x 7" VANE			39.4'						S_{uv} = 0.513 ksf / 0.0 ksf 111' TO 112' - 50 BLOWS FOR 12 INCHES

SAMPLES:
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 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

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

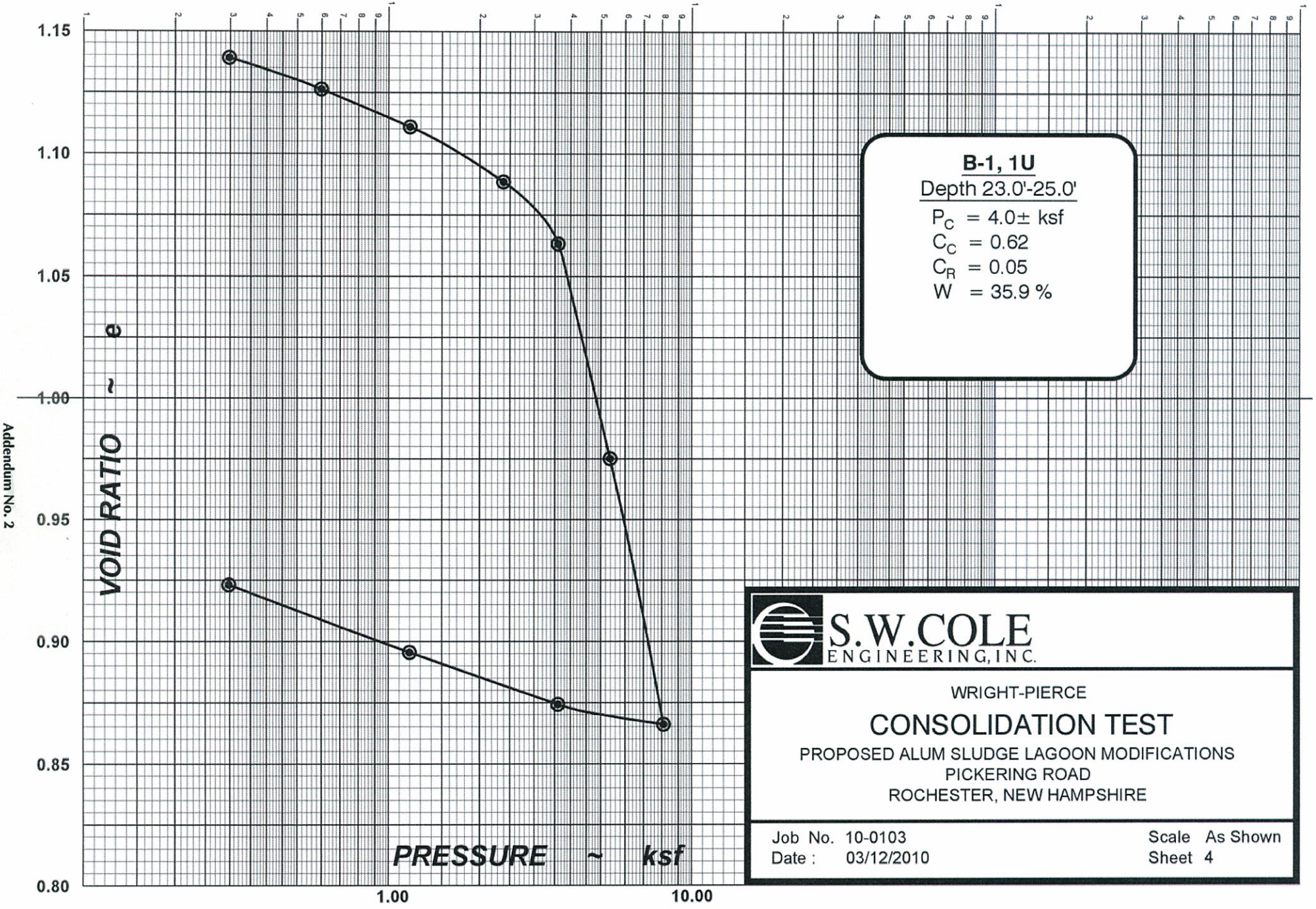
Description of Proportions:

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.



S.W.COLE ENGINEERING, INC.

WRIGHT-PIERCE

CONSOLIDATION TEST

PROPOSED ALUM SLUDGE LAGOON MODIFICATIONS
PICKERING ROAD
ROCHESTER, NEW HAMPSHIRE

Job No. 10-0103 Scale As Shown
Date : 03/12/2010 Sheet 4

WWTF Alum Residuals Lagoon Modifications Bid# 11-12

9:00 AM Mandatory Walk Through

Company	Address	Telephone #	Fax#	E-mail
Greene & Russell Inc	PO Box 987 Concord NH	603224 4114	603224 6114	
D & C. CONSTRUCTION CO. INC	P.O. BOX 123 WATERBORO, ME.	207-247-6023	207-247-6013	
NorthEast Earth Mechanics Inc	159 Barnstead Rd.	603-934-4243	603-435-7950	jimmy@NoEarth.co
Weston & Sampson Eng. Inc	Pittsfield, NH 03263			
~~BROWN INDUSTRIAL GROUP~~ T	5 Centennial Dr. Peabody MA	978-532-1900	978-531-1764	galeotaT@wseinc.com
BROWN INDUSTRIAL GROUP, INC	PO BOX 638 131 LITTLE RIVER ROAD, BERWICK, ME 207-698-5598		207-698-1314	MARK@BROWNINDUSTRIALGROUP.COM
SUR Construction	232 Chestnut Hill, Rock.	532-4554	532-5189	jdsdwildtesurconstruction.co