HALEY & ALDRICH

**REPORT ON**
**INTERSTATE 95 BRIDGE**
**KENNEBEC RIVER CROSSING PROJECT**
**(000556.20/STP-0556(20)X)**
**AUGUSTA, MAINE**

2003-26C

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UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

# REPORT ON
# INTERSTATE 95 BRIDGE
# KENNEBEC RIVER CROSSING PROJECT
# (000556.20/STP-0556(20)X)
# AUGUSTA, MAINE

2003-26C

by

**Haley & Aldrich, Inc.**
**South Portland, Maine**

for

**State of Maine Department of Transportation**
**Augusta, Maine**

**File No. 80765-004**
**April 2003**

HALEY & ALDRICH

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

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HALEY & ALDRICH

30 April 2003
File No. 80765-004

State of Maine
Department of Transportation
16 State House Station
Augusta, Maine 04333

Attention: Laura Krusinski, P.E.

Subject: Geotechnical Investigation
Interstate 95 Bridges
Kennebec River Crossing Project (000556.20/STP-0556(20)X)
Augusta, Maine

Ladies and Gentlemen:

The attached report summarizes the results of our geotechnical investigations for the proposed Interstate 95 Bridges in Augusta, Maine. This bridge project is part of the 7.67-km (2.96-mile) long Kennebec River Crossing Project. This investigation was conducted in accordance with the our proposal dated 25 April 2000 and the Specific Period Contract for Geotechnical Engineering Services (Contract No. U023000807) with the Maine Department of Transportation (MDOT).

The proposed bridges over Interstate 95, referred to herein as the "Interstate 95 Bridges," crosses over Interstate 95 between approximately Station 10+353 and 10+404 (west bridge) and 10+437 and 10+485 (east bridge). The single span bridges will have pile supported stub abutments. The median between the two bridges will be earth filled. The bridges will accommodate two travel and shoulders on both sides lanes, making a total structure width of about 14 meters. We understand that the superstructure is being designed using LRFD (Load and Resistance Factor Design), however, the substructure will be designed ASD (Allowable Stress Design). These and other pertinent geotechnical issues are discussed in this report.

A preliminary report was issued on 28 July 2000 to support other Department documents prepared for a Value Engineering (VE) review of the project. This report containsc foundation design and construction recommendations.

Stationing and other units of measurement in this report are in metric units. English units are in parentheses when used.

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The following report was prepared using a format devised by the MDOT. The report is divided into sections as outlined below:

- Section 1, Text – Introduction, Geological Setting, Subsurface Explorations, Subsurface Conditions, Laboratory Testing, Geotechnical Design Comments, Construction Considerations, and Limitations of Recommendations;
- Section 2, Illustrations – Foundation Survey, Summary of Subsurface Explorations, Exploration Logs, Results of Laboratory Testing;
- Section 3, Appendices – (Not applicable)

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

Sincerely yours,
HALEY & ALDRICH, INC.

Brian K. Lawrence, P.E.
Staff Engineer

James W. Weaver, P.E.
Vice President

Enclosures

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## TABLE OF CONTENTS


Cover Letter to State of Maine Department of Transportation

| Section 1 – Text | | Page No. |
|---|---|---|
| 1. | Introduction | 1 |
| 2. | Geological Setting | 2 |
| 3. | Subsurface Explorations | 3 |
| 4. | Subsurface Conditions | 4 |
| 5. | Laboratory Testing | 5 |
| 6. | Geotechnical Design Recommendations | |
| | 6.01 General | 6 |
| | 6.02 Bridge Foundation Design Considerations | 6 |
| 7. | Construction Considerations | |
| | 7.01 General | 10 |
| 8. | Limitations of Recommendations | 11 |

| Section 2 – Illustrations | Sheet No. |
|---|---|
| Project Locus | 1 |
| Foundation Survey | 2 |
| Summary of Subsurface Explorations | 3 |
| Exploration Logs | 4 through 15 |
| Results of Laboratory Testing | 16 through 19 |
| Section 3 – Appendices | N/A |


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Section 1

# 1. INTRODUCTION

A subsurface investigation was completed for the proposed Interstate 95 Bridges. The bridge site is located on interstate I-95, approximately 0.4 km (0.2 miles) north of Old Belgrade Road and 0.4 km (0.3 miles) west of the proposed Eight Rod Road Bridge, as shown on Sheet 1, Project Locus. The proposed bridges are part of the Kennebec River Crossing Project, which includes roadways and bridges extending from Interstate 95 to Route 202/3.

The proposed Interstate 95 Bridges cross over northbound and southbound lanes of the Interstate generally between approximately Stations 10+354 and 10+485. We understand that the following are design data for the Interstate 95 Bridges:

- HS 25 loading
- Total superstructure width = 14.2 m fascia to fascia
- Two travel lanes at 3.6 m each
- Two shoulders at 2.4 m each
- Superstructure type - Weathered Steel Plate Girder at 3.2-m spacing

The bridges will be single span structures supported by stub abutments; the west bridge will be approximately 51.2 meters long and the east bridge will be approximately 48.4 meters long. An approximately 32-m long and 12-m high earthfill embankment will be provided in the I-95 median between the two bridges.

The proposed site is generally located in the I-95 right-of-way and median. Ground surface elevations vary from approximately El. 74 to El. 78. Elevations discussed in this report are in meters and are referenced to National Geodetic Vertical Datum (NGVD).

## 2. GEOLOGIC SETTING

Terrain – In general, ground surface topography in the vicinity of the proposed Interstate 95 Bridges is gently rolling. Construction of Interstate 95 created two earthfill embankments with a low-lying median between them. The ground surface to the east rises several meters.

Soils – "Surficial Geology of Maine," dated 1985, indicates that surficial soil conditions in the vicinity of the project site consist primarily of glacial marine deposits of the Presumpscot Formation.

Bedrock – "Bedrock Geology of Maine," dated 1985, indicates that bedrock in the vicinity of the site is described as granitic rocks commonly containing varying amounts of quartz and muscovite.

Groundwater – Groundwater is expected to be influenced by small drainage streams in the area. Regional drainage is expected to be toward the Kennebec River to the east.

## 3. SUBSURFACE EXPLORATIONS

A field exploration program was undertaken at the site to provide specific subsurface information for foundation analysis and design.

Maine Test Borings, Inc. of Brewer, Maine drilled a total of four borings (B5 through B8) in the vicinity of Interstate 95, during the period 15 through 19 May 2000. The boring locations were selected to determine the general subsurface conditions in the vicinity of the bridge abutments. As-drilled test boring locations and elevations were determined by MDOT and are shown on Sheet 2, Foundation Survey. A subsurface profile is also shown on Sheet 2, and a summary of subsurface conditions encountered in the four borings is shown on Sheet 3. Logs of the four borings are attached as Sheets 4 through 15.

The borings were drilled to depths ranging from approximately 10.0 m to 13.9 m below ground surface and were terminated after coring approximately 3 m of bedrock. Core runs C1 through C3 in B8 were drilled through glacial till, cobbles, and boulders. Soil samples were collected at approximately 1.6-m intervals using a standard split spoon sampler. Thin wall tube samples were taken in borings B5 and B8. NX size (2-in. diameter) bedrock core samples were obtained from each of the borings.

## 4. SUBSURFACE CONDITIONS

Subsurface conditions encountered in the test borings generally consist of three principal soil units overlying bedrock and beneath topsoil; FILL, MARINE DEPOSITS and GLACIAL TILL.

Fill - Fill was encountered in B5 and B6 and is described as loose brown silty fine SAND (SM) to medium stiff gray-brown mottled clayey SILT (ML/CL). Boring B6 encountered approximately 0.12 m of dense gray finely stratified fine sandy SILT (ML), trace organics, root fibers and wood fibers at the bottom of the fill unit, which is probably the former topsoil layer. The encountered thickness of the unit ranged from approximately 1.4 to 3.3 m.

Marine Deposits - The marine deposit generally consists of a stiff to very stiff brown silty CLAY (CL) to clayey SILT (ML\CL), with occasional to frequent fine sand partings. With depth the soil color changes to gray and the consistency to medium stiff. The encountered thickness of the marine deposits unit ranged from approximately 4.5 to 5.8 m, consisting of approximately 2 to 3.8 m of stiff weathered soil underlain by 0.9 to 2.5 m of softer gray silt and clay.

Glacial Till - The glacial till unit varies in composition and ranges from very stiff gray silty CLAY (CL/ML), with varying amounts of sand and gravel, to very dense brown gravelly coarse to fine SAND (SW), trace silt. A number of obstructions (likely cobbles and boulders) were encountered during drilling operations. An approximately 0.3-m thick boulder was cored in boring B5, and cobbles and boulders were also cored in B8. The encountered thickness of the unit ranged from approximately 1.3 to 4.5 m.

Bedrock - The bedrock observed in core samples recovered from B5 to B8 generally consists of hard to very hard fresh to moderately weathered white to gray fine-grained GRANITE. The borings penetrated from 1.5 m to 3.2 m into the bedrock.

Groundwater depths ranged from 0.0 to 1.7 meters below ground surface. However, groundwater levels were measured at the completion of drilling and do not represent stabilized groundwater levels. In addition, groundwater levels are expected to fluctuate with season, precipitation, temperature and construction activities in the area. Therefore, groundwater levels during and following construction will vary from those encountered in the explorations.

## 5. LABORATORY TESTING

Laboratory tests were performed on two thin-wall tube samples of the marine clay recovered from B5 and B8 (one from each boring). The primary purpose of the testing program was to evaluate the compressibility and stress history characteristics of the marine clay. Testing consisted of two one-dimensional consolidation tests and a variety of geotechnical index tests including water content determinations, Atterberg Limits, lab vane, torvane and pocket penetrometer. The tests were performed in the Haley & Aldrich laboratory in general accordance with standard ASTM procedures or equipment manufacturer's recommendations.

Results of laboratory testing are tabulated on Sheets 16 through 18. Test results are summarized in graphical form on Sheet 20, Atterberg Limits, Compressibility and Strength Data. Measured water contents ranged from about 29 to 39 percent, measured liquid limits ranged from about 36 to 41, and plastic limits from about 19 to 20. Measured saturated unit weights ranged from about 17.9 to 18.7 $kN/m^3$ (114 to 119 lbs. per cu. ft.). The undrained shear strength of the marine clay, based on the lab tests, ranged from about 30 to 50 kPa (620 to 1040 lbs. per sq. ft.).

The consolidation tests performed on the thin wall samples obtained from B5 and B8 indicate that the clays and silts are overconsolidated. The test results indicate that the maximum previous stress ($\sigma_{vm}$) for the samples is approximately 250 kPa (5,200 psf) in B5 and 200 kPa (4,200 psf) in B8. The approximate distribution of $\sigma_{vm}$ with depth is shown on Sheet 19 in relation to the predicted in-situ vertical effective stress ($\sigma_{vo}$). The overconsolidation ratio, OCR, calculated as the ratio $\sigma_{vm}/\sigma_{vo}$, ranged from greater than 5 (estimated) within the stiff upper olive-brown clayey silt, to about 3 near the bottom of the marine clay. The average compression ratio (CR) is about 0.17 and the average recompression ratio (RR) is about 0.006.

# 6. GEOTECHNICAL DESIGN RECOMMENDATIONS

## 6.01 General

Both of the Interstate 95 bridges will consist of single span structures supported on stub abutments. The bridges will carry two travel lanes to pass over Interstate 95. Approach embankments on the order of 11 m high will be required. The center fill area will contain a maximum of approximately 11.5 meters of fill. The test borings generally encountered from 4.5 to 5.8 m of marine silt and clay deposits overlying approximately 1.3 to 4.5 m of dense granular soils (glacial till) and eventually bedrock in the vicinity of the proposed bridge abutments.

A general discussion of the bridge foundation design recommendations is presented in the following paragraphs.

## 6.02 Bridge Foundation Design Considerations

Foundation Alternatives – An assessment of bridge foundation alternatives, including shallow earth-supported and deep (pile) foundations, was made.

An assessment of settlement of approach embankments was made. Fill will be required adjacent to the abutments, up to 11 m west of Interstate 95 and up to 10 m east of Interstate 95. Fill height in the median is approximately 11.5 m. These loads will cause consolidation settlement of the underlying marine clay stratum. However, the marine silts and clays in this area are heavily overconsolidated. We calculated that approach embankments would undergo settlement on the order of 40 mm (1½ in.) due primarily to consolidation of the marine soils under the weight of the approach embankment fill. Because the silts and clays are overconsolidated, we expect that most of this settlement would occur during embankment construction. If a staged construction schedule was established wherein the approach embankments could be constructed early in the contract period, most of the anticipated settlement could be forced to occur before the abutments were built. Post-construction settlements of the abutments could probably be limited to bridge-tolerable levels.

The MDOT Bridge Design Manual (January 1996, most recent revisions September 1998) page 700(48) states four limitations for use of spread footing abutments. The limitations are:

- Steel structure length: ≤ 24 m
- Concrete structure length: ≤ 42 m
- Abutment Heights: ≤ 2.4 m
- Skews: ≤ 25°

Since the bridge lengths will be 51.2 meters (west bridge) and 48.2 meters (east bridge), it appears that the site does not meet the criteria for spread footing abutments.

A variety of pile types were considered for support of the bridge including: steel H-section piles, concrete filled steel pipe piles and precast-prestressed concrete piles. Steel H-section piles were judged to be the most technically feasible and cost-effective pile alternative for the following reasons:

- Many pile driving contractors in Maine have experience installing the piles
- They are easy to splice

- The steel configuration results in a relatively high resistance to bending stresses
- They are required by the Department to support integral abutments

The following steel H-sections were evaluated:

HP 250x62 - 250 MPa and 345 MPa (36 and 50 ksi)
HP 310x79 - 250 MPa and 345 MPa (36 and 50 ksi)
HP 360x108 - 250 MPa and 345 MPa (36 and 50 ksi)
HP 360x132 - 250 MPa and 345 MPa (36 and 50 ksi)

The structural capacity of the steel H-section pile options were evaluated assuming a maximum allowable stress of 33 percent of the yield stress (applicable for axial loads for piles greater than 9 m in length and driven to practical refusal on/in bedrock). Since the piles will likely be driven to bedrock or refusal, the allowable axial structural capacity is equal to the allowable axial geotechnical capacity. The allowable design axial structural and geotechnical capacities for the various pile options are as follows:

| Pile Type | Steel Strength (MPa/ksi) | Allowable Axial Structural Capacity (kN) |
|---|---|---|
| HP 250x62 | 250 (36 ksi) | 666 |
| HP 250x62 | 345 (50 ksi) | 920 |
| HP 310x79 | 250 (36 ksi) | 833 |
| HP 310x79 | 345 (50 ksi) | 1,150 |
| HP 360x108 | 250 (36 ksi) | 1,150 |
| HP 360x108 | 345 (50 ksi) | 1,585 |
| HP 360x132 | 250 (36 ksi) | 1,400 |
| HP 360x132 | 345 (50 ksi) | 1,930 |

The piles should be driven to a practical refusal (minimum of 10 hammer blows with less than 12.5 mm penetration) with a hammer system capable of developing a specified minimum ultimate geotechnical capacity without damaging the pile. The recommended minimum ultimate geotechnical pile capacity for each pile section was developed by increasing the structural capacity by a geotechnical factor of safety of 2.25 (assumes subsurface explorations, static capacity calculations, wave equation analyses and dynamic pile testing and monitoring). The resulting minimum ultimate geotechnical capacity for each pile section is as follows:

| Pile Type | Steel Strength (MPa/ksi) | Ultimate Axial Geotechnical Capacity (kN) |
|---|---|---|
| HP 250x62 | 250 (36 ksi) | 1,500 |
| HP 250x62 | 345 (50 ksi) | 2,070 |
| HP 310x79 | 250 (36 ksi) | 1,875 |
| HP 310x79 | 345 (50 ksi) | 2,585 |
| HP 360x108 | 250 (36 ksi) | 2,585 |
| HP 360x108 | 345 (50 ksi) | 3,565 |
| HP 360x132 | 250 (36 ksi | 3,150 |
| HP 360x132 | 345 (50 ksi) | 4,340 |

Wave equation analyses were conducted on these pile sections with hammer systems with rated energies ranging from approximately 24 to 100 kJ (18 to 74 ft-kip). The results of the analyses confirm that there are hammer systems available that are capable of driving these pile sections to the required minimum ultimate geotechnical capacities without damaging the piles.

All of the piles should be fitted with cast steel driving shoes to protect the pile tips from damage when driving into bedrock.

We anticipate that piles will encounter bedrock at approximately El. 65 for the west abutment of the west bridge. Piles driven for the other three abutments will likely encounter bedrock at El. 68 to 69. Therefore, pile lengths will likely be on the order of 17 to 20 m. It should be noted that the piles could potentially achieve the required penetration resistance within the glacial till stratum, particularly if cobbles or boulders are encountered, or on bedrock. Therefore, pile lengths should be expected to vary. Reference should be made to Sheet 2 and the test boring logs for subsurface conditions at the proposed structure locations.

Load Testing and Dynamic Monitoring – A geotechnical factor of safety of 2.25 was used for evaluation of the piles. We recommend that two of the piles be dynamically monitored during installation in accordance with AASHTO Table 4.5.6.2A. Dynamic monitoring should be performed at the start of production pile driving.

Lateral Loading – Lateral loads may be reacted using battered piles. We recommend that the pile batter be no flatter than 1 horizontal to 4 vertical (1H:4V).

Lateral Earth Pressures – We understand that the abutments will be designed as unrestrained retaining walls, free to rotate at the top (i.e., an active earth pressure condition). In our opinion, the lateral earth pressures given in Section 700.I of the Bridge Design Manual are appropriate (equivalent fluid unit weight of 5.7 $kN/m^3$). We recommend that the parameters for soil type No. 4 in Table I (phi = 32 degrees, soil unit weight = 19.6 $kN/m^3$) be assumed. The lateral earth pressure resulting from construction or surcharge loads should be accounted for in accordance with Section 700.F. If the abutments are designed with approach slabs, the surcharge load may be neglected.

Drainage – It is our opinion that the use of the design considerations for drainage of fill behind structures given in Section 700.B will allow adequate drainage of backfill behind the abutments. We recommend that soil backfill placed within 3000 mm of the back of the abutments consist of Granular Borrow for Underwater Backfill, MDOT Specification 703.19 (i.e., no more than 10 percent by weight passing the No. 200 sieve).

Negative Skin Friction – Consolidation of the clay stratum may be sufficient to mobilize negative skin friction (downdrag) on piles installed through the embankment fill and underlying marine silt and clay deposits. However, we anticipate that downdrag loads can be eliminated by driving piles at some time after embankment construction, to allow consolidation of the clay stratum. The clay layer is thin and the clay layer is overconsolidated, therefore we anticipate that most of the ground surface settlement should occur within several weeks after embankment construction.

Lateral Squeeze – Lateral squeeze is not expected to be a problem at the Interstate 95 Bridges since vertical settlements are expected to be on the order of 30 mm, most of which should take place during construction of the embankments.

Embankment Stability – Global stability of the west abutment was assessed using the preliminary bridge and embankment configuration and subsurface information discussed in this report. The calculated factor of safety for a rotational shear failure of a 9.5-m high west embankment on the order of 1.7. The factor of safety for the 11.5-m high median embankment is approximately 1.6. Therefore, embankment stability is not considered to be a issue at the Interstate 95 Bridge site.

Seismic Design Considerations – It is understood that the bridges will be designed for Seismic Performance Category B (SPC B) since it will be a part of the National Highway System (NHS). A site coefficient (S) of 1.0 should be used. AASHTO Bridge Design Specifications (1996) indicate that SPC B abutments be designed using the Mononobe-Okabe analysis, which assumes that the abutment is free to yield. However, if the abutment is restrained against lateral movements, the peak ground acceleration should be multiplied by 1.5.

The soils at the site are not considered to be liquefaction-susceptible.

Abutments – It is understood that stub abutments will be used for this project. The superstructure type will be weathered steel plate girder at 3.2-m spacing. There are no known site or subsurface conditions present that would preclude the use of stub abutments.

Since stub abutments are being used on the project the balance of the retained height can be accommodated by using protected earth slopes (concrete faced 1-3/4:1 slope). The bottom of the stub abutments should be designed for frost depth in accordance with page 700(1), Section A of the Bridge Design Manual.

Embankment Construction Considerations – Roadway embankments will be required as part of the bridge project. The embankments could be on the order of 11-m high at the bridge abutment locations. We anticipate that the embankments will settle as much as 40 mm due to a recompression of the underlying overconsolidated marine silt and clay soils. The settlement will occur relatively rapidly during embankment construction. We do not believe that post-construction settlement will be significant.

Bridge approach slabs are recommended.

## 7. CONSTRUCTION CONSIDERATIONS

### 7.01 General

Construction of the I-95 Bridges will involve construction of earthfill approach embankments and deep foundations to support the bridges. All of the construction activities will occur at or near existing site grade; no substantial excavations are anticipated. The borings drilled in the vicinity of the bridges did not encounter material other than topsoil that would have to be removed before embankment construction could commence.

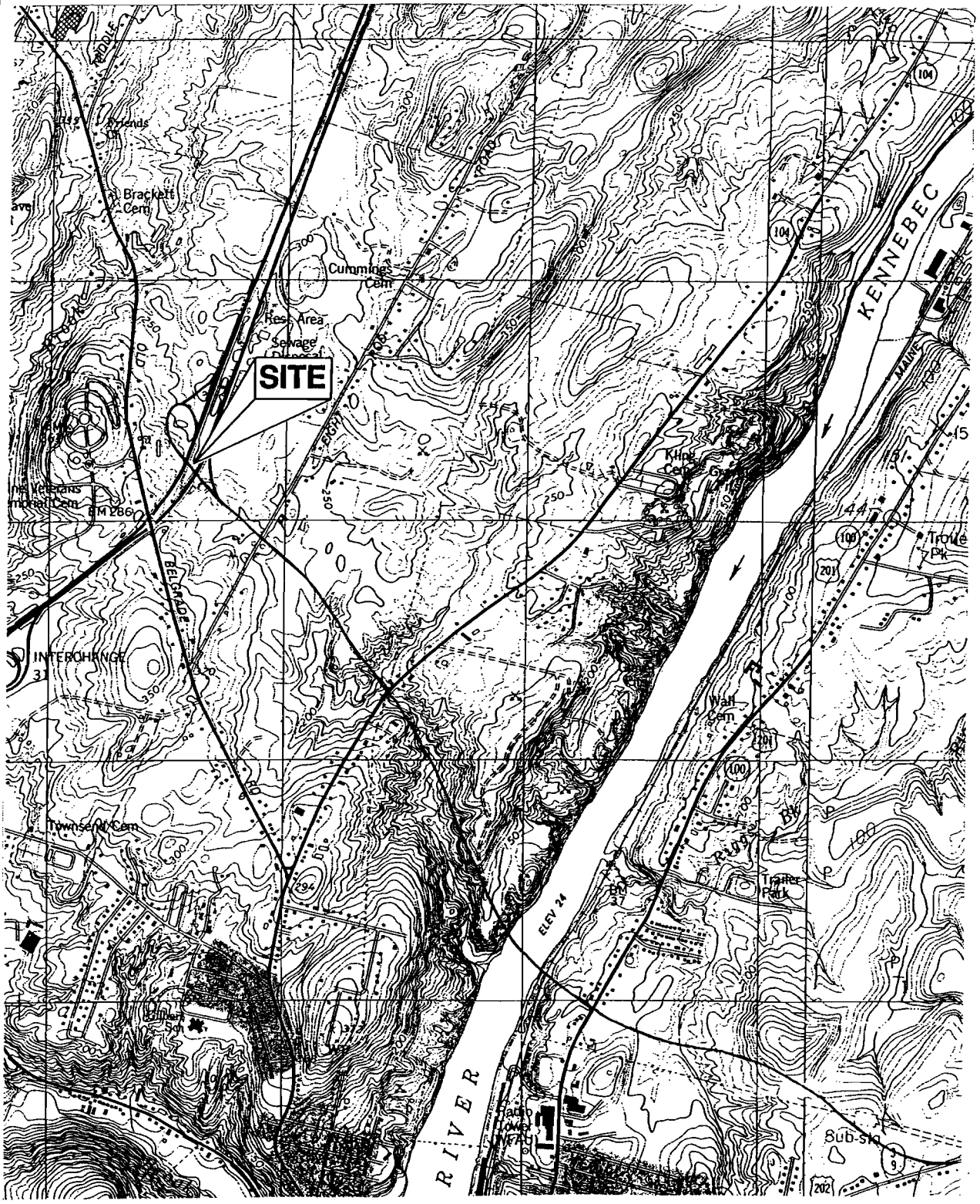
Foundation piles will be driven through embankment materials, marine silt and clay deposits and dense glacial till soils to refusal on/in bedrock. Based on the conditions encountered in the test borings, it is likely that there are cobble and/or boulder-sized rock fragments in the glacial till. Steel H-section piles should be provided with driving shoes to protect the pile tips from damage when driving through the glacial till and to/into the bedrock.

## 8. LIMITATIONS OF RECOMMENDATIONS

This report has been prepared for specific application to the Interstate 95 Bridge project in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

The recommendations presented herein are based, in part, on the information on subsurface conditions and proposed construction details described herein. We request that Haley & Aldrich be provided the opportunity for a general review of the design and specifications, in order to determine that our earthwork and foundation recommendations have been interpreted as they were intended. In particular, we should review the applicability of our recommendations.

Section 2




SITE COORDINATES: N44°21'12",W69°46'57"

-N-

MAINE

U.S.G.S. QUADRANGLE: AUGUSTA, MAINE

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

INTERSTATE 95 BRIDGE
KENNEBEC RIVER CROSSING PROJECT
AUGUSTA, MAINE

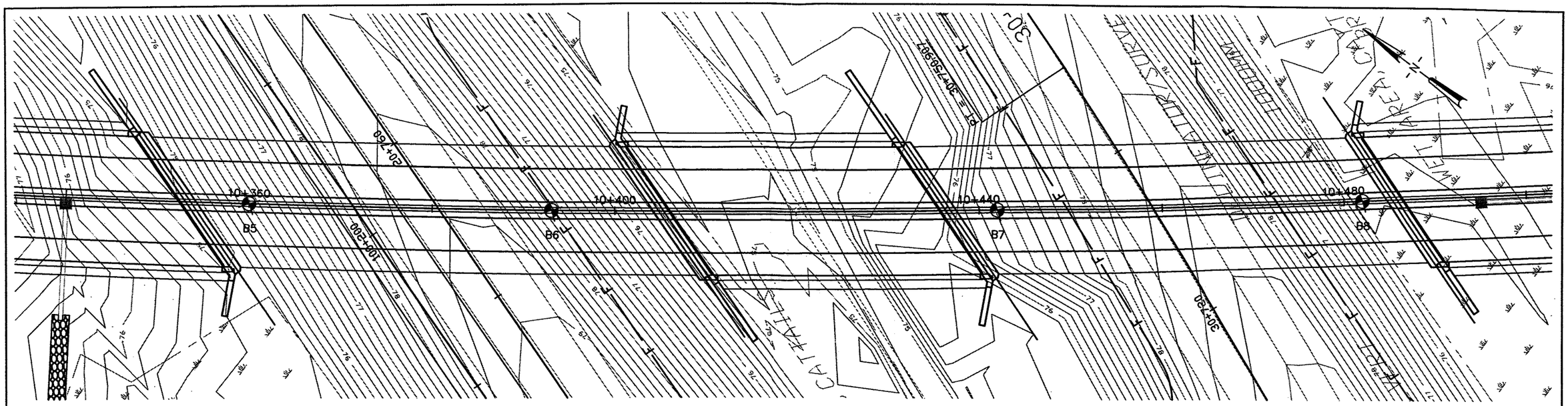
PROJECT LOCUS

APPROX. SCALE: 1 in.= 2,000 ft.

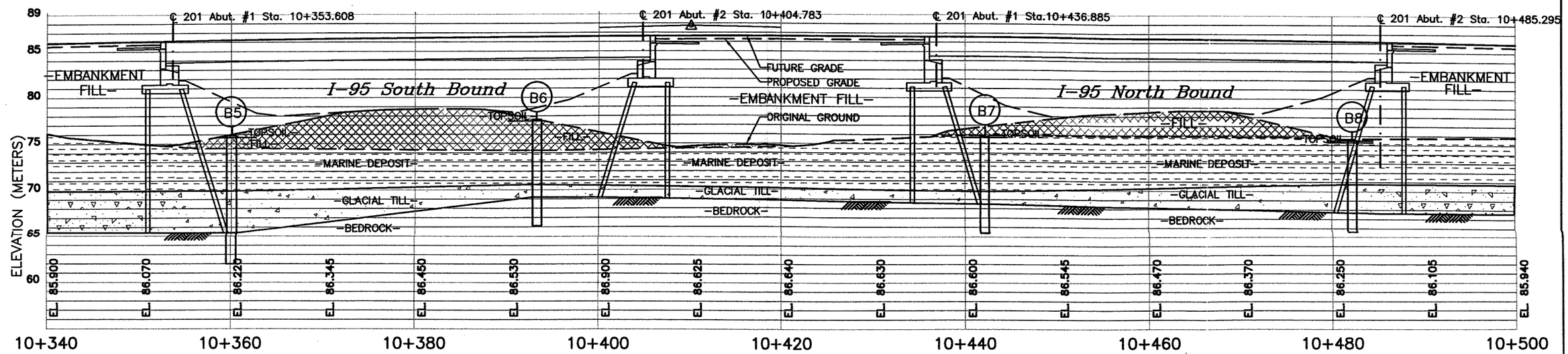
APRIL 2003

FILE NO. 80765-004

SHEET 1




PLAN




PROFILE

5 0 5 10
SCALE IN METERS

PROFILE KEY/GEOLOGIC UNITS

FILL–PRIMARILY REWORKED NATURAL SOILS

MARINE DEPOSITS–PRIMARILY SILT AND CLAY, WITH OCCASIONAL LENSES OR LAYERS OF SILTY SAND

GLACIAL TILL DEPOSITS– HETEROGENEOUS MIX OF GRAVEL, SAND, SILT AND CLAY

BEDROCK SURFACE– INTERPOLATED OR EXTRAPOLATED FROM BEDROCK CORES, REFUSALS OR JUDGEMENT

NOTES:

1. BASE PLAN PROVIDED BY HNTB CORPORATION AND MODIFIED BY HALEY & ALDRICH, INC. TO INCLUDE SUBSURFACE INFORMATION.

2. BORINGS WERE DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE DURING THE PERIOD 15 THROUGH 19 MAY 2000.

3. EXPLORATIONS WERE MONITORED BY HALEY & ALDRICH, INC. PERSONNEL.

4. LOCATIONS AND ELEVATIONS OF BORINGS WERE DETERMINED IN THE FIELD BY MAINE DEPARTMENT OF TRANSPORTATION.

LEGEND:

B5 DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

KENNEBEC RIVER CROSSING PROJECT
I95 BRIDGE, PIN 000556.20
AUGUSTA, MAINE

FOUNDATION SURVEY

SCALE: AS SHOWN

APRIL 2003

FILE NO. 80765-004

SHEET 2

**SHEET 3**
**SUMMARY OF SUBSURFACE CONDITIONS**
**INTERSTATE 95 BRIDGE**
**AUGUSTA RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m) | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Alluvial Deposits | Fluvial Deposits | Marine Deposits | Glacial Till | Bedrock |
| B5 | 10+360 | CL | 75.90 | 13.90 | 0.61 | 0.12 | 1.25 | -- | -- | 4.57 | 4.55 | 3.41* |
| B6 | 10+393 | CL | 77.60 | 11.52 | 1.71 | 0.15 | 3.32 | -- | -- | 3.54 | 1.37 | 3.14* |
| B7 | 10+442 | CL | 75.80 | 10.30 | 0.00 | 0.12 | -- | -- | -- | 5.79 | 1.34 | 3.11* |
| B8 | 10+482 | CL | 75.60 | 10.00 | 0.00 | 0.18 | -- | -- | -- | 4.61 | 3.07 | 2.13* |

Notes:
-- Not encountered in exploration.
* Depth of penetration into stratum in exploration (does not necessarily represent full depth of deposit).
1. Elevations referenced to National Geodetic Vertical Datum (NGVD).

HALEY & ALDRICH, INC. 17 April 03

G:\PROJECTS\80765\REPORTS\I95Sheet3.DOC

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B5**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+360, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HW | SS | NX |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES

RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.; NW Casing from 7.22-10.49m.

ELEVATION 75.90
DATUM NGVD
START 17 May 2000
FINISH 17 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 75.77 | Loose, dark brown loamy fine sandy SILT, |
| | | 2 | 38 | 0.61 | 0.12 | trace roots |
| | | 4 | | | | -TOPSOIL- |
| | | 4 | | | | Loose, brown silty fine SAND |
| | | | | | | -FILL- |
| 1.0 | | | | | 74.52 | |
| | | | | | 1.37 | Medium stiff, gray clayey SILT |
| | | 4 | S2 | 1.52 | 74.34 | Stiff, gray-brown mottled clayey SILT, |
| | 12 | 5 | 41 | 2.13 | 1.55 | frequent fine sand partings |
| | | 10 | | | | |
| 2.0 | 19 | 11 | | | | -MARINE DEPOSIT- |
| | 27 | | | | | |
| | 22 | | | | | |
| | 24 | | | | | |
| 3.0 | | 4 | S3 | 3.05 | | Medium stiff, gray-brown finely stratified |
| | 14 | 3 | 61 | 3.66 | | clayey SILT and silty CLAY layers, |
| | | 3 | | | | occasional fine sand partings |
| | 12 | 2 | | | | |
| | 14 | | | | | -MARINE DEPOSIT- |
| 4.0 | | | | | | |
| | 14 | | | | | |
| | 14 | | | | | |
| | | PUSH | U1 | 4.57 | | Medium stiff to stiff, gray silty CLAY, |
| | 22 | | 61 | 5.18 | | trace fine sand |
| 5.0 | 14 | | | | | |
| | 17 | | | | | |
| | 18 | | | | | |
| | | | | | 69.95 | |
| 6.0 | 109 | | | | 5.94 | Very stiff, gray silty CLAY, little coarse |
| | | 14 | S4 | 6.10 | | to fine angular gravel, trace coarse to fine |
| | 17 | 13 | 41 | 6.71 | | sand with occasional fine sand partings |
| | | 13 | | | | |
| | 45 | 33 | | | | -GLACIAL TILL- |
| | 94 | | | | | |
| 7.0 | | | | | | |
| | 265 | | | | 68.67 | |
| | | | | | 7.22 | Note: Cored through boulder, then continued |
| | 207/.3 | | | | 68.34 | boring with 8cm. casing |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/17/00 | 0709 | 0.2 | | 1.52 | 0.79 |
| 5/17/00 | 1740 | 10.5 | 10.58 | 13.90 | 0.61 |
| 5/17/00 | 1811 | 11.0 | 0.00 | 7.77 | 0.61 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 10.49 |
| ROCK CORED (M) | 3.23 |
| SAMPLES | 4S, 1U, 3C |

H&A **METRIC LOG**

M_PORHA 80765-000

Sheet 4

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B5
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | - | | | | 7.56 | Note: Advanced roller bit to 9.14m. Washed through many cobbles and boulders and advanced casing to 9.14m. |
| 8.0 | - | | | | | |
| | 44 | | | | | |
| | 32 | | | | | |
| 9.0 | 34 | | | | | |
| | 7 | 31<br>35<br>36 | S5<br>18 | 9.14<br>9.60 | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| | 27 | | | | | -GLACIAL TILL- |
| 10.0 | 64 | | | | | |
| | 36 | | | | | |
| | 115/.7 | | | | 65.41<br>10.49 | Top of Bedrock at 10.49m.<br>See Core Boring Report |

M_PORHA 80765-000

H&A METRIC LOG

Sheet 5

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B5
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Top of Bedrock at 10.49m.<br>Advanced roller bit to 10.67<br>Begin NX rock core |
| 10.0 | | | | | | | 65.4<br>10.5 | |
| | 1.5 | C1 | 10.7<br>11.7 | 1.1<br>0.5 | 100<br>43 | Fr.-Mod. | | C1: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is low angle, extremely close to moderate, rough, undulating, discolored, open. Secondary joint set is high angle, extremely close to moderate, rough, stepped and undulating, tight, discolored. |
| 11.0 | 1 | | | | | | | |
| | 1 | | | | | | | |
| | 2 | C2 | 11.7<br>12.4 | 0.7<br>0.5 | 100<br>71 | Fr.-Mod. | | C2: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is high angle and low angle, very close to wide, rough, undulating, tight to open, discolored. |
| 12.0 | 1 | | | | | | | |
| | 2 | C3 | 12.4<br>13.9 | 1.5<br>1.3 | 100<br>86 | Fr.-Sl. | | C3: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is low angle, very close to moderate, rough, undulating, discolored, tight to open. |
| | 2 | | | | | | | |
| 13.0 | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 1 | | | | | | 62.0<br>13.9 | Bottom of Exploration at 13.90m. |

METRIC

80765-000

Sheet 6

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B6**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+393, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HW | SS | NX |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES

RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 77.60
DATUM NGVD
START 15 May 2000
FINISH 16 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 2 4 7 | S1 33 | 0.00 0.61 | 77.45 0.15 | Loose, dark brown loamy coarse to fine sandy SILT, roots -TOPSOIL- |
| | | | | | | Loose, brown silty fine SAND, trace roots -FILL- |
| 1.0 | | | | | | |
| | 12 | 3 7 4 3 | S2 43 | 1.52 2.13 | 75.71 1.89 | Loose, brown silty fine SAND |
| 2.0 | 11 | | | | | Medium stiff, brown-gray mottled clayey SILT -FILL- |
| | 6 11 14 | | | | | |
| 3.0 | 17 44 | 3 4 15 16 | S3 48 | 3.05 3.66 | 74.25 3.35 | |
| | | | | | 74.13 3.47 | Dense, gray finely stratified fine sandy SILT, trace organics, root fibers from 3.35m.-3.44m.(Probable former topsoil) Wood from 3.44m-3.47m. |
| 4.0 | 49 40 28 | | | | | |
| | 32 46 | 3 4 6 7 | S4 61 | 4.57 5.18 | 72.91 4.69 | Medium stiff, gray clayey SILT Stiff, brown(slightly mottled to gray) clayey SILT -MARINE DEPOSIT- |
| 5.0 | 47 48 43 | | | | | |
| 6.0 | 27 45 | WOH WOH 1 7 | S5 61 | 6.10 6.71 | 71.48 6.13 | Medium stiff gray silty CLAY -MARINE DEPOSIT- |
| 7.0 | 91 220 137 | | | | 70.59 7.01 | -GLACIAL TILL- |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/16/00 | 0815 | 0.50 | 8.47 | 11.52 | 1.77 |
| 5/16/00 | 0830 | 0.75 | | 8.08 | 1.71 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 8.47 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 6S, 2C |

H&A **METRIC LOG**

M_PORHA 80765-000

Sheet 7

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B6
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 25 | S6 | 7.62 | | Very stiff, gray clayey SILT, little gravel |
| | | 37 | 10 | 8.23 | 69.68 | |
| 8.0 | | 33 | | | 7.92 | -GLACIAL TILL- |
| | | 16 | | | | Very dense, brown-tan gravelly coarse to |
| | | | | | 69.22 | fine SAND |
| | | | | | 8.38 | Top of Bedrock at 8.38m. |
| | | | | | | Advanced roller bit into rock to 8.47m. |
| | | | | | | See Core Boring Report |

M_PORHA 80765-000

H&A METRIC LOG

Sheet 8

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B6
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATH-ERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 7.0 | | | | | | | | |
| 8.0 | | | | | | | | Top of Bedrock at 8.38m. Advanced roller bit to 8.47m. |
| | | | | | | | 69.2 | Begin NX rock core |
| | | | | | | | 8.4 | |
| | | C1 | 8.5 / 10.0 | 1.5 / 1.0 | 100 / 64 | Fr.-Sl. | | C1: Very hard to hard, fresh to slightly weathered white to gray fine grained GRANITE. Primary joint set is low angle, extremely close to moderate, rough, undulating to planar, fresh to discolored, tight to open. Secondary joint set is high angle, extremely close to moderate, rough, planar, fresh to discolored, tight to open. |
| | 3 | | | | | | | |
| 9.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| 10.0 | | C2 | 10.0 / 11.5 | 1.4 / 1.2 | 92 / 78 | Fr.-Sl. | | C2: Very hard to hard, fresh to slightly weathered white to gray fine grained GRANITE. Primary joint set is low angle to moderately dipping, very close to wide, rough, planar to undulating, fresh to discolored, tight to open. |
| | 2 | | | | | | | |
| | 1.5 | | | | | | | |
| | 1.5 | | | | | | | |
| 11.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | | | | | | | 66.1 | |
| | | | | | | | 11.5 | Bottom of Exploration at 11.52m. |

METRIC

80765-000

Sheet 9

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B7**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+442, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HW | SS | NX |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES

RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 75.80
DATUM NGVD
START 16 May 2000
FINISH 16 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 2 3 4 4 | S1 28 | 0.00 0.61 | 75.68 0.12 | Loose dark brown fine sandy SILT, trace roots, gravel -TOPSOIL- |
| | | | | | | Medium stiff, brown mottled clayey SILT -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | 42 | 5 5 8 13 | S2 48 | 1.52 2.13 | 73.91 1.89 | Stiff, brown mottled clayey SILT |
| 2.0 | 47 | | | | 73.67 2.13 | Medium dense, brown-gray mottled fine sandy SILT |
| | 44 | | | | | |
| | 40 | | | | | |
| | 40 | | | | | |
| 3.0 | 46 | 3 5 6 5 | S3 51 | 3.05 3.66 | | Stiff, brown (slightly mottled to gray) clayey SILT -MARINE DEPOSIT- |
| | 50 | | | | | |
| | 42 | | | | 71.84 3.96 | |
| 4.0 | 36 | | | | | |
| | 35 | | | | | |
| | 42 | WOH WOH WOH WOH | S4 61 | 4.57 5.18 | | Medium stiff, gray silty CLAY -MARINE DEPOSIT- |
| 5.0 | 38 | | | | | |
| | 36 | | | | | |
| | 50 | | | | 69.89 5.91 | |
| 6.0 | 72 | | | | | |
| | 10 | 16 54 52 30 | S5 15 | 6.10 6.71 | | Very dense, gray coarse to fine SAND, some silt -GLACIAL TILL- |
| | 18 | | | | | |
| | 54 | | | | | |
| 7.0 | 109/.9 | | | | 68.55 7.25 | Note: Washed ahead of casing through Till to 7.25m. Advanced roller bit through probable |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/16/00 | 1500 | 0.25 | 7.28 | 10.36 | 0.15 |
| 5/16/00 | 1500 | 0.50 | | 6.00 | 0.00 |

Artesian

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 7.25 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 5S, 4C |

H&A **METRIC LOG**

M_PORHA 80765-000

Sheet 10

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B7
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | | | | | Bedrock from 7.25m-7.28m.<br>Top of Bedrock at 7.25m.<br>See Core Boring Report |

H&A METRIC LOG

M_PORHA 80765-000

Sheet 11

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B7
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 5.0 | | | | | | | | |
| 6.0 | | | | | | | | Top of Bedrock at 7.25m.<br>Advanced roller bit to 7.32m.<br>Begin NX rock core |
| 7.0 | | | | | | | 68.5<br>7.3 | |
| | 3 | C1 | 7.3<br>7.7 | 0.4<br>0.0 | 100<br>0 | Fr. | | C1: Very hard to hard, fresh to slightly weathered, white to gray fine grained GRANITE. Primary joint set is low angle, very close to close, rough, undulating, fresh, tight to open. |
| | 3 | C2 | 7.7<br>9.1 | 1.4<br>0.4 | 100<br>29 | Fr.-Sl. | | C2: Very hard to hard, fresh to slightly weathered, white to gray fine grained GRANITE. Primary joint set is low angle to moderately dipping, extremely close to close, rough, undulating and planar, discolored, tight to open. Secondary joint set is high angle, undulating, smooth to rough, discolored, tight. |
| 8.0 | 1.5 | | | | | | | |
| | 2 | | | | | | | |
| | 3 | | | | | | | |
| 9.0 | 2 | | | | | | | |
| | 3 | C3 | 9.1<br>9.7 | 0.5<br>0.1 | 96<br>18 | Fr.-Sl. | | C3: Same lithology as C2. Primary joint set is low angle, extremely close to very close, planar to undulating, rough, discolored, tight to open. Secondary joint set is high angle, rough, undulating, discolored, tight. |
| | 2 | C4 | 9.7<br>10.4 | 0.6<br>0.6 | 89<br>78 | Fr.-Sl. | | C4: Same lithology as C2. Primary joint set is low angle, close to moderate, rough, undulating, discolored, tight. |
| 10.0 | 4 | | | | | | | |
| | 1.5 | | | | | | 65.4<br>10.4 | Bottom of Exploration at 10.36m. |

METRIC

80765-000

Sheet 12

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B8**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+482, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HW | SS | NX |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES

RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 75.59
DATUM NGVD
START 19 May 2000
FINISH 19 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 75.50 | Water |
| | | 1 | S1 | 0.09 | 0.09 | Very loose, dark brown fine sandy SILT, |
| | | 1 | 41 | 0.70 | 75.32 | roots |
| | | 3 | | | 0.27 | |
| | | 4 | | | 74.89 | -TOPSOIL- |
| | | | | | 0.70 | Loose, brown to gray silty fine SAND |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | | 4 | S2 | 1.52 | | Stiff, brown mottled clayey SILT, frequent |
| | 12 | 5 | 61 | 2.13 | | fine sand partings and layers |
| | | 6 | | | | |
| 2.0 | 15 | 7 | | | | |
| | 9 | | | | 73.30 | |
| | | | | | 2.29 | |
| | 9 | | | | | |
| | 10 | | | | | |
| 3.0 | | | | | | |
| | 16 | Push | U1 | 3.05 | | Medium stiff to stiff, gray silty CLAY |
| | | | 61 | 3.66 | | |
| | 15 | | | | | -MARINE DEPOSIT- |
| | 17 | | | | | |
| 4.0 | | | | | | |
| | 16 | | | | | |
| | 12 | | | | | |
| | 53 | WOH | S3 | 4.57 | 70.81 | Medium stiff to stiff, gray silty CLAY |
| | | 12 | 38 | 5.18 | 4.79 | Dense, gray silty coarse to fine SAND, |
| 5.0 | 218 | 31 | | | | little gravel, trace clay |
| | | 44 | | | | |
| | 99 | | | | | -GLACIAL TILL- |
| | 95 | | C1 | 5.64 | | Cored through Glacial Till, cobbles and |
| | | | 84 | 6.64 | | boulders from 5.64m. to 7.86m. |
| 6.0 | 136 | | | | | |
| | | | C2 | 6.64 | | |
| | | | 46 | 7.47 | | |
| 7.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/19/00 | | | 5.49 | 10.00 | 0.00 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 7.86 |
| ROCK CORED (M) | 4.36 |
| SAMPLES | 3S,1U,4C |

H&A **METRIC LOG**

M_PORHA 80765-000

Sheet 13

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B8
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | | C3 56 | 7.47 7.86 | 67.73 7.86 | Top of Bedrock at 7.86m. Advanced roller bit to 8.47m. See Core Boring Report |

H&A METRIC LOG

M_PORHA 80765-000

Sheet 14

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B8
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 7.0 | | | | | | | | Top of Bedrock at 7.86m. Advanced roller bit to 8.47m. Begin NX rock core |
| | 3 | | | | | | 67.7 7.9 | |
| 8.0 | 2 | | | | | | | |
| | 3 | | | | | | | |
| | | C4 | 8.5 | 1.3 | 83 | | | Very hard, fresh, gray fine grained GRANITE. Primary joint set is low angle, very close to moderate, rough, undulating and planar, fresh, open. No secondary joint set. |
| | 2 | | 10.0 | 1.2 | 80 | | | |
| 9.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | 65.6 10.0 | Bottom of Exploration at 10.0m. |

METRIC

80765-000

Sheet 15

# GEOTECHNICAL LABORATORY SOIL TEST RESULTS - TUBE SAMPLES

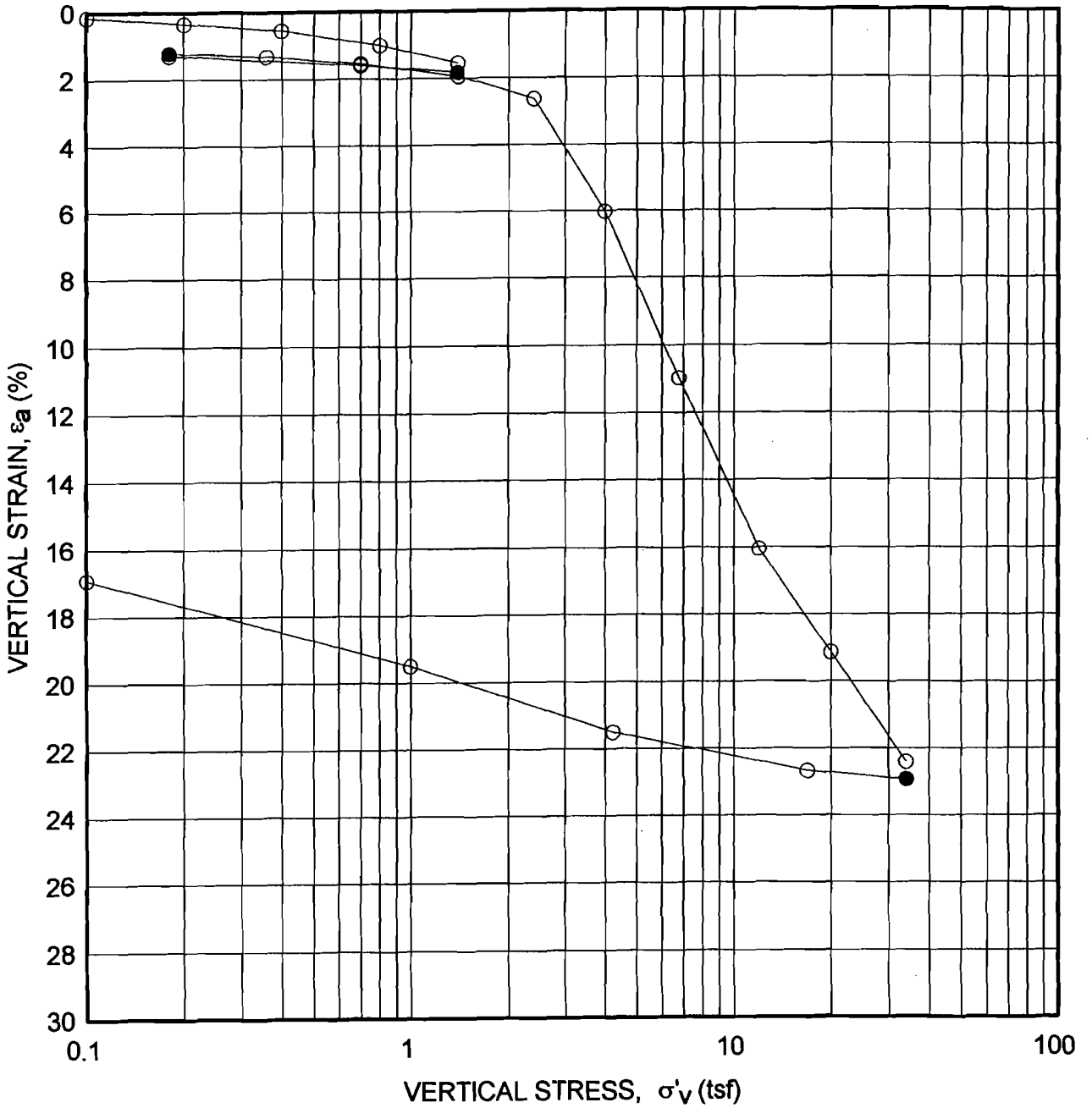
**Proposed Augusta Bypass Project**
**Augusta, ME**



| Test | Description | USCS | Depth (ft) | Test No. | Nat. Water Cont. (%) | Atterberg Limits (%) Liq. Limit Wl | Plas. Limit Wp | Plas. Index Ip | Index Value (tsf) Tor-vane | Shear Vane | Rem. Shear Vane | Pkt Pen. PP/2 | Stress History Precons Press (tsf) / Test Qual | CR / RR | Total Unit Wt. (pcf) | Undr. Shear Str. cu (tsf) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Boring:** | **B05** | | | | | | | | | | | | | | | | |
| **Sample:** | **U01** | | | | | | | | | | | | | | | | |
| **Depth (ft):** | **15.0 to 17.0** | | | | | | | | | | | | | | | | |
| **Recovery (in.):** | **24.25** | | | | | | | | | | | | | | | | |
| Description | Stiff gray silty CLAY | CL | 16.5 | | | | | | | | | | | | | | |
| Tube Extrusion | | | 16.5 | | 34.9 | | | | 0.52 | | | 0.50 | | | 114.29 | | |
| Tube Extrusion | | | 16.6 | | 38.4 | | | | 0.51 | | | 0.43 | | | | | |
| Atterberg Limit | | | 16.8 | | 37.2 | 40.7 | 18.5 | 22.2 | | | | | | | | | |
| Consolidation | | | 16.8 | OED001 | 38.9 | | | | | | | | 2.6 | 0.140 | 114.60 | | |
| | | | | | | | | | | | | | Fair | 0.007 | | | |
| Tube Extrusion | | | 16.9 | | 33.8 | | | | 0.50 | 0.43 | 0.12 | 0.37 | | | | | |
| **Boring:** | **B08** | | | | | | | | | | | | | | | | |
| **Sample:** | **U01** | | | | | | | | | | | | | | | | |
| **Depth (ft):** | **10.0 to 12.0** | | | | | | | | | | | | | | | | |
| **Recovery (in.):** | **23.75** | | | | | | | | | | | | | | | | |
| Description | Medium stiff gray silty CLAY | CL | 11.5 | | | | | | | | | | | | | | |
| Tube Extrusion | | | 11.5 | | 30.2 | | | | 0.52 | | | 0.44 | | | 119.45 | | |
| Tube Extrusion | | | 11.6 | | 32.5 | | | | 0.45 | | | 0.36 | | | | | |
| Atterberg Limit | | | 11.8 | | 29.2 | 35.8 | 19.6 | 16.2 | | | | | | | | | |
| Consolidation | | | 11.8 | OED002 | 34.0 | | | | | | | | 2.1 | 0.129 | 119.00 | | |
| | | | | | | | | | | | | | Good | 0.005 | | | |
| Tube Extrusion | | | 11.9 | | 32.0 | | | | 0.50 | 0.42 | 0.11 | 0.31 | | | | | |



Sheet 16




Boring No. : **B05**
Sample No. : **U01**
Depth (ft) : **16.75**

Test No. : **OED01**

Atterberg Limits (%)

Wl : 40.7
Wp : 18.5
Ip : 22.2

Sample Description : Stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial : | 38.8 | 1.178 |
| Final : | 28.6 | 0.824 |

Preconsolidation Pressure (tsf) : 2.6
Compression Ratio, CR : 0.140
Recompression Ratio, RR : 0.007

6 July 2000 ; J:\OED\80765000\OED01\0770OD.WB2

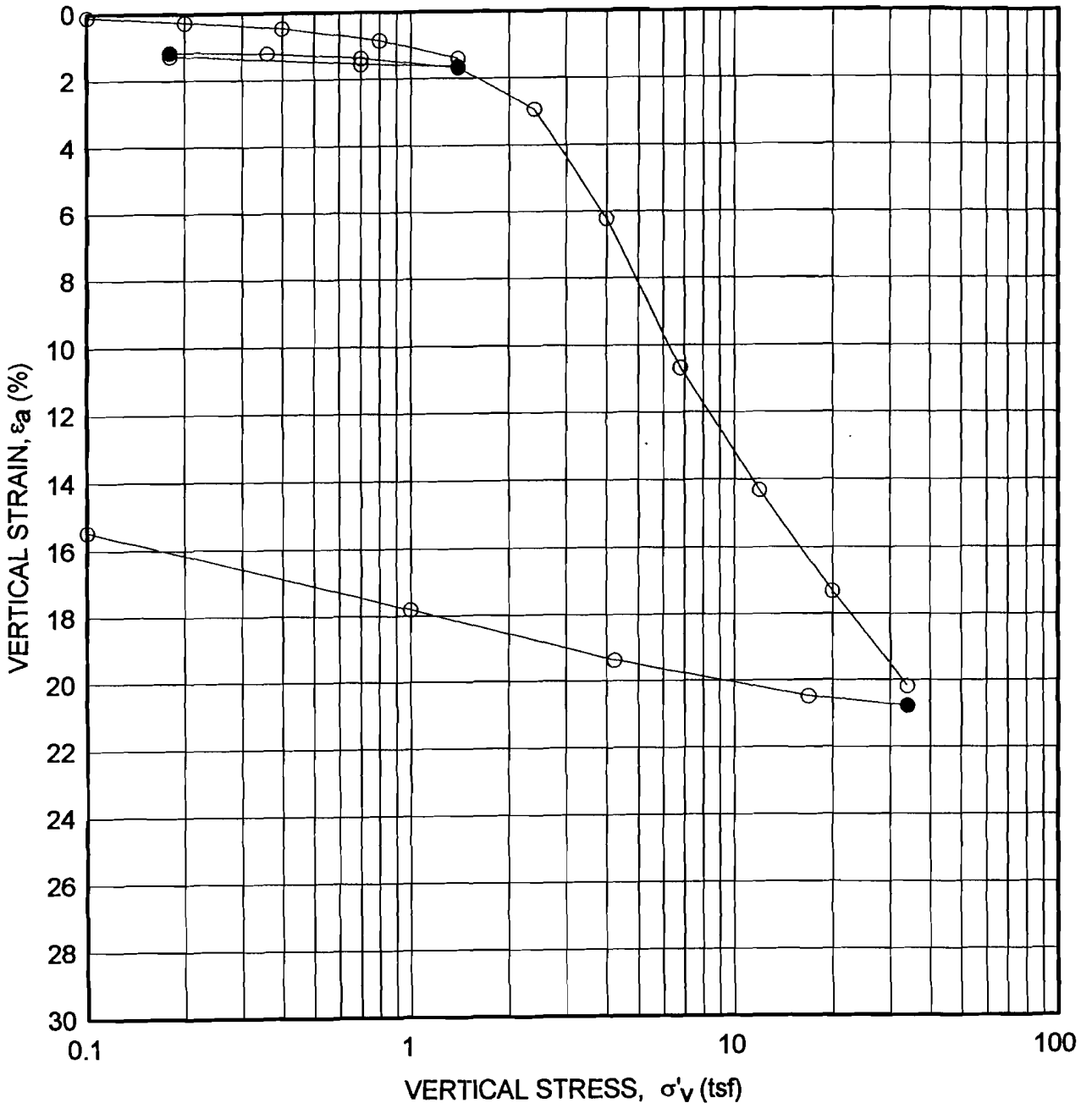
HALEY & ALDRICH, INC.

Augusta River Crossing Project
Augusta, Maine

**CONSOLIDATION TEST**

FILE NO. 80765-000 MAY, 2000

Sheet 17




Boring No. : **B08**
Sample No. : **U01**
Depth (ft) : **11.75**

Test No. : **OED02**

Atterberg Limits (%)

Wl : 35.8
Wp : 19.6
Ip : 16.2

Sample Description : Stiff to medium stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial : | 34.0 | 1.044 |
| Final : | 25.5 | 0.741 |

Preconsolidation Pressure (tsf) : 2.1
Compression Ratio, CR : 0.129
Recompression Ratio, RR : 0.005

6 July 2000 ; J:\OED\80765000\OED02\0771OD.WB2

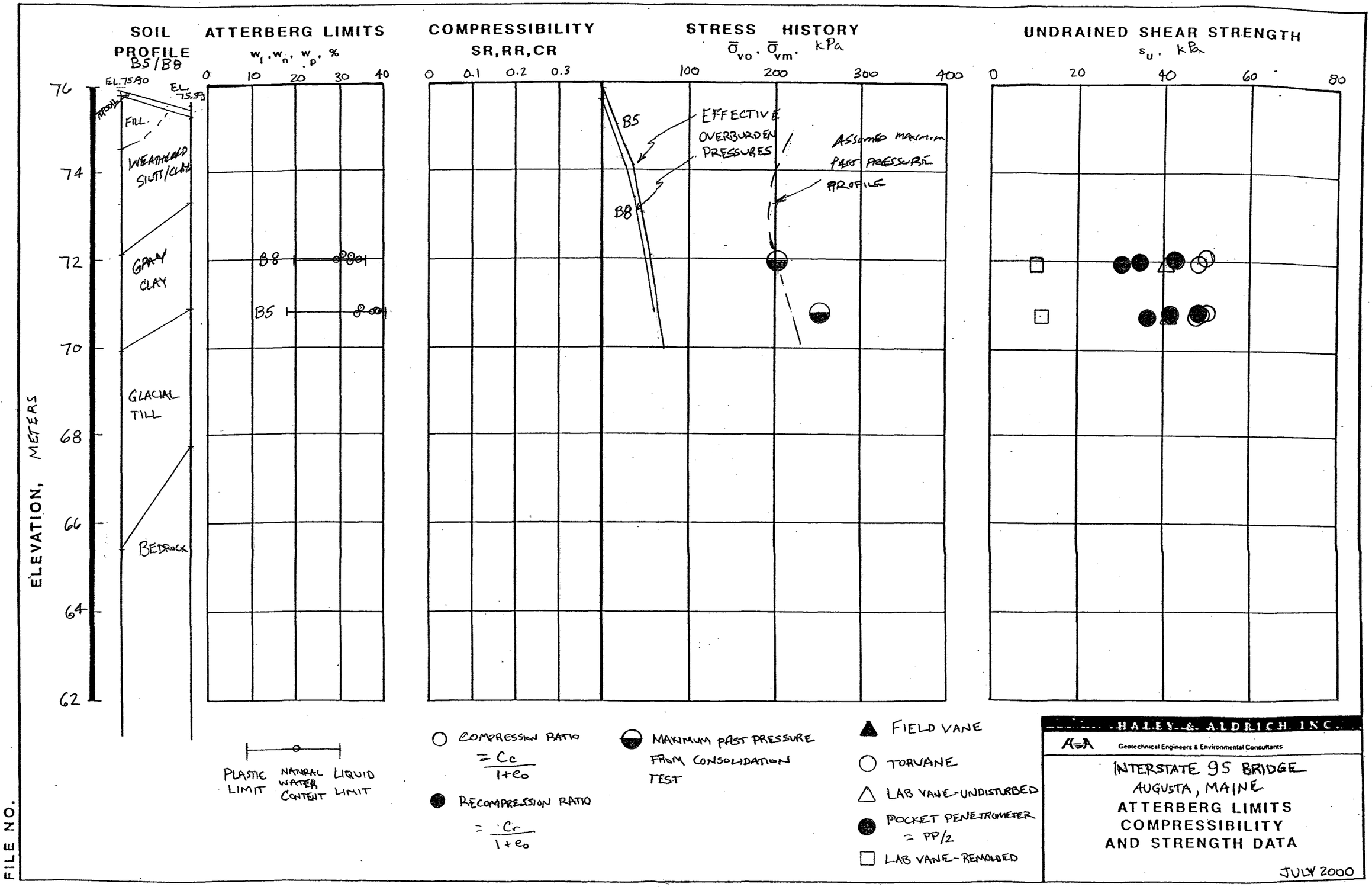
HALEY & ALDRICH, INC.

Augusta River Crossing Project
Augusta, Maine

**CONSOLIDATION TEST**

FILE NO. 80765-000 JUNE 2000

Sheet 18




HALEY & ALDRICH, INC.

Geotechnical Engineers & Environmental Consultants

INTERSTATE 95 BRIDGE
AUGUSTA, MAINE
ATTERBERG LIMITS
COMPRESSIBILITY
AND STRENGTH DATA

JULY 2000

FILE NO.

SHEET 19

2003 - 05C

# REPORT ON
# GEOTECHNICAL ENGINEERING EVALUATION
# KENNEBEC RIVER CROSSING PROJECT
# CONTRACT NO. 1, PIN 556.21
# AUGUSTA, MAINE

Phase II, West Highway Segment

by

**Haley & Aldrich, Inc.**
**South Portland, Maine**

for

**Maine Department of Transportation**
**Augusta, Maine**

**File No. 80765-001**
**November 2001**

HALEY & ALDRICH

## EXECUTIVE SUMMARY

The Kennebec River Crossing project is approximately 5.84 km in length and consists of two to four lanes of roadway, a grade-separated intersection with Interstate 95 at the western end of the alignment, a bridge structure over Eight Rod Road, an at-grade intersection with West River Road (Route 104), a bridge structure over the Kennebec River, an at-grade intersection with Route 201 and an at-grade intersection with Route 3 at the eastern end of the alignment. Contract No.1 of the proposed Kennebec River Crossing project includes the highway portions of the interchange with I-95 to the western bank of the Kennebec River. The roadway alignment passes through fields and wooded areas that are primarily undeveloped. The topography ranges from gently rolling to steeper, undulating hills.

The Phase II exploration program consisted of 89 test borings which were supplemental to the borings drilled for Phase I in 2000. Five observation wells were installed and monitored to obtain groundwater levels. A laboratory testing program was conducted on tube samples to determine engineering properties of the marine silty clay. Grain size analyses were also conducted to aid in soil classification for potential reuse. Soils encountered included Topsoil, Fill, Marine Deposits, Glaciofluvial Deposits, Glacial Stream Deposits, Glacial Till and Bedrock.

Laboratory tests indicated that the marine silty clay water content ranges from 22 to 39, liquid limit ranges from 33 to 41, and plastic limit ranges from 14 to 21. The clays are moderately sensitive, and the undrained shear strength of the clay, based on laboratory tests, ranges from approximately 16 to 75 kPa. An average compression ratio of 0.17 and an average recompression ratio of 0.007 were determined from consolidation tests. The OCR ranges from about 1.4 to 5.

The anticipated subgrade materials are Marine silty clay, clayey silt and silty fine sand, Glacial Till and bedrock. We anticipate that these materials, as well as embankment fill, are suitable for support of a properly designed and constructed roadway pavement section. We recommend that prior to placement of roadway fill, all topsoil, organic matter, debris fill and other unsuitable materials be entirely removed. Soil resilient modulus values range from approximately 3200 psi for silty sand and silty clay to 5100 psi for Glacial Till. Frost susceptibility classifications range from II to III for Glacial Till, to IV for silty sand, clayey sand, and silty clay.

Analyses of embankment and culvert settlements indicate that the maximum total settlements would be on the order of 70 mm. Post-construction settlements of embankments are expected to be minimal. Factors of safety for embankment stability are adequate at 1.7 to 1.9.

The embankment slopes as steep as 1 vertical to 2 horizontal (1V:2H) should be acceptable from an overall stability standpoint. However, these are relatively steep and will likely require slope protection to prevent surface erosion and sloughing.

We analyzed backslope stability in the soil cut areas of the project. The calculated factors of safety for 1V to 2H slopes range from 1.2 to 1.6, depending on the assumed elevation of the

water table. Naturally-occurring slopes with similar slope geometry conditions exist along portions of the alignment in near the Kennebec River without apparent instability. Localized areas of seepage of groundwater from the cut slopes should be anticipated, and may result in near-surface sloughing.

Excavation dewatering and control of surface water runoff will be required to prevent instability of excavation slopes and to prevent disturbance of subgrade soils.

Bedrock will be encountered generally between Station 11+310 to 11+490 and 12+480 to 12+520. Cuts as deep as 6 m below the bedrock surface are likely. Drilling and blasting techniques will be required for bedrock excavation. Typical MDOT cut slopes in rock (4V to 1H) are considered appropriate for design. However, rock face conditions should be verified during construction to confirm that the cut slope will be stable, i.e. there are no loose, unstable rock blocks exposed at the face.

Transition zones will be required in areas where the roadway subgrade changes from soil to bedrock, and bedrock to soil (generally between Station 11+310 to 11+490 and 12+480 to 12+520). Typical MDOT transition zone details are considered appropriate.

We expect that excavated Marine silty sand and Glacial Till soils can be reused for embankment construction providing that they are placed and compacted at a moisture content near optimum. Marine silt and silty clay may be used for embankment construction provided that they are placed outside limits defined by 1:1 lines sloped outward and downward from the outer limits of the gravel subbase course layer (non-critical section of embankment). Construction debris located in the vicinity of Station 12+640 was investigated by MDOT and it appears that the material can be used in non-critical sections of embankments.

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

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www.HaleyAldrich.com

HALEY & ALDRICH

30 November 2001
File No. 80765-001

Maine Department of Transportation
16 State House Station
Augusta, Maine 04333-0016

Attention: Mr. Mike Moreau

Subject: Geotechnical Engineering Evaluation
Kennebec River Crossing Project
Contract No. 1, PIN 556.21
Augusta, Maine

Ladies and Gentlemen:

Summarized herein are the results of field explorations and geotechnical engineering evaluations conducted for Contract No. 1 of the proposed Kennebec River Crossing Project located in Augusta, Maine. This work was undertaken in accordance with our proposal dated 25 July 2001 and under the terms and conditions of our Specific Period Contract for Geotechnical Engineering Services (Contract No. U02300807).

## INTRODUCTION

The Kennebec River Crossing project is approximately 5.84 km in length and consists of two to four lanes of roadway, a grade-separated intersection with Interstate 95 at the western end of the alignment, a bridge structure over Eight Rod Road, an at-grade intersection with West River Road (Route 104), a bridge structure over the Kennebec River, an at-grade intersection with Route 201 and an at-grade intersection with Route 3 at the eastern end of the alignment. Contract No.1 of the proposed Kennebec River Crossing project includes the highway portions of the interchange with I-95 to the western bank of the Kennebec River generally as indicated on Figure 1, Project Locus. The I-95 interchange consists of four ramps (A, B, C and D) described as follows:

Ramp A – I-95 southbound on ramp – Station 100+000 to 100+712, one travel lane and shoulders

Ramp B – I-95 southbound off ramp – Station 200+000 to 200+500, one travel lane and shoulders

**OFFICES**
Boston
*Massachusetts*
Cleveland
*Ohio*
Dayton
*Ohio*
Denver
*Colorado*
Detroit
*Michigan*
Hartford
*Connecticut*
Los Angeles
*California*
Manchester
*New Hampshire*
Newark
*New Jersey*
Rochester
*New York*
San Diego
*California*
Tucson
*Arizona*
Washington
*District of Columbia*

*Printed on recycled paper.*

Ramp C – I-95 Northbound off ramp – Station 300+000 to 300+400, one travel lane and shoulders

Ramp D – I-95 Northbound on ramp – Station 400+000 to 400+640, one travel lane and shoulders

The new section of Route 3 proceeds easterly from I-95 at Station 9+920 to the westerly abutment of the Kennebec River Bridge at 12+860. The roadway will have two travel lanes and shoulders between Station 9+900 and 10+640 and four travel lanes from Station 10+640 to the Kennebec River Bridge (Station 12+860).

The intersection of Routes 3 and 104 (West River Road) is at grade and includes improvements to Route 104 between Stations 500+000 and 500+635.

The I-95 and Eight Rod Road bridge structures will be constructed under Contract No. 4. The Kennebec River Bridge will be constructed under Contract No. 2 and the highway sections extending from the Kennebec River Bridge to the intersection with Route 3 will be constructed under Contract No. 3.

A preliminary memorandum titled "Phase I – Geotechnical Engineering Evaluation, Kennebec River Crossing Project," dated 17 November 2000, was prepared for the preliminary phase of this project. This report addresses the field explorations, laboratory testing and geotechnical evaluations made in connection with Contract No. 1. Separate reports will be prepared for the other project contracts.

The roadway alignment in Contract No. 1 passes through fields and wooded areas that are undeveloped. The proposed alignment crosses I-95 and Eight Rod Road via bridge structures and will cross Route 104 (West River Road) at grade. The easterly terminus of Contract No. 1 is the west abutment of the Kennebec River Bridge.

Ground surface topography along the westerly portion (I-95 interchange to Station 10+940) of the alignment is gently rolling (fields), ranging from approximately El. 82 to 77 (note elevations are in meters and are referenced to NGVD). The ground topography generally between Station 10+940 and 11+740 (West River Road) is more rugged and ranges from approximately El. 77 to 53; the area is wooded and the alignment crosses several streams and one significant low and wet area (Station 11+640). The alignment from West River Road to the Kennebec River is located on the side of a generally-southwesterly trending hillside. There are several erosion gullies that are 5 to 10-m deep that are crossed by the alignment. There is a construction debris disposal area in the vicinity of Station 12+640 that primarily contains miscellaneous building debris; the conditions in this area were investigated by MDOT. Refer to Figures No. 2 through 18 of this report for information showing the existing ground surface and the proposed finished highway grades along the project centerline.

As indicated by the vertical alignment shown on Figures 2 through 18, construction of the Contract 1 ramps and roadway will include cuts and fills generally as follows:

- I-95 Ramp A – 0 to 6.5-m fills (Figures 7 and 8)
- I-95 Ramp B – 2-m cuts to 8-m cuts (Figures 5 and 6)
- I-95 Ramp C – 0 to 5.5-m fills (Figure 2)
- I-95 Ramp D – 0 to 6-m fills (Figures 3 and 4)
- Route 3
  - Station 9+920 to 11+140 – 0 to 10-m fills (Figures 9 to 12)
  - Station 11+140 to 11+600 – 0 to 10-m fills (Figures 12 and 13)
  - Station 11+600 to 11+750 - 0 to 9-m fills (Figure 13)
  - Station 11+750 to 12+860 – 10-m cuts to 8-m fills (Figures 13, 16, 17 and 18)
- Route 104 – 2-m cuts to 2-m fills (Figures 14 and 15)

Typical MDOT embankment and cut side slopes are as follows:

- Embankment slopes with guardrail – 1 vertical to 2 horizontal (1:2)
- Embankment slopes with no guardrail – 1:4
- Cut slopes in soil – 1:2
- Cut slopes in rock – 4:1

The typical MDOT pavement section is a total of 760 mm thick and consists of bituminous concrete and granular base and subbase course supported on a prepared subgrade.

Design and preparation of Contract No. 1 construction documents will be by HNTB of Westbrook, Maine.

## SUBSURFACE EXPLORATIONS

### General

Subsurface explorations were conducted in two phases (Phase I and Phase II) to identify the general subsurface soil, rock and groundwater conditions along the Contract 1 alignment.

### Phase I Subsurface Explorations

Subsurface explorations conducted for the Phase I study consisted of twenty-six (26) test borings (designated B1 through B26) and two groundwater observation wells (installed in completed borings B17 and B23 and designated B17(OW) and B23(OW)). The purpose of these borings and observation wells was to evaluate general subsurface conditions along the

proposed alignment. In general the explorations were made at about 100 to 150-m intervals along and near the centerline of the alignment.

Maine Test Borings, Inc. of Brewer, Maine drilled the Phase I borings and installed the wells generally during the period 11 May to 5 June 2000. The boring locations were established by Haley & Aldrich and were determined in the field by Maine Department of Transportation (MDOT) survey personnel. Haley & Aldrich personnel monitored the explorations and prepared test boring logs and observation well installation records. The as-drilled exploration locations and ground surface elevations are summarized in Table I and are shown on the test boring logs presented herein as Appendix A.

The test borings were drilled to depths ranging from approximately 1.2 m to 15.8 m below ground surface and were terminated in dense granular soils, bedrock or a predetermined depth. The depths of the borings were selected by Haley & Aldrich to penetrate below the anticipated excavation limits (cut areas) or to identify the thickness of compressible marine clay deposits (embankment areas).

Observation wells were installed in two of the completed boreholes (B17 and B23). The wells consisted of a perforated PVC pipe placed below groundwater level, and a solid PVC riser pipe extending to ground surface. Bentonite seals were placed at ground surface to prevent infiltration from surface runoff. Observation well installation details and measured water levels are presented with the relevant boring logs in Appendix A.

Water levels were measured in the borings and wells at the completion of the drilling activity. The measured water levels are shown on Table I, presented in the test boring logs and indicated on the groundwater monitoring report forms (B17OW and B23OW). It is noted that the water levels measured at the completion of drilling probably do not represent the stabilized groundwater levels; the water levels shown on the groundwater monitoring report forms for B17OW and B23OW are expected to represent groundwater at the time of the measurements. Furthermore, it is anticipated that groundwater levels fluctuate seasonally and in response to certain construction activities. Therefore, water levels encountered during construction are expected to vary from those indicated on Table I and in the test boring logs.

**Phase II Subsurface Explorations**

Subsurface explorations conducted for the Phase II study consisted of eighty-nine (89) test borings (designated C1-1-01 through C1-82-01, C1-16A-01, C1-45A-01, C1-65A-01, C1-66A-01, C1-69A-01, C1-69B-01 and C1-70A-01) and five groundwater observation wells (installed in completed borings C1-21-01, C1-22-01, C1-39-01, C1-58-01 and C1-61-01, and designated C1-21-01(OW), C1-22-01(OW), etc.). The purpose of drilling the borings and installing the observation wells was to provide more specific subsurface information along the Contract No. 1 alignment with emphasis on areas where major cuts and/or bedrock is anticipated. In general the explorations were made at 20-m to 60-m intervals between

Stations 11+340 and 11+650, and between Stations 11+760 and 12+854. Six borings were drilled on the west side of Interstate 95 to provide additional information on the proposed interchange ramps. Four borings were drilled along Route 104 (West River Road) to provide information on the proposed elevation changes to that road. Boring logs were prepared using Maine DOT's format and soil classification system.

Maine Test Borings, Inc. of Brewer, Maine drilled the borings and installed the wells generally during the period 6 August to 6 September 2001. The boring locations were established by Haley & Aldrich and were determined in the field by Maine Department of Transportation (MDOT) survey personnel. Haley & Aldrich personnel monitored the explorations and prepared test boring logs and observation well installation records. The as-drilled exploration locations and ground surface elevations are summarized in Table II and are shown on the test boring logs presented herein as Appendix B.

The test borings were typically drilled using 76-mm diameter steel casing or hollow stem augers. Soil samples were recovered at nominal 1.5-m intervals below the ground surface by driving a 3-cm inside diameter split spoon sampler with a 64-kg hammer dropped from a height of 760 mm. Field vane shear tests were conducted in several borings to provide information on the undrained shear strength characteristics of the marine silt and clay deposits. Maine DOT's field vane set was used for this project. The field shear vane apparatus consisted of 5/8-inch (16 mm) diameter chrome-moly drill rods, torque wrenches and five field vanes. Only the 55 mm x 110 mm vane from this set was used on this project. Other field vanes were taken using Maine Test Borings' 2 inch x 7 inch (50 mm x 180 mm) field vane when the Maine DOT vane was not available. NX-size bedrock core samples were obtained from some of the borings to confirm the presence of bedrock and to evaluate its condition. Borings in which core samples were obtained may be identified from Table II; descriptions of the recovered bedrock core samples are included with the logs.

The test borings were drilled to depths ranging from approximately 0.64 m to 14.34 m below ground surface and were terminated in dense granular soils, bedrock or a predetermined depth. The depths of the borings were selected by Haley & Aldrich to penetrate below the anticipated excavation limits (cut areas) or to identify the thickness of compressible marine clay deposits (embankment areas).

Observation wells were installed in five of the completed boreholes (C1-21-01, C1-22-01, C1-39-01, C1-58-01 and C1-61-01). The wells consisted of a perforated PVC pipe placed below groundwater level, and a solid PVC riser pipe extending to ground surface. Bentonite seals were placed at ground surface to prevent infiltration from surface runoff. Several planned wells were not installed because of dry soil conditions. Observation well installation details and measured water levels are presented with the relevant boring logs in Appendix B.

Water levels were measured in the borings and wells at the completion of the drilling activity. The measured water levels are shown on Table II, presented in the test boring logs and

indicated on the groundwater monitoring report forms (C1-21-01(OW), C1-22-01(OW), C1-39-01(OW), C1-58-01(OW) and C1-61-01(OW)). It is noted that the water levels measured at the completion of drilling probably do not represent the stabilized groundwater levels; the water levels shown on the groundwater monitoring report forms are expected to represent groundwater at the time of the measurements. Furthermore, it is anticipated that groundwater levels fluctuate seasonally and in response to certain construction activities. Therefore, water levels encountered during construction are expected to vary from those indicated on Table II and in the test boring logs.

## LABORATORY TESTING

A laboratory testing program was conducted on selected samples recovered from test borings to assist in soil classification and the evaluation of reuse potential of soils from cut areas of the project.

In Phase I, a limited laboratory testing program was conducted on selected samples recovered from test borings B5, B8, B12 and B13 to assist in soil classification, and the evaluation of compressibility characteristics and stress history characteristics of the marine clay deposits encountered in the embankment fill areas.

Testing consisted of four one-dimensional consolidation tests and a variety of geotechnical index tests including water content determinations, Atterberg Limits, lab vane, torvane and pocket penetrometer. The tests were performed in the Haley & Aldrich laboratory.

Phase II testing consisted of 18 grain size analyses, 9 water content determinations and 4 Atterberg Limits. The tests were performed in the Haley & Aldrich laboratory.

Results of laboratory testing are presented in Appendix C of this report. Test results are summarized on sheets C1 and C2 and are presented in graphical form as sheets C3 through C6 (consolidation test results) and C7 through C10 (Atterberg Limits, Compressibility and Strength Data). Sheet C11 presents water content results, Sheet C12 shows graphical results of Atterberg Limits tests, and Sheets C13 through C19 present results of grain size analyses.

## SUBSURFACE CONDITIONS

The test borings drilled within the Contract No. 1 alignment encountered six principal soil units (Topsoil, Fill, Marine Deposits with silty sand and silty clay subunits, Glaciofluvial Deposits, Glacial Stream Deposits and Glacial Till) and bedrock. Fill material was encountered in the test borings drilled adjacent to I-95 (B5 and B6), Eight Rod Road (B9), along Route 104 (C1-31-01 to C1-34-01), and the debris fill area in the gravel pit (C1-68-01, C1-69-01, C1-69A-01, C1-69B-01, C1-72-01 through C1-75-01, and C1-78-01 through C1-81-01). Encountered thickness and generalized descriptions of the various soil units are summarized as follows:

**Topsoil** – 0.03 to 0.27 m – Loose, brown, silty fine SAND (USCS (Unified Soil Classification System) – SM), with surficial root mat. No laboratory samples of topsoil were tested.

**Fill** – 0.30 to 7.01 m – Loose to medium dense, brown, silty fine SAND (SM), very dense gravelly SAND (SP and SW), and medium stiff, brown mottled clayey SILT (CL). Material in the debris fill area contained concrete rubble wire, wood chips, brick fragments, cinders and other miscellaneous material. No laboratory samples of fill were tested.

**Marine Deposits** – 0.12 to 13.80 m:

> **Silty Sand** – Loose to medium dense, brown silty fine SAND and sandy SILT. Soil classifications based on USCS were typically SM, ML, SP-SM and SW. AASHTO classifications for the 7 samples tested were A-2-4, A-3 and A-4.
>
> **Silty Clay/Clayey Silt** – Stiff to soft, brown to gray, silty CLAY and clayey SILT with layers and lenses of silt and fine sand. Soil classifications based on USCS were typically CL and ML. AASHTO classifications for the 8 clay (CL) samples tested were A-6 and A-7-6. AASHTO classifications for the 3 silt (ML) samples tested were likely A-4.

**Glaciofluvial** – 2.65 to 4.36 m – Light brown to gray-brown, medium dense to dense, gravelly SAND with trace silt, poorly-graded. Soil classifications based on USCS were typically SP, SP-SM and GM. AASHTO classifications for the 2 samples tested were A-1-a and A-1-b.

**Glacial Stream Deposit** – 0.91 to 2.10 m – Brown, dense to very dense, gravelly SAND, trace silt, well-graded. Soil classification based on USCS was typically SW. No laboratory samples of the Glacial Stream Deposit were tested.

**Glacial Till** – 0.04 to 7.89 m – Dense to very dense, brown coarse to fine SAND with variable amounts of silt and fine gravel with indications of cobbles and boulders. Soil classifications based on USCS were primarily SP, SW, GM and GP-GM. AASHTO classifications for the 6 samples tested were A-1-a, A-1-b, A-2-4 and A-4.

The test borings drilled in the vicinity of the I-95 ramps and up to approximately Station 12+300 on Route 3 encountered the silty sand subunit of the marine deposit overlying the silty clay/clayey silt subunit. However from about Station 12+300 to the Kennebec River, the borings encountered the silty sand subunit below the silty clay/clayey silt. When encountered below the silty clay/clayey silt, the silty sand is generally gray in color and medium dense to dense.

Descriptions of bedrock cored in the explorations generally varied from a hard, slightly weathered GRANITE (B5, B6, and B7; and in the C1-xx-01 series, 16A and 39) to a moderately hard, slightly weathered SLATE (B16; and in the C1-xx-01 series, 8, 9, 15, 16A, 17, 18, 19, 39, 65A, 69B, and 70A), PHYLLITE (B17; and in the C1-xx-01 series, 7, 13, and 14), and SCHIST (B19; and in the C1-xx-01 series, 10 and 11).

Water was measured in completed borings at depths ranging from approximately 0.15 m above ground surface (artesian condition in B4) to 14.2 m below ground surface. However, these measurements were made immediately upon completion of the borings and probably do not represent stabilized groundwater. Water level data are presented in Tables I and II. Groundwater was measured in the Phase II observation wells from 1 to 12 days after installation of the wells. Groundwater depths ranged from 4.21 to 10.42 m below ground surface. The corresponding elevation of water in these wells ranged from El. 57.9 m to El. 66.2 m. Observations wells from Phase I explorations were also measured during Phase II explorations. Observation well B17OW was measured on 26 August 2001 at a depth of 4.5 m below ground surface (corresponds to El. 69.5 m). This is close to the measured depth of 4.2 m below ground surface measured in 2000. The well installed in B23OW was dry on 30 August 2001 which means that the depth to water was greater than 12.1 m below the ground surface at that location. Groundwater levels are expected to fluctuate with season, precipitation, temperature, construction activity in the area and other factors.

The subsurface conditions encountered in the test borings are summarized on the profiles included in this report as Figure Nos. 2 through 18.

## RESULTS OF LABORATORY AND FIELD TESTING

The results of the field testing (field vane shear tests) are indicated on the boring logs, and the results of the laboratory testing are included in Appendix C of this report.

Measured water contents within the marine silty clay/clayey silt subunit ranged from approximately 22 to 39 percent; measured liquid limits ranged from about 33 to 41, and plastic limits from about 14 to 21. The USCS classification of these samples is CL, and the AASHTO classification is A-6 and A-7-6. The natural water content of some portions of the clay was close to or above the liquid limit. Therefore, these portions are considered to be moderately sensitive in-situ, that is, the clay would be expected to experience strength loss upon remolding or significant strain. Measured saturated unit weights ranged from about 17.9 to 19.8 kN/cu m. The undrained shear strength of the marine clay, based on lab and field tests, ranged from approximately 16 to 75 kPa.

Consolidation tests were performed on specimens obtained from thin wall tube samples in Phase I explorations. Tests performed on samples from B5, B8, B12 and B13 indicate that the clays and silts are overconsolidated. The encountered thickness of the marine silt and clay deposits from these samples ranged from approximately 1.8 m in B13 to 4.6 m in B12.

Phase II explorations encountered up to 13.84 m of marine silt and clay (in C1-1-01). The test results indicate that the maximum previous stress for the samples ranged from about 140 kPa in B12 to 250 kPa in B5. The average compression ratio (CR) is about 0.17 and the average recompression ratio (RR) ranges from about 0.006 to 0.008.

The approximate distribution of maximum past pressure with depth is shown on sheets C-7 through C-9 in relation to the predicted in-situ vertical effective stress. The overconsolidation ratio, OCR, calculated as the maximum past pressure divided by the in-situ effective stress, ranged from approximately 3 to 5 (estimated) within the stiff upper olive-brown clayey silt to between 3 and 1.4 near the bottom of the subunit. Consolidation test curves for each test are presented in Appendix C.

Grain size analyses were performed on samples collected during Phase II explorations. Results of grain size analyses are grouped by soil deposit and are included in Appendix C. The Marine Silt grouping shows that approximately 85 percent passes the #200 sieve (fines – silt and clay fraction), with about 15 percent retained in the coarse to fine sand range. The Marine Sand grouping shows two distinct envelopes of gradation. Two samples were primarily fine sand with only 7 to 12 percent fines. The other five contained between approximately 40 percent and 60 percent fines.

The Glaciofluvial deposit samples contained approximately 12 percent fines. One sample contained over 50 percent gravel, while the other contained only 7 percent gravel. The remainder of each sample consisted of coarse to fine sand.

Glacial Till deposits encompassed a broad range of grain sizes, with each grain size sample containing gravel, sand and silt.

Grain-size samples were grouped according to soil type and classified in the USCS and AASHTO systems. The classifications are presented below.

| Soil Type | USCS Classification | AASHTO Classification |
|---|---|---|
| Marine Silt | ML | A-4 |
| Marine silty Sand | SM, ML, SP-SM | A-2-4, A-3, A-4 |
| Glaciofluvial | GM, SP-SM | A-1-a, A-1-b |
| Glacial Till | SM, GP-GM | A-1-a, A-1-b, A-2-4, A-4 |

## GEOTECHNICAL ENGINEERING RECOMMENDATIONS

### Anticipated Subgrade Conditions

It is anticipated that the proposed pavement section for the roadways will be approximately 760-mm thick. Soil and bedrock units anticipated to be encountered at subgrade level are summarized as follows:

| Approximate Limits (Station) | Anticipated Subgrade Conditions |
|---|---|
| 300+000 to 300+400 (I-95 Ramp C) | Embankment Fill |
| 400+000 to 400+645 (I-95 Ramp D) | Embankment Fill |
| 200+000 to 200+180 (I-95 Ramp B) | Embankment Fill |
| 200+180 to 200+245 (I-95 Ramp B) | Marine sandy Clay |
| 200+245 to 200+495 (I-95 Ramp B) | Embankment Fill |
| 100+000 to 100+710 (I-95 Ramp A) | Embankment Fill |
| 9+900 to 10+352 | Embankment Fill |
| 10+352 to 10+403 | NA – I-95 Bridge |
| 10+403 to 10+439 | Embankment Fill |
| 10+439 to 10+483 | NA – I-95 Bridge |
| 10+483 to 10+845 | Embankment Fill |
| 10+845 to 10+880 | NA – Eight Rod Road Bridge |
| 10+880 to 11+140 | Embankment Fill |
| 11+140 to 11+220 | Marine silty fine Sand, clayey Silt and/or Glacial Till |
| 11+220 to 11+300 | Glacial Till and/or Bedrock |
| 11+300 to 11+500 | Bedrock |
| 11+500 to 11+540 | Glacial Till and/or Marine silty fine Sand |
| 11+540 to 11+600 | Marine silty Clay |
| 11+600 to 11+755 | Embankment Fill |
| 500+100 to 500+365 (Route 104) | Embankment Fill |
| 500+365 to 500+585 (Route 104) | Fill, Glacial Till |
| 11+755 to 11+850 | Marine silty Clay, clayey Silt and silty Sand |
| 11+850 to 11+870 | Glacial Till and/or Bedrock |
| 11+870 to 11+915 | Marine silty Clay and/or silty fine Sand |
| 11+915 to 11+935 | Embankment Fill |
| 11+935 to 11+955 | Marine silty fine Sand |
| 11+955 to 12+010 | Embankment Fill |
| 12+010 to 12+030 | Marine silty Clay and/or silty Sand |
| 12+030 to 12+080 | Embankment Fill |
| 12+080 to 12+085 | Marine silty Sand |
| 12+085 to 12+255 | Embankment Fill |
| 12+255 to 12+275 | Marine Silt, silty Clay and/or silty Sand |
| 12+275 to 12+285 | Glacial Till and/or Bedrock |

| | |
|---|---|
| 12+285 to 12+370 | Marine silty Sand and/or silty Clay |
| 12+370 to 12+390 | Embankment Fill |
| 12+390 to 12+470 | Marine silty Clay and/or clayey Sand |
| 12+470 to 12+540 | Glacial Till and/or Bedrock |
| 12+540 to 12+610 | Glacial Till and/or Marine silty Sand |
| 12+610 to 12+630 | Glacial Till and/or Bedrock |
| 12+630 to 12+800 | Marine Silt, silty Sand and/or silty Clay |
| 12+800 to 12+860 | Embankment Fill |

Refer to Figure Nos. 2 thorough 18 for a graphical presentation of subsurface conditions that are expected to be encountered along the project alignment.

Typical USCS and AASHTO classifications for soil types listed above may be found under "Results of Laboratory and Field Testing," page 9.

It is our opinion that the embankment fill, the marine silty clay, clayey silt and silty fine sand, the glacial till and bedrock materials are suitable for support of a properly designed and constructed roadway pavement section. We recommend that prior to placement of roadway fill, all topsoil, organic matter, debris fill and other unsuitable materials be entirely removed.

**Soil Support S/Roadbed Soil Resilient Modulus Values**

Recommended soil support S-Values and the corresponding Roadbed Soil Resilient Modulus for each unit anticipated at subgrade level are as follows:

| Unit | Soil Support S-Value | Soil Resilient Modulus (psi) |
|---|---|---|
| Silty Sand | 3-1/4 | 3200 |
| Silty Clay | 3-1/4 | 3200 |
| Glacial Till | 4-1/2 | 5100 |

The soil support and soil resilient modulus values were established using correlations of soil gradation, texture and shear strength from references provided by MDOT.

We anticipate that the majority of embankment fill on the project will consist of marine silty sand, clayey silt and silty clay excavated along the alignment (see Figure Nos. 2 through 18). It is our opinion that an embankment fill S-value/Resilient Modulus of 3-1/2/3600 would be appropriate where the subgrade soils consist of silty fine sand. We recommend a higher S-value/Resilient Modulus for silty sand used as embankment fill because systemmatically placed and compacted fill will likely produce a more uniform and denser material. We do not recommend that silty clay be used as fill directly beneath the pavement section.

The bedrock cuts will generate a significant volume of rock fragments that is considered suitable for use as embankment fill. If used as embankment fill the compacted rock

fragments should be covered with a minimum of 300 mm of granular soil graded to fill surface voids in the rock fragment subgrade. The pavement should then be designed in accordance with recommendations for a glacial till subgrade condition.

**Frost Susceptibility Classification**

| Unit | Frost Group |
|---|---|
| Silty and Clayey Sand | IV |
| Silty Clay | III to IV |
| Glacial Till | II to III |

The frost susceptibility classification is based on MDOT criteria.

The freezing index and frost penetration estimates for 762 mm of pavement and base are as follows:

| | | Total Frost Penetration (mm) | | Frost Penetration into Subgrade(mm) | |
|---|---|---|---|---|---|
| Freezing Index (degree-F days) | | Non-granular Subgrade | Granular Subgrade | Non-granular Subgrade | Granular Subgrade |
| Mean | 1000 | 1020 | 1420 | 260 | 660 |
| Design | 1600 | 1270 | 2080 | 510 | 1320 |

**Transition Zones**

Transition zones will be required in areas where the roadway subgrade changes from soil to bedrock, and bedrock to soil (generally between Station 11+310 to 11+490 and 12+480 to 12+520). Typical transition zone details are considered appropriate and are included as Figures No. 19 and 20.

**Underdrains**

Based on cross-section information provided by HNTB, ditches will be provided on each side of the roadway in cut areas. We do not anticipate that underdrains will be required where ditches are provided.

**Embankment Fill Areas**

Based on the presently proposed vertical alignment, there are a number of areas within the limits of Contract No. 1 where substantial thickness of fill will be required. The approximate

limits of the embankment fills with a general description of the maximum fill thickness and the generalized subsurface conditions are summarized as follows:

| Approximate Limits (Station) | Approximate Fill Height (m) | Generalized Soil Conditions |
|---|---|---|
| 300+040 to 300+400 (I-95 Ramp C) | 5.5 | Topsoil<br>0 to 2 m Fill<br>1 to 2 m Marine silty Sand<br>1 to 10 m Marine silty Clay<br>Glacial Till |
| 400+040 to 400+640 (I-95 Ramp D) | 6 | Topsoil<br>0 to 2+ m Fill<br>0 to 1 m Marine silty Sand<br>0 to 10 m Marine silty Clay |
| 200+245 to 200+495 (I-95 Ramp B) | 9 | Topsoil<br>1 to 3 m Marine silty Sand<br>5 to 10 m Marine silty Clay<br>Glacial Till |
| 100+460 to 100+710 (I-95 Ramp A) | 7 | Topsoil<br>0 to 2 m Fill<br>0 to 2 m silty Sand<br>1 to 10 m silty Clay<br>Glacial Till |
| 9+900 to 10+060 | 5 | Topsoil<br>1 to 4 m Marine silty Sand<br>2 to 4 m Marine silty Clay<br>Glacial Till |
| 10+180 to 10+550 | 11 | Topsoil<br>1 m Marine silty Sand<br>5 m Marine silty Clay<br>Glacial Till |
| 10+720 to 11+130 | 8 | Topsoil<br>1 to 2 m Marine silty Sand<br>7 to 9 m Marine silty Clay<br>Glacial Till |

| | | |
|---|---|---|
| 11+600 to 11+755 | 10 | Topsoil<br>0 to 1 m Marine Silt<br>0 to 7 m Marine silty Clay<br>0 to 3 m Marine silty Sand<br>Glacial Till |
| 11+955 to 12+010 | 6 | Topsoil<br>0 to 2 m Marine silty Sand<br>0 to 2 m Marine silty Clay<br>Glacial Till/Bedrock |
| 12+030 to 12+080 | 4 | Topsoil<br>1 to 6 m Marine silty Sand<br>0 to 4 m Marine silty Clay<br>Glacial Till/Bedrock |
| 12+085 to 12+255 | 9 | Topsoil<br>0 to 7 m Marine silty Sand<br>Glacial Till/Bedrock |
| 12+370 to 12+390 | 4 | Topsoil<br>0 to 3 m Marine silty Clay<br>0 to 2 m Marine silty Sand<br>Glacial Till/Bedrock |
| 12+800 to 12+840 | 4 | Topsoil<br>0 to 1 m Fill<br>0 to 2 m Glaciofluvial sand and gravel<br>3 to 6 m Marine silty Clay<br>3 to 5 m Marine sandy Clay/clayey Sand |

The fill areas are also indicated in Figure Nos. 2 through 18. Proposed embankment side slopes are 1:2 where guardrails are provided and 1:4 where no guardrail is provided.

The imposed loading from the construction of the embankments is expected to result in minimal ground surface settlement from densification and consolidation of the underlying soils. An assessment of ground surface settlement was made in the areas where the maximum-height embankments are proposed. We calculated that the ground surface in the vicinity of Station 11+015 (fill height approximately 8 m, and approximately 11 m of Marine silty Clay/clayey Silt) would undergo settlement less than approximately 70 mm. We expect that settlements at other locations on the project will be less than this. Because the silt and clay soils are significantly overconsolidated, we expect that most of this settlement would

occur during and immediately after construction of the embankment. Post-construction settlement is expected to be minimal.

**Culvert Settlement Estimates**

Culverts will be provided beneath proposed embankment fill along the alignment. We evaluated settlements at culvert locations where the explorations indicate that compressible Marine silt and clay soils are present. The results of these calculations are summarized below.

| Culvert Location | Fill Height (m) | Total Settlement (mm) |
|---|---|---|
| 200+275 (Ramp B) | 3 | <50 |
| 200+455 (Ramp B) | 7-9 | <50 |
| 100+585 (Ramp A) | 4.5-5 | <50 |
| 100+670 (Ramp A) | 6-7 | <50 |
| 10+250 | 9-10 | <50 |
| 10+420 | 12 | 63 |
| 10+910 | 7-8 | 55 |
| 11+015 | 7-8 | 68 |

Not included on this list are culverts which are planned for locations where explorations indicate there are little or no cohesive soils, or where cuts are planned rather than fills. We expect that settlements at these other locations will be minimal.

**Embankment Stability**

Evaluations were made of the stability of the embankments. The calculated factor of safety for a rotational shear failure of a nominal 12-m high earthfill embankment with 1:2 side slopes, constructed in the vicinity of Station 10+520 is on the order of 1.7 to 1.9. We believe that this range of calculated factor of safety against a global shear failure is typical for the project and is acceptable.

It is our opinion that embankments constructed with 1:2 side slopes will be acceptable from an overall stability standpoint. However, these are relatively steep slopes and will require slope protection to prevent surface erosion and sloughing, especially if the timing of the project is such that the grass seed does not have sufficient time to take root into the embankment material. One method of minimizing surface erosion uses fiber reinforcement of topsoil and scarification of the embankment surface. A second method is to make small benches or serrations in the slopes and fill these slopes with topsoil. A third method to protect the surface material is to cover the embankments with erosion protection mats.

## Cut Areas

Based on the proposed vertical alignment and the site grades along the proposed project alignment, cuts as deep as approximately 11-m will be required (see Figure Nos. 2 through 18). The approximate limits of the principal cut areas as well as the maximum depth of cut and anticipated subsurface conditions within the depth of the cuts are summarized as follows:

| Approximate Limits (Station) | Maximum Cut Depth (m) | Generalized Subsurface Conditions |
|---|---|---|
| 11+160 to 11+610 | 10 | 0.2 m Topsoil<br>0 to 4 m Glaciofluvial sand and gravel<br>3 to 5 m Marine sand, silt and clay<br>0.5 to 5 m Glacial Till<br>up to 6 m Bedrock |
| 11+750 to 11+955 | 4 | 0.2 m Topsoil<br>0 to 4 m Marine sand, silt and clay |
| 12+012 to 12+032 | 2 | 0.2 m Topsoil<br>2 m Marine sand, silt and clay |
| 12+255 to 12+360 | 9 | 0.2 m Topsoil<br>0 to 9 m Marine sand, silt and clay |
| 12+390 to 12+800 | 11 | 0.2 m Topsoil<br>0 to 5 m Fill<br>0 to 10 m Marine silty clay and fine sand<br>0 to 1 m Glacial Till |

## Cut Slope Stability

The data indicate that the cuts will be made through Marine sand, silt and clay deposits, and some Glacial Till and bedrock. Information provided by MDOT indicate that the typical backslope for cuts will be at 1:2. Evaluations of cut slope stability were undertaken to assess the calculated stability of these cut slopes. In our preliminary report, we modeled three cut slope conditions: all clay, all silty fine sand and clay over silty fine sand. The calculated factors of safety against global shear failure of the cut slopes are summarized as follows:

| Cut Slope Condition | Calculated Factor of Safety |
|---|---|
| Silty Clay | 2.2 |
| Silty fine Sand | 1.3 |
| Silty Clay over Silty fine Sand | 2.0 |

The Phase II exploration program revealed that there are no cut slopes of considerable length which are all silty fine sand. The 9-m deep cut through all silty fine sand, which was modeled in Phase I, was based on available subsurface data at that time. Recent data indicates that the previously assumed slope in the vicinity of 11+540 consists of about 2 meters of silt and sand over silty clay. Therefore, the factor of safety for all silty fine sand does not apply. The calculated factors of safety for the typical cut slope in clay and in clay over silty fine sand appear reasonable.

From Phase II explorations it appears that the longest cut slope is in the vicinity of Station 12+340. The general subsurface conditions are silty sand over weathered silts and clays, over unweathered silts and clays, over silt, over glacial till. The calculated factor of safety for these conditions ranges from about 1.2 to 1.6, depending on the location of the water table. There are existing slopes along the project alignment that are stable at nearly the same geometry as the proposed cut slopes. After the cuts have been made, we expect that the underlying silt will drain the overlying clay as well as the silt itself within some of the generated potential failure surfaces, thereby improving the general slope stability.

Backslopes located within bedrock cut areas are anticipated generally between Station 11+320 to 11+500, and in the vicinity of Stations 12+500 and 12+620. The height of the bedrock cuts are expected to range up to approximately 8.5 m in the vicinity of Station 11+420 and 6 to 7 m high in the vicinity of Station 12+500. The borings drilled in the vicinity of the bedrock slopes indicate that the rock consists primarily of Slate and Phyllite. Joints and bedding planes in the cores typically ranged from near horizontal to slightly dipping but were locally steeply dipping to near vertical. Where the joints and fractures are near horizontal, we expect that steep rock faces will be stable. However, in areas where joints and fracture planes are steeply dipping there could be local areas where the potential for rock face instability to occur exists. The condition of the rock is variable however it appears that a standard MDOT cut face of 4:1 is appropriate for design. It is possible that there will be localized areas where rock blocks formed by intersecting joints and fractures will not be stable at 4:1. In these areas it may be necessary to flatten the slope or to provide rock face reinforcement in the form of grouted rock dowels or anchors. Rock face stability assessments will have to be made in the field during construction.

It is likely that water will be present at the interface between the top of the bedrock and the bottom of the overlying soils, and that seepage from this zone could result in localized sloughing and near surface instability in the soils. It is recommended that a near-level bench

be provided at the interface between the soil and rock. A toe drain may also be needed to control seepage and retain the soil at the toe of the cut soil slope.

**Excavation**

Excavation of Marine silty sand, silty clay and clayey silt and Glacial Till soils will be required within significant portions of the Contract No. 1 alignment. These soils are susceptible to disturbance from construction activities especially when the soils are wet or saturated. It is recommended that roadway subgrades be covered with a minimum of 460 mm of subbase sand and gravel to protect them from rutting and disturbance from construction traffic. If disturbance and rutting occur, the disturbed materials should be removed and replaced with compacted sand and gravel.

Where bedrock is encountered, it is likely that there will be a layer of weathered and fractured rock on the surface that can be removed using hydraulic excavating equipment or it can be ripped. However, with increasing depth the rock will become harder and less weathered and drilling and blasting will be required for removal.

**Dewatering**

We anticipate that excavation dewatering may be accomplished by using ditches and open pumping from sumps located along the alignment. However, the contractor should be made responsible for controlling all infiltration from groundwater and surface runoff to permit construction to proceed in-the-dry.

Excavation and control of water should be done by methods which prevents disturbance to backslopes and subgrade soils. Sumps and pumps should be designed with proper filters to control the loss of fine grained soil.

It is likely that water will be encountered in some of the cuts made in soil and bedrock. The water may represent groundwater or it may be trapped in layers and lenses of coarse-grained soil overlying marine silt and clay deposits, or bedrock fractures and joints. It is expected that seepage from these areas will be temporary. However, while seepage is occurring, it is expected that there will be localized sloughing and near-surface instability of the soil slopes. The contractor will have to control the seepage by using temporary ditches, sumps, or by using granular drainage blankets on the slopes to contain and divert the seepage. The amount of seepage from cuts in bedrock may be significant if the rock is fractured and jointed; pumping from sumps will likely be needed to control the water.

**Reuse of Excavated Soils and Bedrock**

It is understood that to the extent possible, excavated materials will be reused as embankment fill. We anticipate that excavated marine silty sand, silty clay, and processed bedrock materials may be reused as fill in the manner described below:

Marine Silty Sand – Contractors should be made aware the marine silty sand subunit is highly susceptible to strength loss when wet, and that moisture conditioning will probably be required. Contractors should expect that prior to placement and compaction it may be necessary to spread out and dry portions of the marine silty sand that are excessively moist. We recommend that the contract documents include moisture conditioning activities as part of the project earthwork requirements. Grain size analyses performed as part of the Phase II laboratory testing program indicate that marine sand (or silty sand) may be used as common borrow in accordance with State of Maine (MDOT) Standard Specifications, Section 703.18.

Marine Silt and Silty Clay – We anticipate that a significant volume of silt and silty clay will be excavated within the limits of the Contract No. 1 alignment. The clay is typically sensitive and susceptible to strength loss when disturbed. Therefore, we do not recommend the reuse of the clay directly beneath the roadway. The clay should only be allowed as fill outside the limits defined by 1:1 lines sloped outward and downward from the outer limits of the gravel subbase course layer. The clay will be difficult to place and compact if it is wet. It may be necessary to place alternating layers/lifts of clay then granular fill in order to create a stable embankment.

Glaciofluvial – We anticipate that excavated Glaciofluvial deposits (sand and gravel) may be reused as granular borrow in accordance with MDOT Standard Specifications, Section 703.19, Granular Borrow, Material for Embankment Construction. Glaciofluvial deposits should also be suitable as common borrow.

Glacial Till – Glacial Till should be suitable for reuse as common borrow in accordance with MDOT Standard Specifications, Section 703.18, Common Borrow. Contractors should expect that prior to placement and compaction it may be necessary to spread out and dry portions of the Glacial Till that are excessively moist. We recommend that the contract documents include moisture conditioning activities as part of the project earthwork requirements.

Bedrock – We anticipate that excavated bedrock may be reused on the project as riprap or processed for crushed stone or gravel for use as slope protection, rock borrow or drainage layers.

The accumulation of construction debris located in the vicinity of Station 12+640 was investigated by MDOT and the results of that investigation will be reported by the

Department. However, it is understood that most of the debris consists of brick and concrete rubble with miscellaneous amounts of wood, metal, glass, etc. It is anticipated that the debris will be suitable for use in non-critical portions of the roadway embankments (outside a 1:1 line extending downward and outward from the edge of the subbase course).

## CLOSURE

This report has been prepared for specific application for the design and construction of the Contract No. 1 roadway for the Kennebec River Crossing project. The work was intended to investigate the general subsurface conditions along the alignment and assess how the subsurface conditions will affect the planning, design and construction of the roadway. Supplemental design phase geotechnical consulting services will be provided to HNTB during design and preparation of contract documents for Contract No. 1.

The comments and recommendations contained in this report are based in part on the subsurface conditions encountered in the referenced field explorations and our understanding of the roadway design. If different conditions are encountered during construction or if the design of the roadway changes from that described herein, our comments and recommendations may change. We recommend that we have the opportunity to review the contract documents so that we can confirm that our recommendations have been interpreted and implemented as they were intended.

We trust this information is suitable for your present needs. If you have any questions regarding the contents of this report, please do not hesitate to contact us.

Sincerely yours,
HALEY & ALDRICH, INC.

Brian K. Lawrence, P.E.
Engineer

James W. Weaver, P.E.
Vice President

Enclosures:

| | |
|---|---|
| Table I | - Summary of Phase I Subsurface Explorations |
| Table II | - Summary of Phase II Subsurface Explorations |
| Figure 1 | - Project Locus |
| Figures 2 through 18 | - Centerline Profiles |
| Figures 19 and 20 | - Transition Zone Details |
| Appendix A | - Logs of Phase I Test Borings |
| Appendix B | - Logs of Phase II Test Borings |
| Appendix C | - Results of Laboratory Testing |

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Tables

**TABLE I**
**SUMMARY OF PHASE I SUBSURFACE EXPLORATIONS**
**KENNEBEC RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m)[1] | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Marine Deposits | | | Glacial Till | Bedrock |
| | | | | | | | | Silty Sands | Silts and Clays | Silty Sands | | |
| B1 | 200+334 | 12 L | 72.66 | 7.22 | 3.69 | 0.27 | -- | 1.65 | 4.69 | -- | 0.61* | -- |
| B2 | 9+912 | 57 L | 71.20 | 5.24 | -- | 0.24 | -- | 1.34 | 3.66 | -- | --* | --* |
| B3 | 10+085 | 21 L | 77.39 | 5.88 | -- | 0.09 | -- | 3.42 | 3.66 | -- | 0.61* | --* |
| B4 | 10+244 | CL | 74.49 | 4.94 | -0.15 | 0.09 | -- | 1.62 | 2.62 | -- | 0.61* | --* |
| B5 | 10+360 | CL | 75.90 | 13.90 | 0.61 | 0.12 | 1.25 | -- | 4.57 | -- | 4.55 | 3.41* |
| B6 | 10+393 | CL | 77.60 | 11.52 | 1.71 | 0.15 | 3.32 | -- | 3.54 | -- | 1.37 | 3.14* |
| B7 | 10+442 | CL | 75.80 | 10.36 | 0.00 | 0.12 | -- | 2.01 | 3.78 | -- | 1.34 | 3.11* |
| B8 | 10+482 | CL | 75.59 | 10.00 | 0.00 | 0.18 | -- | 2.02 | 2.50 | -- | 3.07 | 2.14* |
| B9 | 300+165 | 2 R | 79.71 | 4.48 | 3.54 | 0.12 | 0.67 | 0.73 | 2.50 | -- | 0.46* | -- |
| B10 | 10+640 | CL | 81.90 | 12.19 | 2.71 | 0.21 | -- | 0.86 | 10.21 | -- | 0.91* | -- |
| B11 | 10+792 | CL | 79.61 | 11.28 | 3.35 | 0.24 | -- | 4.73 | 5.94 | -- | 0.37* | -- |
| B12/ B12A | 10+838 | CL | 79.03 | 15.82 | 14.17 | 0.15 | -- | -- | 9.21 | 0.09 | 3.26 | 3.11* |
| B13 | 10+888 | 2 R | 75.62 | 13.72 | 0.24 | 0.06 | -- | -- | 7.71 | -- | 2.78 | 3.17* |
| B14 | 11+042 | CL | 70.80 | 12.80 | 4.15 | 0.12 | -- | 0.43 | 10.12 | 1.89 | 0.24* | -- |
| B15 | 11+158 | 3 R | 75.04 | 3.51 | 1.68 | 0.15 | -- | 1.98 | -- | -- | 1.38* | -- |
| B16 | 11+362 | CL | 77.74 | 6.46 | 4.63 | 0.09 | -- | 3.29 | -- | -- | -- | 3.08* |
| B17(OW) | 11+457 | CL | 74.03 | 6.86 | 0.12 | 0.15 | -- | 1.40 | 1.80 | 0.22 | 0.42 | 2.87* |
| B18 | 11+646 | CL | 53.19 | 5.03 | 0.34 | 0.21 | -- | 2.78 | -- | -- | 2.04* | -- |
| B19 | 11+798 | CL | 61.11 | 6.22 | 0.79 | 0.12 | -- | 2.99 | -- | -- | -- | 3.11* |
| B20 | 11+996 | 2 R | 51.90 | 2.23 | 1.28 | 0.15 | -- | 0.43 | -- | -- | 1.65 | --* |
| B21/B21A | 12+120 | 2R / 1R | 45.63 | 1.22/1.49 | -- | 0.21 | -- | 0.77/1.22 | -- | -- | 0.24/0.06 | --* |
| B22 | 12+315 | 14 R | 57.88 | 8.29 | 7.13 | 0.15 | -- | 0.12 | 5.98 | 2.04 | -- | --* |
| B23(OW) | 12+442 | 30 R | 55.87 | 12.04 | -- | 0.09 | -- | 0.82 | 6.77 | 4.36 | -- | --* |
| B24 | 12+590 | 14R | 55.60 | 9.60 | -- | -- | 0.91 | 2.60 | -- | 6.09* | -- | -- |
| B25 | 12+741 | 12R | 48.46 | 9.75 | -- | 0.18 | -- | -- | 4.70 | 4.87* | -- | -- |
| B26 | 12+845 | 1R | 36.97 | 25.30 | 17.83 | -- | -- | 1.77[2] | 10.42 | 0.92 | 12.19 | -- |

Notes:

| | |
|---|---|
| -- | Deposit not encountered in exploration or water level not measured |
| * | Depth of penetration into stratum in exploration (does not necessarily represent full depth of deposit) |
| 1. | Elevations referenced to National Geodetic Vertical Datum (NGVD) |
| 2. | Glaciofluvial Deposit – coarse to fine Sand |

**TABLE II**
**SUMMARY OF PHASE II SUBSURFACE EXPLORATIONS**
**KENNEBEC RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m)[1] | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Marine Sand, Silt and Clay | Glacio-fluvial Deposit | Glacial Stream Deposit | Glacial Till | Bedrock |
| C1-1-01 | 200+226 | 8R | 81.250 | 13.91 | -- | 0.06 | -- | 13.84 | -- | -- | 0.04 | R |
| C1-2-01 | 200+418 | 1.5R | 74.770 | 10.77 | -- | 0.03 | -- | 10.61 | -- | -- | 0.30 | -- |
| C1-3-01 | 100+528 | 1R | 71.454 | 3.97 | 0.76 | 0.09 | -- | 1.53 | -- | -- | 2.34 | R |
| C1-4-01 | 100+626 | 1R | 71.710 | 6.65 | 3.81 | 0.06 | -- | 6.04 | -- | -- | 0.54 | R |
| C1-5-01 | 9+913 | 4L | 73.490 | 7.96 | -- | 0.03 | -- | 6.98 | -- | 0.95 | -- | R |
| C1-6-01 | 10+017 | 4L | 75.745 | 6.41 | -- | 0.03 | -- | 4.66 | -- | -- | 1.71 | R |
| C1-7-01 | 11+340 | 15R | 74.541 | 4.05 | 1.71 | 0.24 | -- | 0.40 | -- | -- | 1.28 | 2.13* |
| C1-8-01 | 11+340 | 15L | 75.700 | 4.39 | 0.61 | 0.15 | -- | 0.76 | -- | -- | 1.50 | 1.98* |
| C1-9-01 | 11+380 | 15R | 77.790 | 6.19 | 3.20 | 0.06 | -- | 0.85 | 2.96 | -- | 0.79 | 1.53* |
| C1-10-01 | 11+380 | 15L | 78.906 | 6.86 | 5.39 | 0.21 | -- | -- | 4.36 | -- | 0.76 | 1.55* |
| C1-11-01 | 11+400 | CL | 77.478 | 7.53 | 3.99 | 0.06 | -- | 3.63 | -- | -- | 2.31 | 1.53* |
| C1-12-01 | 11+420 | 15R | 77.480 | 7.47 | 5.82 | 0.12 | -- | -- | 2.65 | -- | 4.70* | -- |
| C1-13-01 | 11+420 | 15L | 76.438 | 3.84 | 0.67 | 0.12 | -- | 2.44 | -- | -- | -- | 1.28* |
| C1-14-01 | 11+440 | CL | 75.139 | 5.21 | 2.01 | 0.03 | -- | 2.68 | -- | -- | 0.34 | 2.16* |
| C1-15-01 | 11+457 | 15R | 75.331 | 6.86 | 4.63 | 0.03 | -- | 3.90 | -- | -- | 1.34 | 1.59* |
| C1-16-01 | 11+457 | 15L | 73.986 | 4.11 | 3.17 | 0.15 | -- | 3.42 | -- | -- | 0.54* | -- |
| C1-16A-01 | 11+457 | 15.5L | 73.986 | 5.64 | 2.53 | 0.15 | -- | 3.42 | -- | -- | 0.51 | 1.56* |
| C1-17-01 | 11+480 | CL | 74.172 | 7.89 | 4.60 | 0.06 | -- | 4.05 | -- | -- | 2.29 | 1.49* |
| C1-18-01 | 11+500 | 15R | 75.264 | 12.34 | 7.92 | 0.09 | -- | 2.96 | -- | -- | 7.89 | 1.40* |
| C1-19-01 | 11+500 | 15L | 72.867 | 9.39 | 4.69 | 0.12 | -- | 3.45 | -- | -- | 4.45 | 1.37* |
| C1-20-01 | 11+540 | 25L | 73.022 | 8.23 | 2.31 | 0.09 | -- | 8.14* | -- | -- | -- | -- |
| C1-21-01 | 11+540 | 15L | 74.765 | 11.58 | 1.39 | 0.09 | -- | 11.49* | -- | -- | -- | -- |
| C1-22-01 | 11+540 | 15R | 72.747 | 11.58 | 4.05 | 0.12 | -- | 10.37 | -- | -- | 1.09* | -- |
| C1-23-01 | 11+540 | 30R | 73.719 | 5.79 | -- | 0.09 | -- | 5.70* | -- | -- | -- | -- |
| C1-24-01 | 11+562 | 15L | 70.541 | 12.10 | 9.14 | 0.15 | -- | 9.91 | -- | -- | 2.04* | -- |
| C1-25-01 | 11+560 | CL | 72.300 | 12.80 | 8.78 | 0.09 | -- | 12.71* | -- | -- | -- | -- |

**TABLE II**
**SUMMARY OF PHASE II SUBSURFACE EXPLORATIONS**
**KENNEBEC RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m)[1] | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Marine Sand, Silt and Clay | Glacio-fluvial Deposit | Glacial Stream Deposit | Glacial Till | Bedrock |
| C1-26-01 | 11+560 | 15R | 68.935 | 8.87 | 7.62 | 0.09 | -- | 7.38 | -- | -- | 1.40* | -- |
| C1-27-01 | 11+601 | 1.4R | 64.802 | 11.28 | 9.91 | 0.03 | -- | 11.25* | -- | -- | -- | -- |
| C1-28-01 | 11+599 | 16.2R | 67.491 | 8.23 | 0.00 | 0.09 | -- | 8.14* | -- | -- | -- | -- |
| C1-29-01 | 11+620 | 18L | 53.854 | 2.41 | 0.76 | 0.09 | -- | 2.32 | -- | -- | -- | R |
| C1-30-01 | 11+648 | 20R | 53.411 | 5.18 | 1.37 | 0.03 | -- | 3.51 | -- | -- | 1.64* | -- |
| C1-31-01 | 500+240 | 5.1R | 55.814 | 8.69 | -- | -- | 4.21 | 4.02 | -- | -- | 0.46 | R |
| C1-32-01 | 500+302 | 5.9L | 57.430 | 1.13 | -- | -- | 1.13 | -- | -- | -- | -- | R |
| C1-33-01 | 500+423 | 3.7R | 66.411 | 1.68 | -- | -- | 1.52 | -- | -- | -- | 0.16 | R |
| C1-34-01 | 500+513 | 5.7L | 70.176 | 3.66 | -- | -- | 1.52 | 1.53 | -- | -- | 0.61** | -- |
| C1-35-01 | 11+760 | 15L | 64.000 | 3.47 | 3.35 | 0.03 | -- | 1.77 | -- | -- | 1.67 | R |
| C1-36-01 | 11+760 | CL | 63.281 | 3.47 | -- | 0.06 | -- | 3.45 | -- | -- | -- | R |
| C1-37-01 | 11+760 | 10R | 61.915 | 1.52 | -- | 0.03 | -- | 1.49 | -- | -- | -- | R |
| C1-38-01 | 11+820 | 15R | 63.437 | 5.19 | -- | 0.06 | -- | 4.09 | -- | -- | 1.03* | -- |
| C1-39-01 | 11+841 | 16L | 64.400 | 6.92 | 5.57 | 0.03 | -- | 2.77 | -- | -- | 1.10 | 3.02* |
| C1-40-01 | 11+840 | CL | 64.378 | 4.58 | -- | 0.03 | -- | 4.39 | -- | -- | 0.15 | R |
| C1-41-01 | 11+840 | 15R | 65.558 | 7.32 | -- | 0.06 | -- | 7.26* | -- | -- | -- | -- |
| C1-42-01 | 11+860 | 15L | 64.280 | 2.90 | -- | 0.09 | -- | 1.07 | -- | -- | 1.74 | R |
| C1-43-01 | 11+899 | 16.9L | 63.331 | 2.44 | -- | 0.09 | -- | 2.35 | -- | -- | -- | R |
| C1-44-01 | 11+900 | 0.8L | 62.499 | 5.19 | -- | 0.06 | -- | 4.05 | -- | -- | 1.07* | -- |
| C1-45-01 | 11+940 | 15L | 59.739 | 2.07 | -- | 0.06 | -- | 2.01* | -- | -- | -- | -- |
| C1-45A-01 | 11+940 | 12L | 59.739 | 2.41 | -- | 0.06 | -- | 2.01 | -- | -- | 0.34* | -- |
| C1-46-01 | 11+940 | 15R | 56.000 | 2.38 | -- | 0.06 | -- | 1.65 | -- | -- | 0.67 | R |
| C1-47-01 | 12+020 | 15L | 60.561 | 8.23 | -- | 0.09 | -- | 8.14* | -- | -- | -- | -- |
| C1-48-01 | 12+061 | 15.7R | 47.133 | 2.14 | -- | 0.06 | -- | 1.46 | -- | -- | 0.61 | R |
| C1-49-01 | 12+121 | 30R | 41.200 | 0.67 | -- | 0.06 | -- | 0.61 | -- | -- | -- | R |
| C1-50-01 | 12+120 | 8.5R | 45.100 | 0.18 | -- | 0.03 | -- | 0.12 | -- | -- | 0.03 | R |
| C1-51-01 | 12+120 | 10L | 47.455 | 1.28 | -- | 0.06 | -- | 0.70 | -- | -- | 0.52 | R |

**TABLE II**
**SUMMARY OF PHASE II SUBSURFACE EXPLORATIONS**
**KENNEBEC RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m)[1] | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Marine Sand, Silt and Clay | Glacio-fluvial Deposit | Glacial Stream Deposit | Glacial Till | Bedrock |
| C1-52-01 | 12+180 | 10R | 48.730 | 0.67 | -- | 0.03 | -- | 0.64 | -- | -- | -- | R |
| C1-53-01 | 12+240 | 15R | 46.896 | 1.62 | -- | 0.09 | -- | 0.67 | -- | -- | 0.86 | R |
| C1-54-01 | 12+240 | 10L | 52.761 | 0.64 | -- | 0.03 | -- | 0.46 | -- | -- | 0.15 | R |
| C1-55-01 | 12+281 | 0.9R | 58.400 | 4.51 | -- | 0.03 | -- | 3.78 | -- | -- | 0.70 | R |
| C1-56-01 | 12+282 | 25L | 65.856 | 7.63 | -- | 0.09 | -- | 7.16 | -- | -- | 0.37 | R |
| C1-57-01 | 12+340 | CL | 63.713 | 12.81 | -- | 0.09 | -- | 12.71* | -- | -- | -- | -- |
| C1-58-01 | 12+341 | 20L | 68.413 | 13.94 | 13.63 | 0.06 | -- | 10.67 | 1.16[2] | -- | 2.04 | R |
| C1-59-01 | 12+340 | 41.8L | 72.391 | 12.81 | -- | 0.06 | -- | 12.74* | -- | -- | -- | -- |
| C1-60-01 | 12+420 | 0.9R | 62.200 | 12.69 | -- | 0.03 | -- | 11.70 | -- | -- | 0.95 | R |
| C1-61-01 | 12+420 | 30L | 70.366 | 10.13 | 9.64 | 0.06 | -- | 9.85 | -- | -- | 0.21 | R |
| C1-62-01 | 12+460 | 18.4L | 63.000 | 6.68 | 6.62 | 0.06 | -- | 5.33 | -- | -- | 1.29 | R |
| C1-63-01 | 12+459 | 35.8L | 71.036 | 8.39 | -- | 0.06 | -- | 7.26 | -- | -- | 1.06 | R |
| C1-64-01 | 12+498 | 1.7L | 64.700 | 10.46 | -- | 0.03 | -- | 10.18 | -- | -- | 0.24 | R |
| C1-65-01 | 12+500 | 25L | 68.809 | 8.02 | -- | 0.12 | -- | 5.98 | -- | -- | 1.92 | R |
| C1-65A-01 | 12+500 | 25L | 68.809 | 9.76 | -- | 0.12 | -- | 5.98 | -- | -- | 1.89 | 1.76* |
| C1-66-01 | 12+501 | 40L | 70.356 | 4.42 | -- | 0.06 | -- | 4.36* | -- | -- | -- | -- |
| C1-66A-01 | 12+502 | 40L | 70.356 | 4.58 | -- | 0.06 | -- | 4.51 | -- | -- | -- | R |
| C1-67-01 | 12+541 | 8.7R | 55.555 | 8.05 | -- | 0.03 | -- | 4.54 | -- | -- | 3.48 | R |
| C1-68-01 | 12+540 | 15L | 67.246 | 9.94 | -- | 0.12 | 2.01 | 7.32 | -- | -- | 0.49 | R |
| C1-69-01 | 12+540 | 35L | 66.985 | 3.05 | -- | -- | 3.05 | -- | -- | -- | R* | -- |
| C1-69A-01 | 12+540 | 37.4L | 66.900 | 4.12 | -- | -- | 2.74 | -- | 0.37 | -- | 1.00 | R |
| C1-69B-01 | 12+541 | 35.6L | 66.900 | 5.92 | -- | -- | 2.74 | -- | 0.37 | -- | 1.28 | 1.52* |
| C1-70-01 | 12+580 | 5L | 62.332 | 10.07 | -- | 0.03 | -- | 9.66 | -- | -- | 0.37 | R |
| C1-70A-01 | 12+580 | 5L | 62.200 | 12.08 | -- | 0.03 | -- | 9.66 | -- | -- | 0.98 | 1.40* |
| C1-71-01 | 12+580 | 25L | 61.291 | 4.94 | -- | 0.06 | -- | 2.53 | -- | -- | 2.35 | R |

**TABLE II**
**SUMMARY OF PHASE II SUBSURFACE EXPLORATIONS**
**KENNEBEC RIVER CROSSING PROJECT**
**AUGUSTA, MAINE**

| Explor. No. | Station (m) | Offset (m) | Ground Surface El. (m)[1] | Expl. Depth (m) | Depth to Water (m) | Strata Thickness (m) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Topsoil | Fill | Marine Sand, Silt and Clay | Glacio-fluvial Deposit | Glacial Stream Deposit | Glacial Till | Bedrock |
| C1-72-01 | 12+620 | 10R | 57.058 | 10.16 | -- | -- | 5.18 | 3.35 | -- | -- | 1.38 | 0.24* |
| C1-73-01 | 12+620 | 15L | 57.104 | 5.64 | -- | -- | 4.27 | -- | -- | -- | 1.32 | R |
| C1-74-01 | 12+658 | 10R | 53.652 | 10.07 | -- | -- | 7.01 | 3.05* | -- | -- | -- | -- |
| C1-75-01 | 12+660 | 15L | 53.385 | 9.00 | -- | -- | 1.55 | 5.77 | -- | -- | 1.67 | R |
| C1-76-01 | 12+700 | CL | 49.966 | 8.24 | -- | 0.03 | -- | 8.20* | -- | -- | -- | -- |
| C1-77-01 | 12+740 | 13.5R | 49.000 | 6.86 | -- | 0.06 | -- | 6.80 | -- | -- | R* | -- |
| C1-78-01 | 12+740 | 15L | 46.958 | 7.32 | -- | 0.03 | 0.46 | 6.83* | -- | -- | -- | -- |
| C1-79-01 | 12+781 | 10R | 44.200 | 5.19 | -- | -- | 0.52 | 3.75 | -- | 0.91* | -- | -- |
| C1-80-01 | 12+820 | CL | 37.019 | 12.35 | -- | -- | 0.30 | 9.94 | -- | 2.10 | -- | R |
| C1-81-01 | 12+838 | 10.5L | 37.200 | 14.34 | -- | -- | 1.22 | 11.80 | -- | 1.31* | -- | -- |
| C1-82-01 | 12+854 | 10R | 37.299 | 14.34 | -- | 0.03 | -- | 12.95 | -- | 1.35* | ---- | -- |

Notes:
-- Deposit not encountered in exploration or water level not measured
* Depth of penetration into stratum in exploration (does not necessarily represent full depth of deposit)
R Auger refusal or split spoon refusal
1. Elevations referenced to National Geodetic Vertical Datum (NGVD)
2. Glaciofluvial deposit is over Marine Deposit in C1-58-01

Figures

| METRIC | 1. All dimensions are in millimeters unless otherwise noted. 2. All elevations and stations are in meters. | F.H.W.A. REG. NO. | STATE | PROJECT NUMBER | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|
| | | 1 | MAINE | STP-0556.21 | 1 | ??? |

AUGUSTA THIRD BRIDGE
PIN 0556.20

# STATE OF MAINE
# DEPARTMENT OF TRANSPORTATION

## PLAN LEGEND

COUNTY LINES
TOWN LINES
PROPERTY LINES
R/W LINES–EXISTING
R/W LINES–NEW–ACCESS–CONTROL
R/W LINES–NEW–NO ACCESS–CONTROL
R/W LINES–NEW WITHIN EXISTING R/W
R/W LINES–EXISTING WITHIN NEW R/W
CULVERT–EXISTING
CULVERT–PROPOSED
CURBING–EXISTING
CURBING–PROPOSED
FIRE HYDRANTS ◆ EXISTING ◆ PROPOSED
TRAVELWAY–EXISTING
TRAVELWAY–PROPOSED
RAILROAD
OUTLINE OF BODIES OF WATER
CATCH BASINS ■ EXISTING ■ PROPOSED
MANHOLES ● EXISTING ● PROPOSED
UTILITY POLES ♦ EXISTING ♦ PROPOSED
UTILITY POLES–JOINT OCCUPANCY
PROPOSED UTILITY POLE–TEMPORARY
FENCE (LABEL TYPE)
TREES ● HARDWOOD ◀ SOFTWOOD
WOODS

# AUGUSTA THIRD BRIDGE
## (INTERSTATE 95 TO KENNEBEC RIVER BRIDGE)
## KENNEBEC COUNTY
### NATIONAL HIGHWAY SYSTEM
## PROJECT NO. STP-0556.21
### PROJECT LENGTH: 5.34 km
### A GRADING, DRAINAGE, BASE AND PAVEMENT PROJECT

PROFILE KEY/GEOLOGIC UNITS

MARINE SILT/SAND– MARINE SILTS AND SANDS (AND POSSIBLY MINOR AMOUNTS OF CLAY) PRIMARILY NON–PLASTIC

MARINE SILTS/CLAYS– PRIMARILY SILT AND CLAY (AND VARYING QUANTITIES OF SAND AT SOME LOCATIONS)HAVING SOME DEGREE OF PLASTICITY

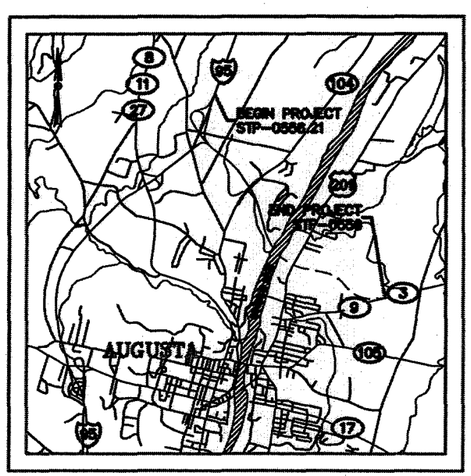
GLACIOFLUVIAL DEPOSITS– PRIMARILY SAND AND GRAVEL (TYPICALLY DERIVED FROM GLACIAL MELTWATER, MAY ALSO INCLUDE OTHER GLACIAL DEPOSITIONAL FEATURES)

GLACIAL STREAM DEPOSITS– PRIMARILY SAND AND GRAVEL (TRANSPORTED BY ACTIVE GLACIAL MELTWATER STREAMS)

GLACIAL TILL DEPOSITS– HETEROGENEOUS MIX OF SAND, SILT, AND GRAVEL

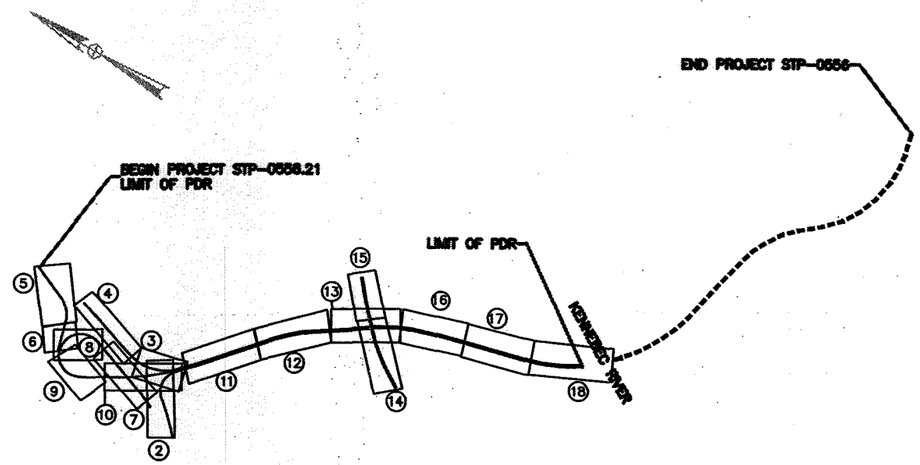
FILL–REWORKED NATURAL SOILS OR MISCELLANEOUS DEBRIS FILL

BEDROCK SURFACE– INTERPOLATED OR EXTRAPOLATED FROM BEDROCK CORES, REFUSALS, OR JUDGEMENT




A PORTION OF KENNEBEC COUNTY

1 0 1 2
SCALE IN KILOMETERS




KEY PLAN– NUMBERS REFER TO REPORT FIGURES PRESENTED HEREINAFTER.

LAYOUT PLAN
500 0 500 1000

LEGEND:

B5 DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. DURING THE PERIOD 11 MAY TO 5 JUNE 2000.

C1–8–01 DESIGNATION AND APPROXIMATE LOCATION OF TEST BORINGS DRILLED BY MAINE TEST BORINGS, INC. DURING THE PERIOD 6 AUGUST TO 6 SEPTEMBER 2001.

NOTES:

1. BASE PLAN PROVIDED BY HNTB CORPORATION AND MODIFIED BY HALEY & ALDRICH, INC.

2. TEST BORINGS WERE DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE DURING THE PERIOD 11 MAY TO 5 JUNE 2000(B–SERIES) AND 6 AUGUST TO 6 SEPTEMBER 2001(C1–XX–01 SERIES).

3. EXPLORATIONS WERE MONITORED BY HALEY & ALDRICH, INC. PERSONNEL.

4. LOCATIONS AND ELEVATIONS OF TEST BORINGS WERE DETERMINED IN THE FIELD BY MAINE DEPARTMENT OF TRANSPORTATION.

5. SEE FIGURE 2 THROUGH 18 FOR PLAN AND PROFILE INFORMATION.

HALEY & ALDRICH
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

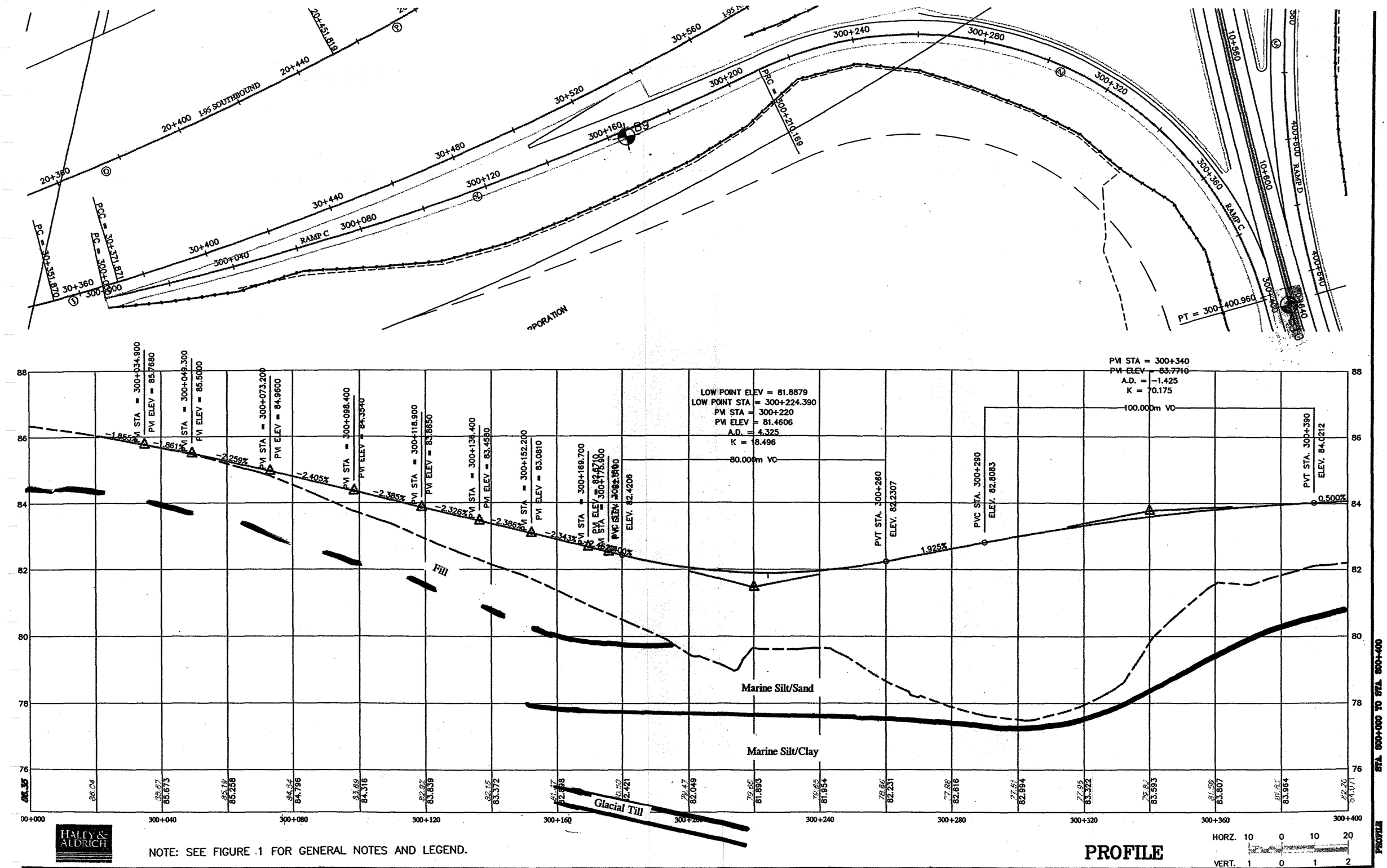
KENNEBEC RIVER CROSSING PROJECT
AUGUSTA, MAINE

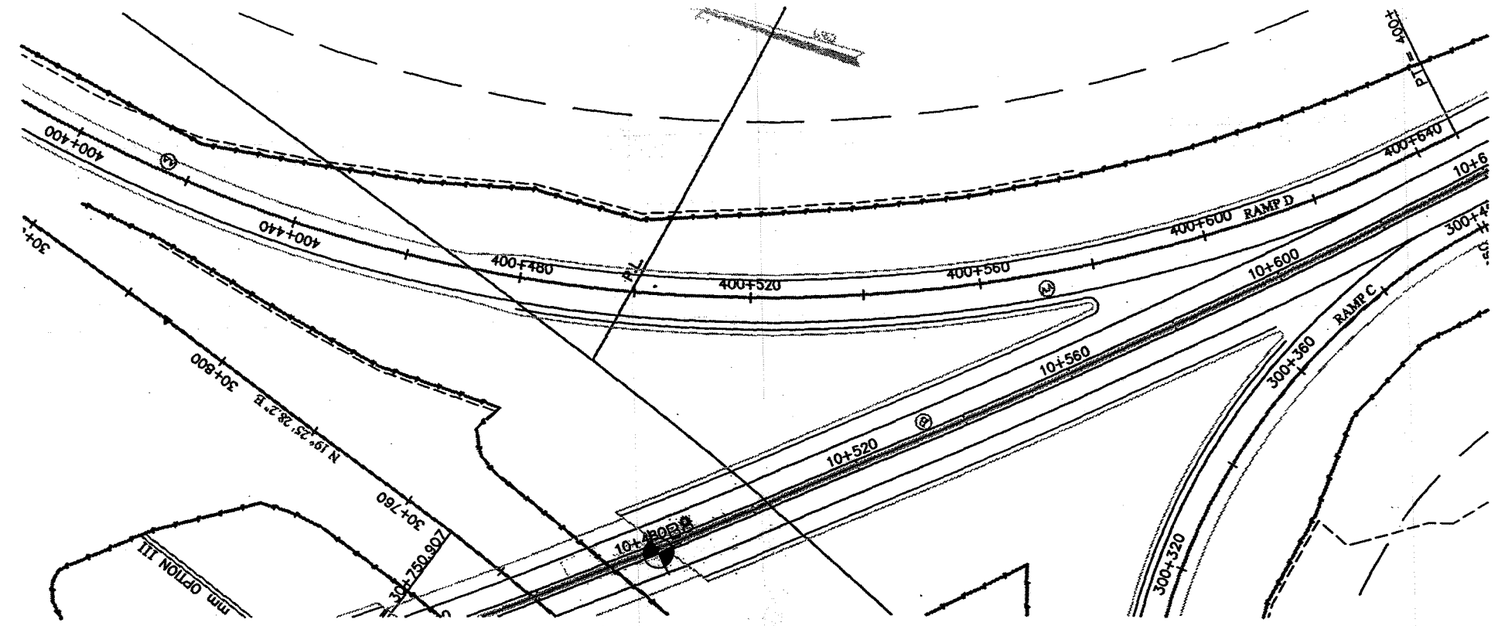
PROJECT LOCUS/PLAN AND PROFILE KEY

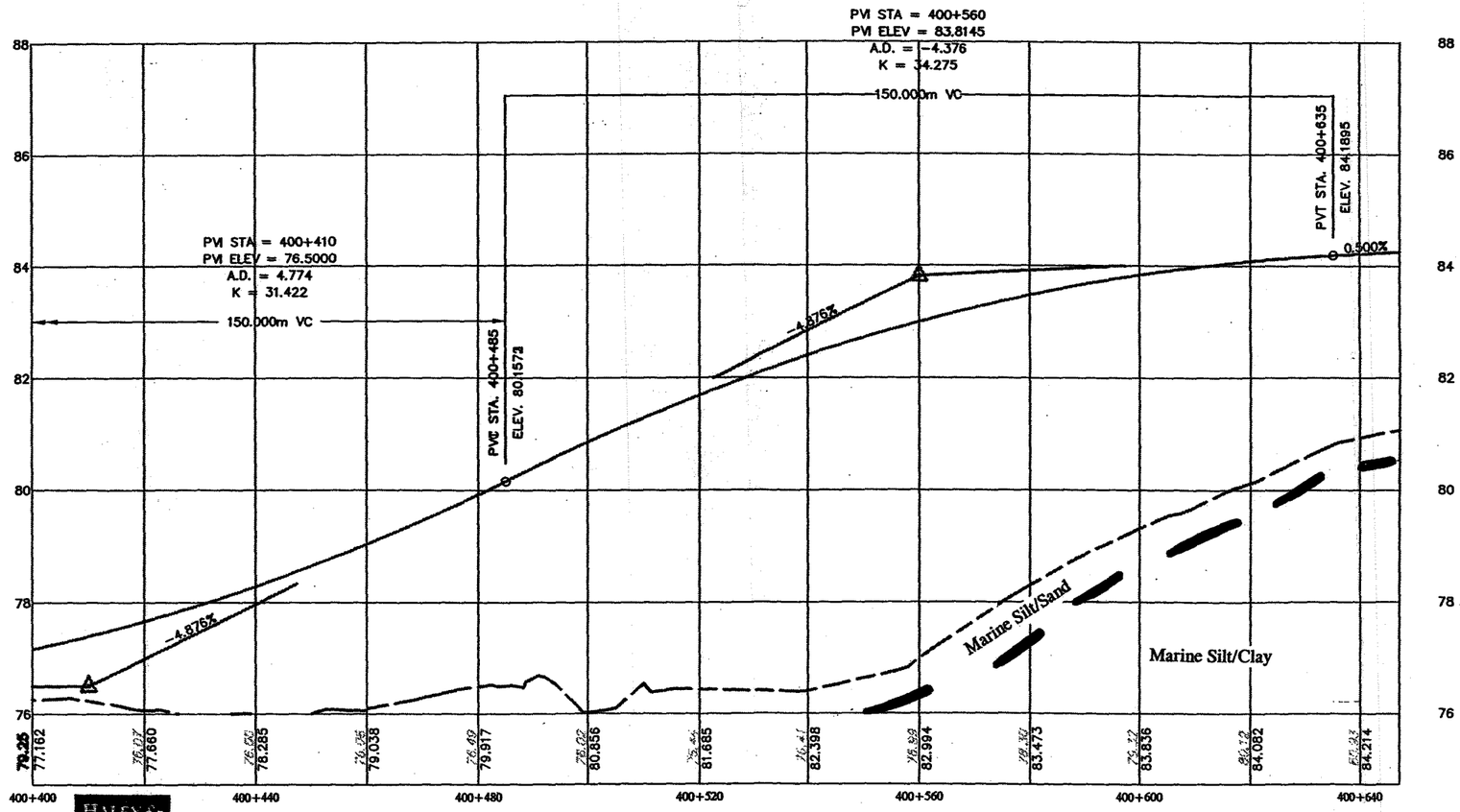
SCALE: AS SHOWN NOVEMBER 2001

FILE NO. 80765–001

FIGURE 1


I-95 SOUTHBOUND
RAMP C
RAMP D
PC = 30+351.870
PCC = 30+371.871
PC = 300+000.000
PRC = 300+219.169
PT = 300+400.960
LOW POINT ELEV = 81.8879
LOW POINT STA = 300+224.390
PVI STA = 300+220
PVI ELEV = 81.4606
A.D. = 4.325
K = 18.496
80.000m VC
PVI STA = 300+340
PVI ELEV = 83.7710
A.D. = -1.425
K = 70.175
100.000m VC
PVT STA. 300+260
ELEV. 82.2307
PVC STA. 300+290
ELEV. 82.8083
PVT STA. 300+390
ELEV. 84.0212
0.500%
1.925%
Fill
Marine Silt/Sand
Marine Silt/Clay
Glacial Till
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 1 0 1 2
AUGUSTA (RAMP C)
FIGURE 2




NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.

HALEY & ALDRICH

# PROFILE

HORZ. 10 0 10 20

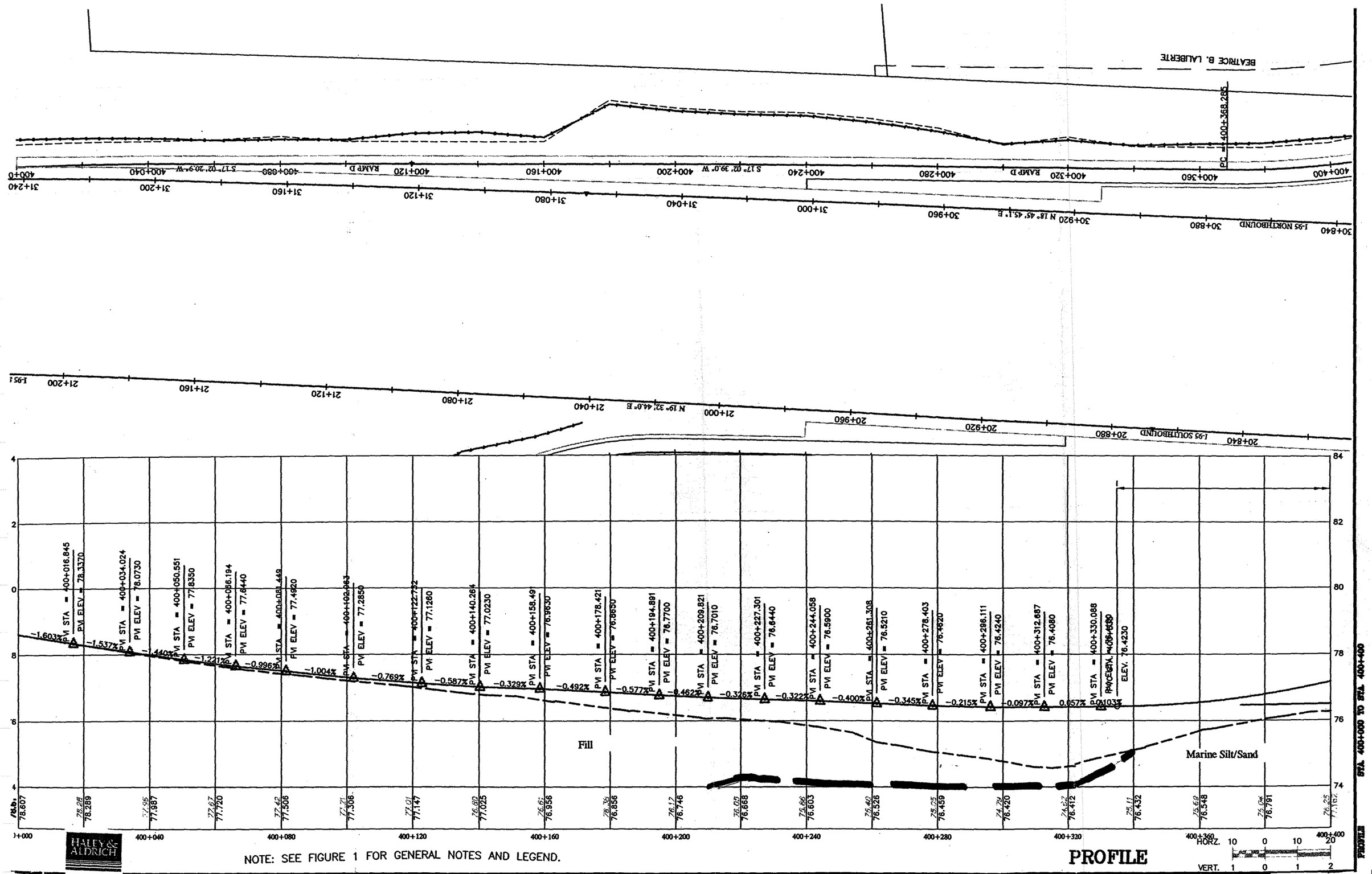
VERT. 1 0 1 2

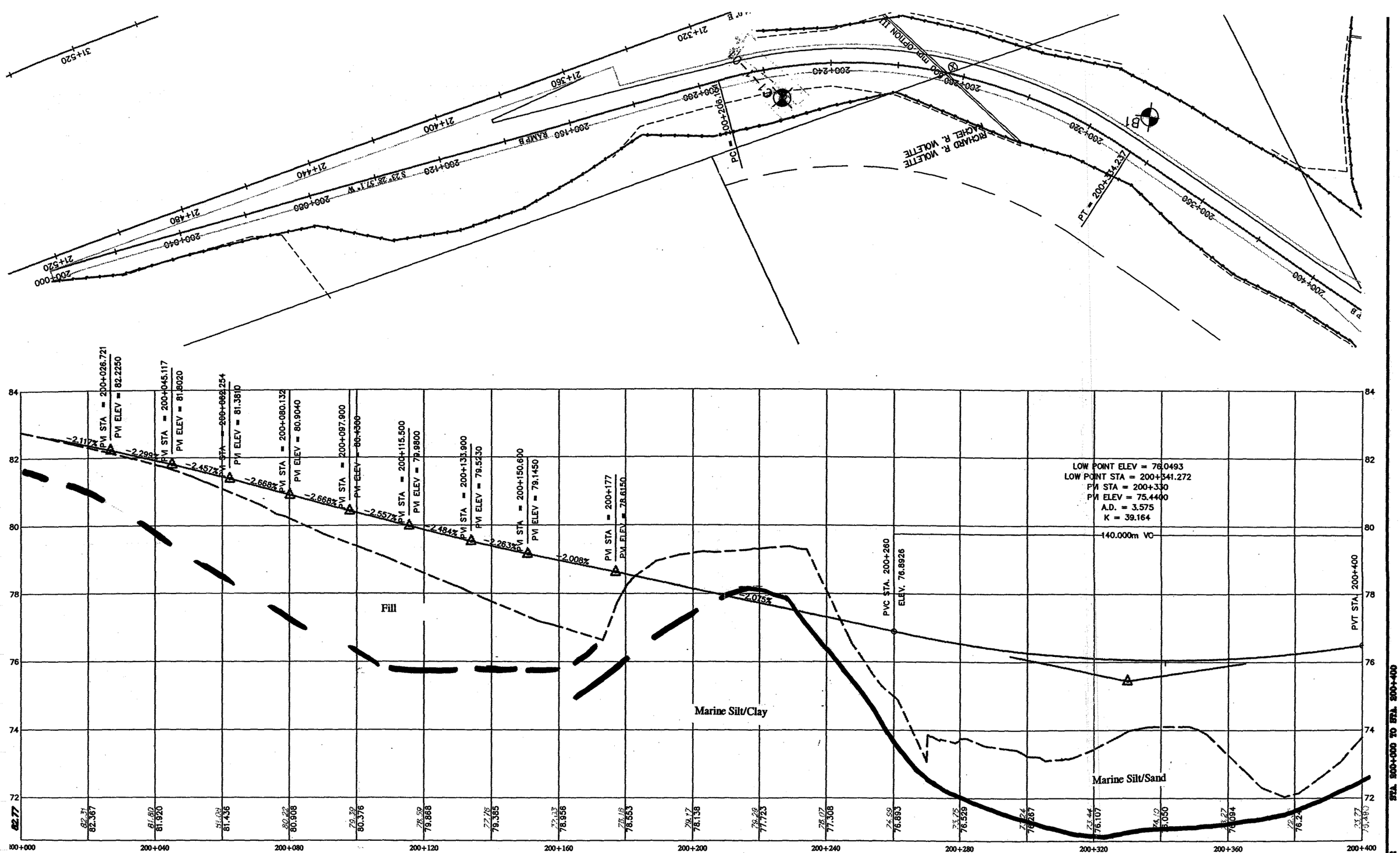
AUGUSTA (RAMP D)

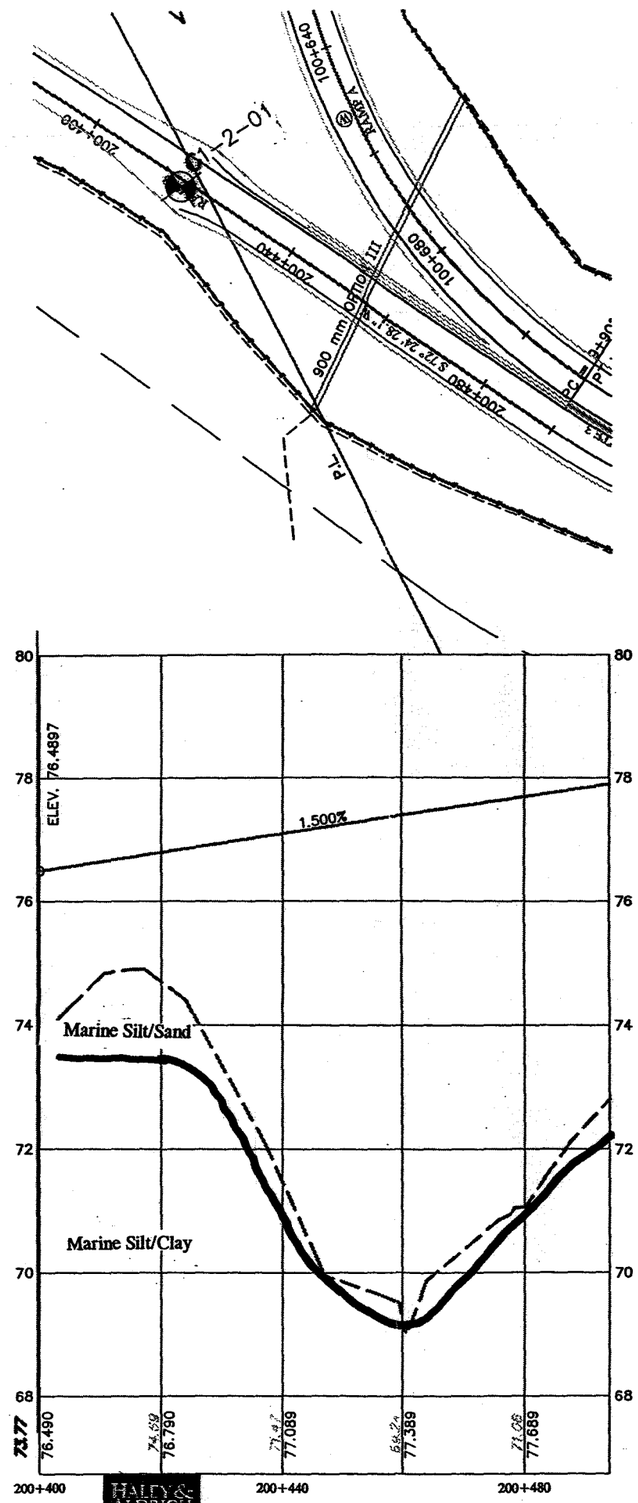
FIGURE 3

STA. 400+400 TO STA. 400+640

PROFILE


BEATRICE B. LAUBERTE
PC = 400+368.285
I-95 NORTHBOUND
I-95 SOUTHBOUND
RAMP D
S 17° 02' 39.0" W
S 17° 02' 20.9" W
N 18° 45' 45.1" E
N 19° 32' 44.0" E
PVI STA = 400+016.845
PVI ELEV = 78.3370
PVI STA = 400+034.024
PVI ELEV = 78.0730
PVI STA = 400+050.551
PVI ELEV = 77.8350
PVI STA = 400+056.194
PVI ELEV = 77.8440
PVI STA = 400+081.449
PVI ELEV = 77.4920
PVI STA = 400+092.063
PVI ELEV = 77.2850
PVI STA = 400+122.732
PVI ELEV = 77.1280
PVI STA = 400+140.284
PVI ELEV = 77.0230
PVI STA = 400+158.49
PVI ELEV = 76.9630
PVI STA = 400+178.421
PVI ELEV = 76.8650
PVI STA = 400+194.891
PVI ELEV = 76.7700
PVI STA = 400+209.821
PVI ELEV = 76.7010
PVI STA = 400+227.301
PVI ELEV = 76.6440
PVI STA = 400+244.058
PVI ELEV = 76.5900
PVI STA = 400+261.308
PVI ELEV = 76.5210
PVI STA = 400+278.403
PVI ELEV = 76.4820
PVI STA = 400+296.111
PVI ELEV = 76.4240
PVI STA = 400+312.687
PVI ELEV = 76.4080
PVI STA = 400+330.088
PVI ELEV = 76.4230
-1.603%
-1.537%
-1.440%
-1.221%
-0.996%
-1.004%
-0.769%
-0.587%
-0.329%
-0.492%
-0.577%
-0.462%
-0.326%
-0.322%
-0.400%
-0.345%
-0.215%
-0.097%
0.057%
0.103%
Fill
Marine Silt/Sand
STA 400+000 TO STA 400+400
PROFILE
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 1 0 1 2
AUGUSTA (RAMP D)
FIGURE 4


PC = 200+026.721
PVI STA = 200+045.117
PVI ELEV = 81.8020
PVI STA = 200+080.132
PVI ELEV = 80.9040
PVI STA = 200+097.900
PVI ELEV = 80.4300
PVI STA = 200+115.500
PVI ELEV = 79.9800
PVI STA = 200+133.900
PVI ELEV = 79.5230
PVI STA = 200+150.600
PVI ELEV = 79.1450
PVI STA = 200+177
PVI ELEV = 78.6150
-2.117%
-2.298%
-2.457%
-2.668%
-2.668%
-2.557%
-2.484%
-2.263%
-2.008%
-2.015%
LOW POINT ELEV = 76.0493
LOW POINT STA = 200+341.272
PVI STA = 200+330
PVI ELEV = 75.4400
A.D. = 3.575
K = 39.164
140.000m VC
PVC STA. 200+260
ELEV. 76.8926
PVT STA. 200+400
Fill
Marine Silt/Clay
Marine Silt/Sand
82.77
82.31
82.387
81.80
81.920
81.09
81.436
80.22
80.908
79.39
80.376
78.59
79.868
77.76
79.385
77.13
78.956
77.18
78.553
76.48
78.138
76.28
77.723
75.07
77.308
74.59
76.893
73.75
76.529
73.24
76.287
73.44
76.107
74.10
76.050
75.27
76.094
76.2
76.22
73.77
76.493
84
82
80
78
76
74
72
200+000
200+040
200+080
200+120
200+160
200+200
200+240
200+280
200+320
200+360
200+400
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 1 0 1 2
AUGUSTA (RAMP B)
FIGURE 5
PROFILE
STA. 200+000 TO STA. 200+400




NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.

HALEY & ALDRICH

# PROFILE

HORZ. 10 0 10 20

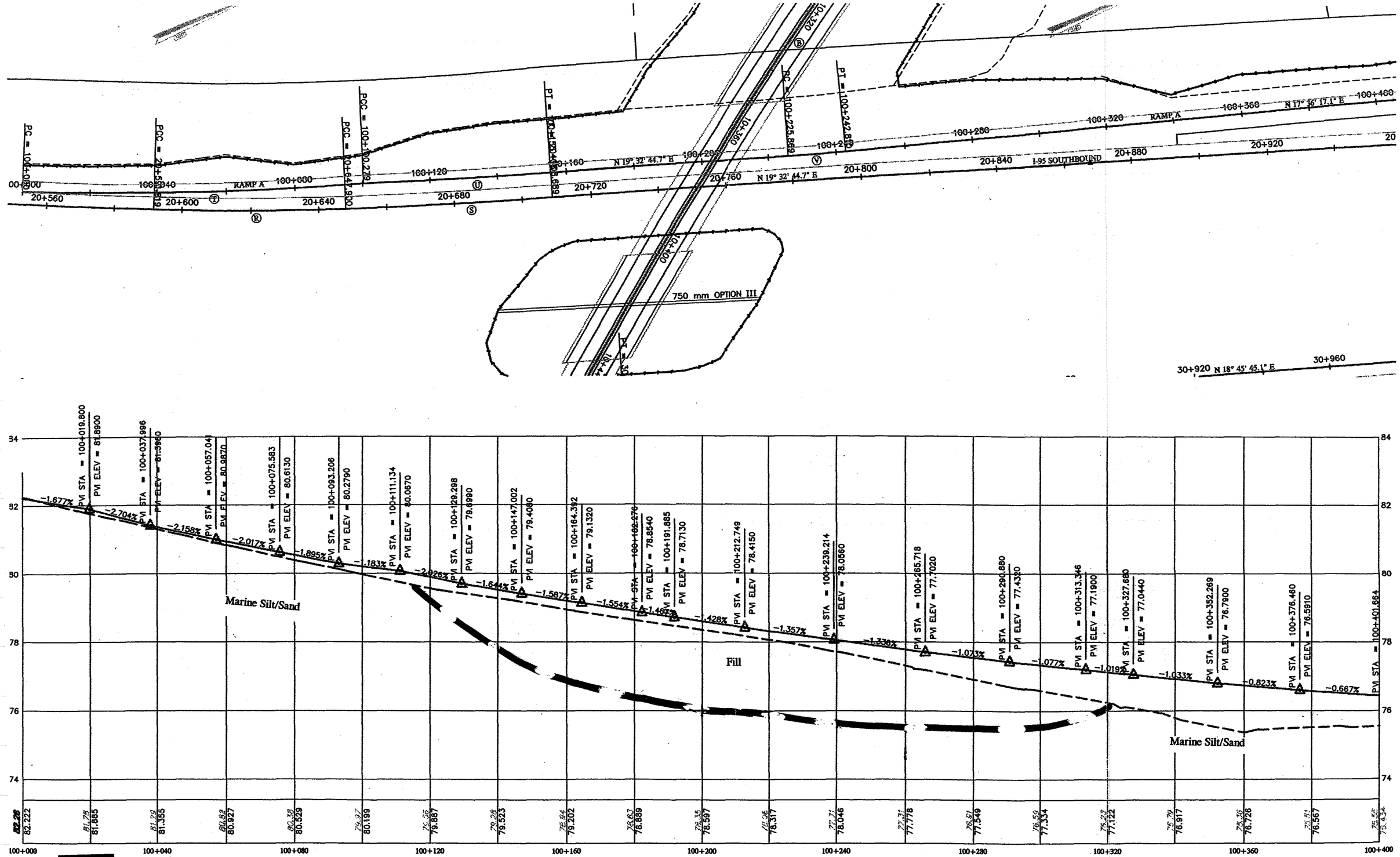
VERT. 1 0 1 2

AUGUSTA (RAMP B)

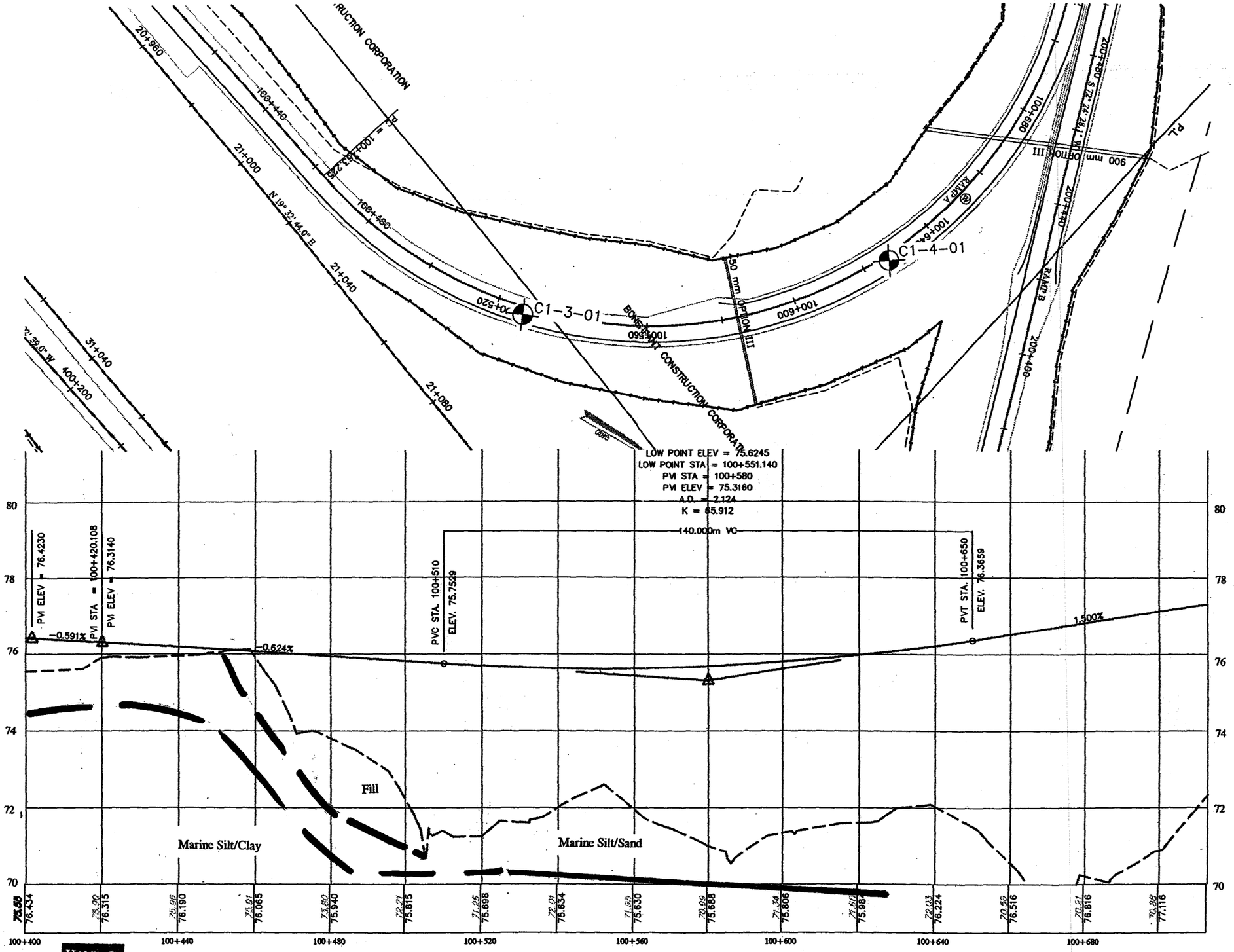
FIGURE 6

STA. 200+400 TO STA. 200+480

ELEVATION




NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.




NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.

# PROFILE

HALEY & ALDRICH

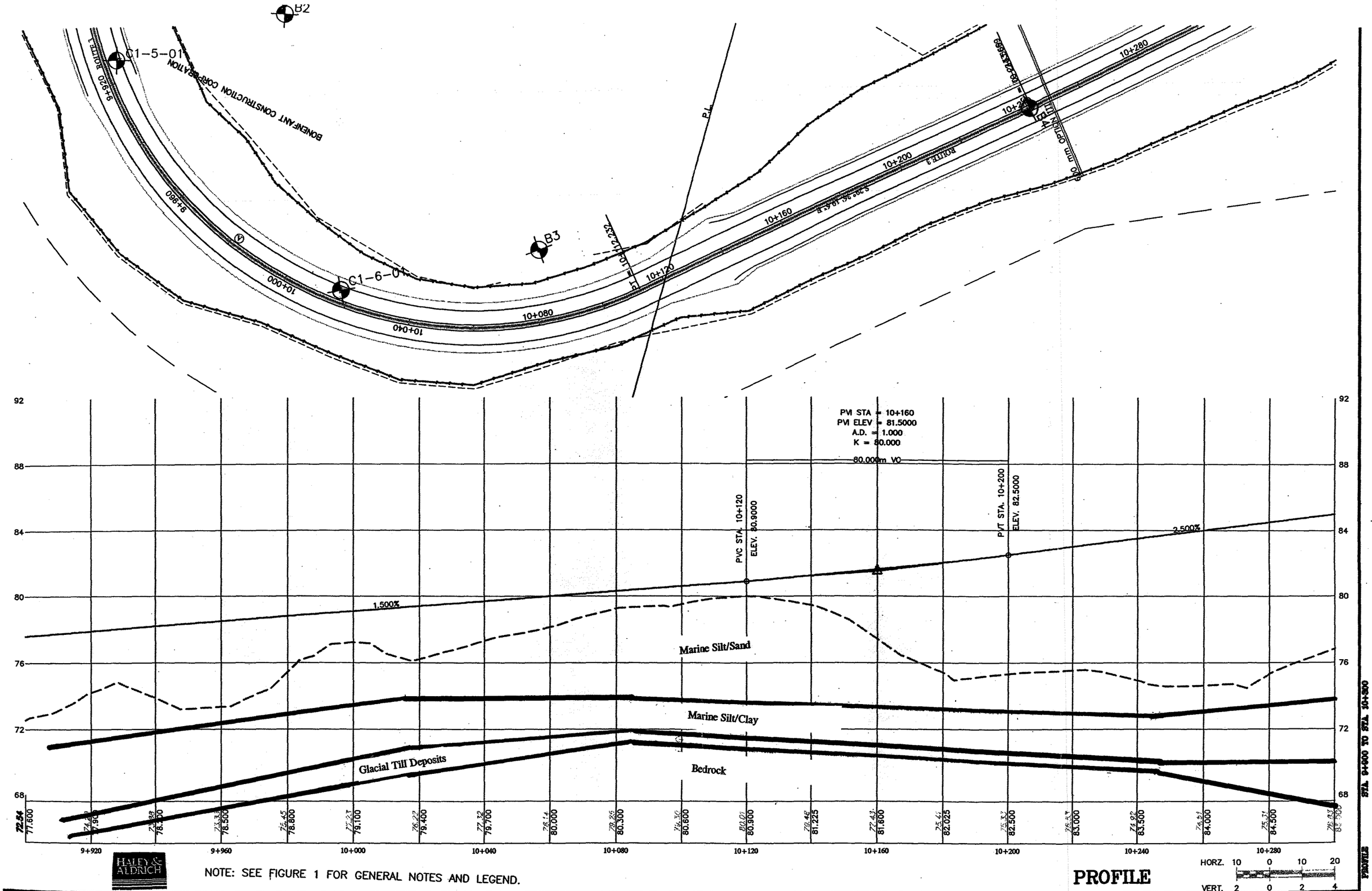
HORZ. 10 0 10 20

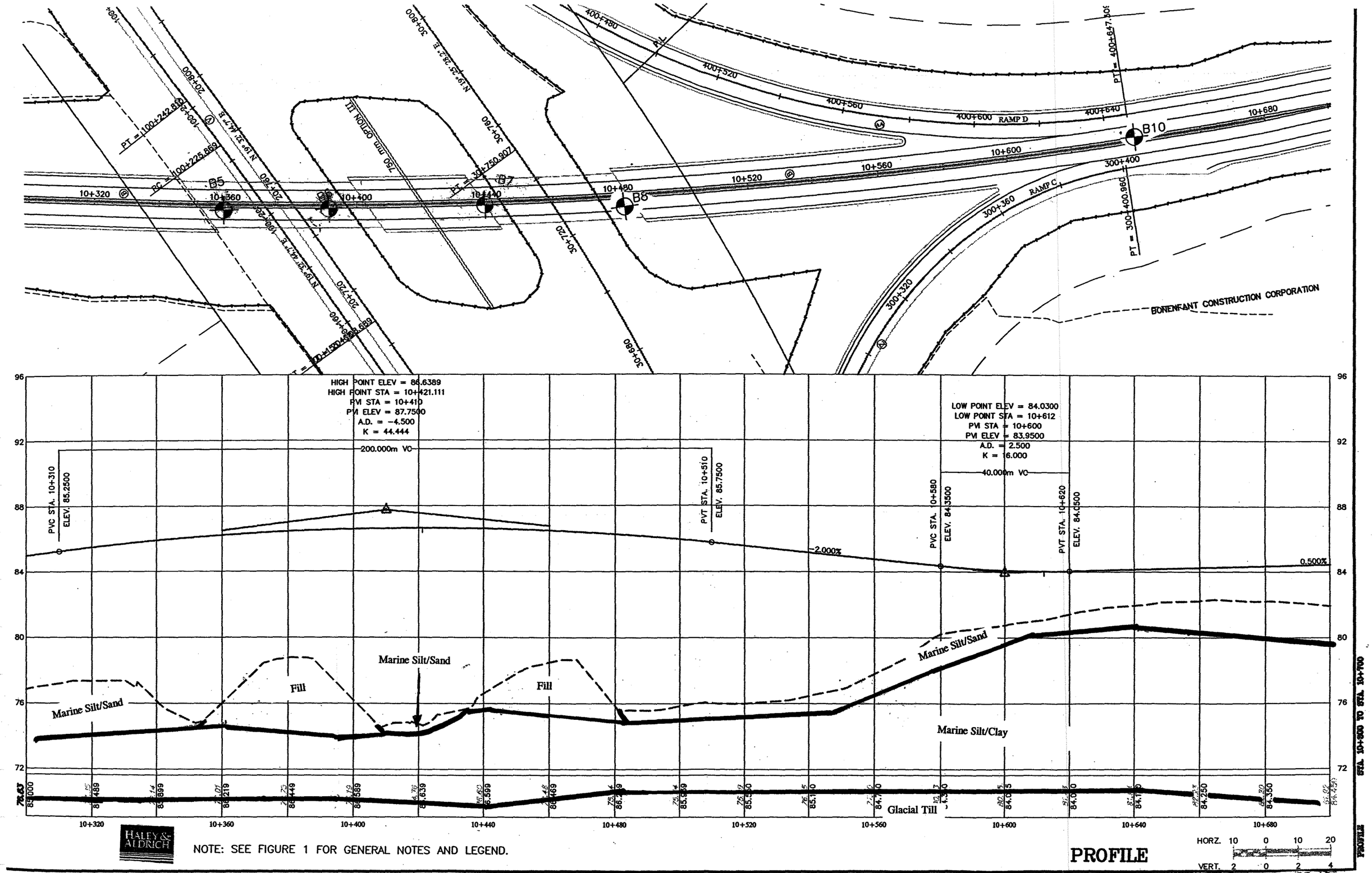
VERT. 1 0 1 2

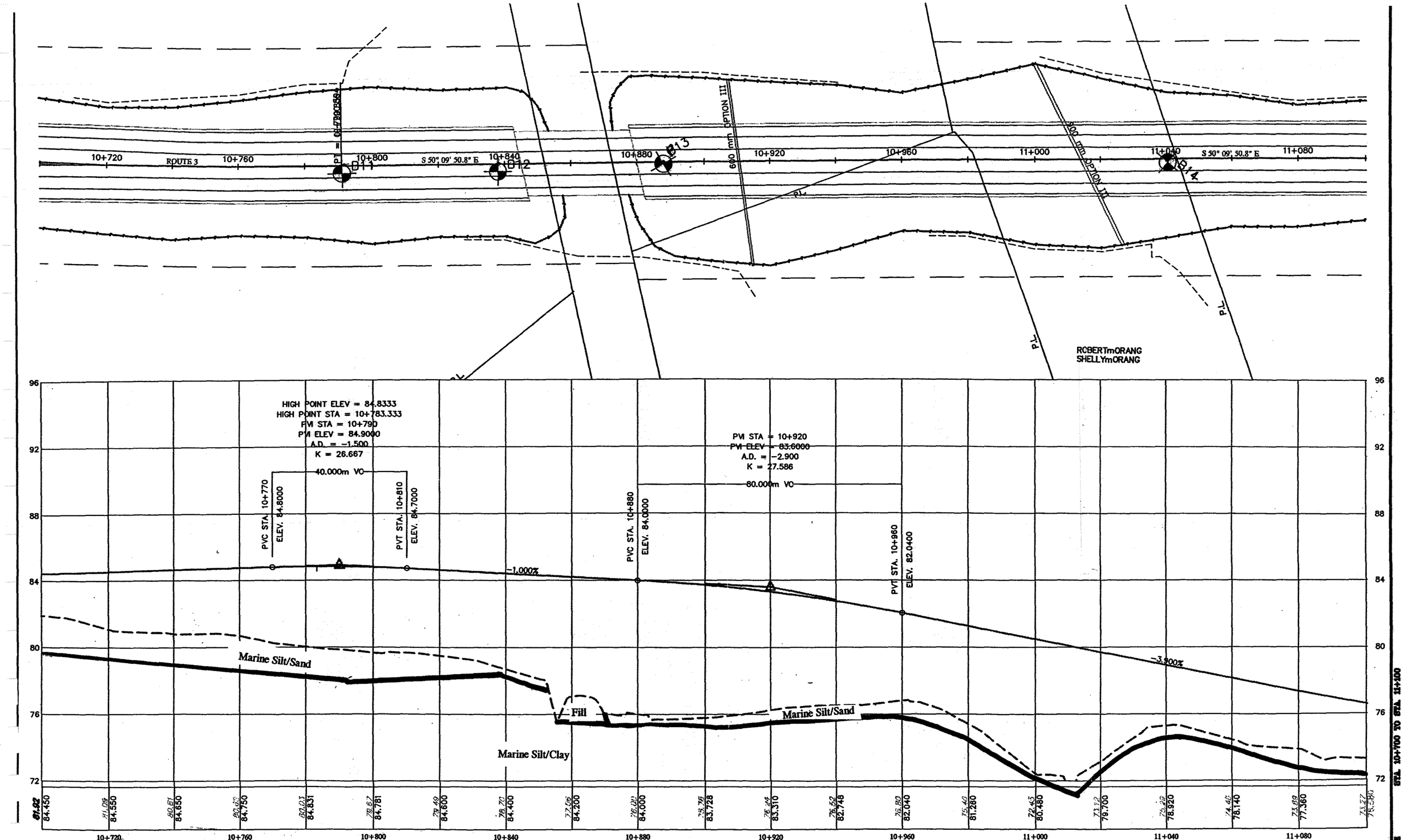
AUGUSTA (RAMP A)

FIGURE 8

STA 100+400 TO STA 100+680


B2
C1-5-01
BONENFANT CONSTRUCTION CORPORATION
9+920 ROUTE 1
9+960
10+000
C1-6-01
B3
10+040
10+080
10+120
10+160
10+200
10+280
ROUTE 3
S 39°36'19" E
P.L.
PVI STA = 10+160
PVI ELEV = 81.5000
A.D. = 1.000
K = 80.000
80.000m VC
PVC STA. 10+120
ELEV. 80.9000
PVT STA. 10+200
ELEV. 82.5000
1.500%
2.500%
Marine Silt/Sand
Marine Silt/Clay
Glacial Till Deposits
Bedrock
92
88
84
80
76
72
68
9+920
9+960
10+000
10+040
10+080
10+120
10+160
10+200
10+240
10+280
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
AUGUSTA (REF. 3)
STA. 9+900 TO STA. 10+300


HIGH POINT ELEV = 86.6389
HIGH POINT STA = 10+421.111
PVI STA = 10+410
PVI ELEV = 87.7500
A.D. = -4.500
K = 44.444
200.000m VC
PVC STA. 10+310
ELEV. 85.2500
PVT STA. 10+510
ELEV. 85.7500
-2.000%
LOW POINT ELEV = 84.0300
LOW POINT STA = 10+612
PVI STA = 10+600
PVI ELEV = 83.9500
A.D. = 2.500
K = 16.000
40.000m VC
PVC STA. 10+580
ELEV. 84.3500
PVT STA. 10+620
ELEV. 84.0500
0.500%
Marine Silt/Sand
Fill
Marine Silt/Sand
Fill
Marine Silt/Sand
Marine Silt/Clay
Glacial Till
B5
B6
B7
B8
B10
750 mm OPTION III
RAMP D
RAMP C
BONENFANT CONSTRUCTION CORPORATION
PT = 100+242.869
RC = 100+225.869
PT = 300+750.907
PT = 400+647.305
PT = 300+400.986
N 19° 32' 44.7" E
N 19° 25' 28.3" E
10+320
10+360
10+400
10+440
10+480
10+520
10+560
10+600
10+640
10+680
300+320
300+360
300+400
400+480
400+520
400+560
400+600
400+640
96
92
88
84
80
76
72
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
AUGUSTA (REV. 8)
FIGURE 10




HALEY & ALDRICH

NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.

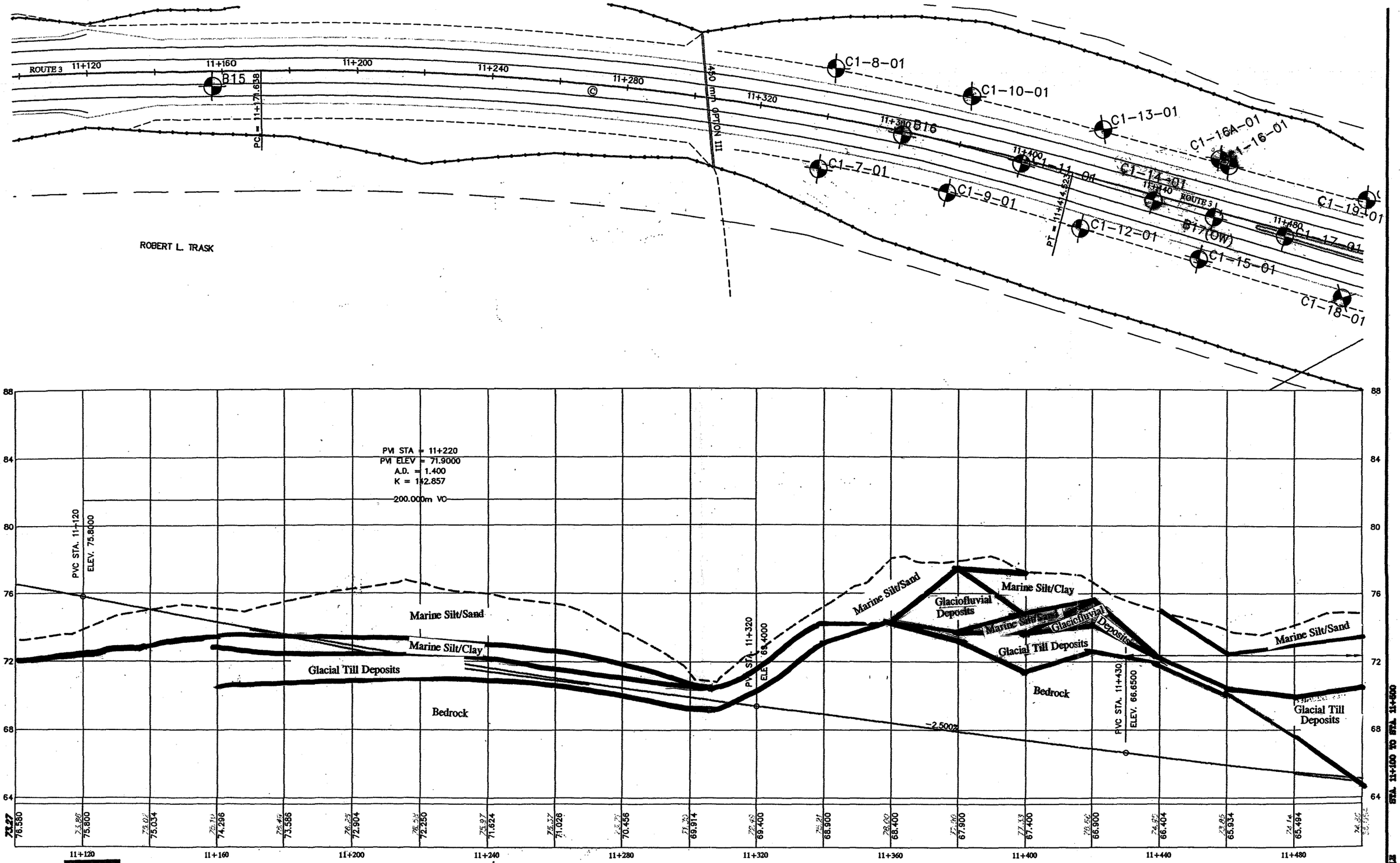
# PROFILE

HORZ. 10 0 10 20

VERT. 2 0 2 4

AUGUSTA (RTE. 3)

FIGURE 11


ROUTE 3
11+120
11+160
11+200
11+240
11+280
11+320
11+360
11+400
11+440
11+480
B15
PC = 11+171.638
450 mm OPTION III
C1-8-01
C1-10-01
C1-13-01
C1-16A-01
C1-16-01
B16
C1-7-01
C1-11-01
C1-14-01
C1-9-01
C1-12-01
B17(OW)
C1-15-01
C1-17-01
C1-18-01
C1-19-01
PT = 11+414.623
ROBERT L. TRASK
PVI STA = 11+220
PVI ELEV = 71.9000
A.D. = 1.400
K = 142.857
200.000m VC
PVC STA. 11+120
ELEV. 75.8000
PVC STA. 11+320
ELEV. 68.4000
PVC STA. 11+430
ELEV. 66.6500
-2.500%
Marine Silt/Sand
Marine Silt/Clay
Glacial Till Deposits
Bedrock
Glaciofluvial Deposits
88
84
80
76
72
68
64
75.580
75.800
75.034
74.296
73.586
72.904
72.250
71.624
71.026
70.456
69.914
69.400
68.900
68.400
67.900
67.400
66.900
66.404
65.934
65.494
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
AUGUSTA (RTE 9)
FIGURE 12

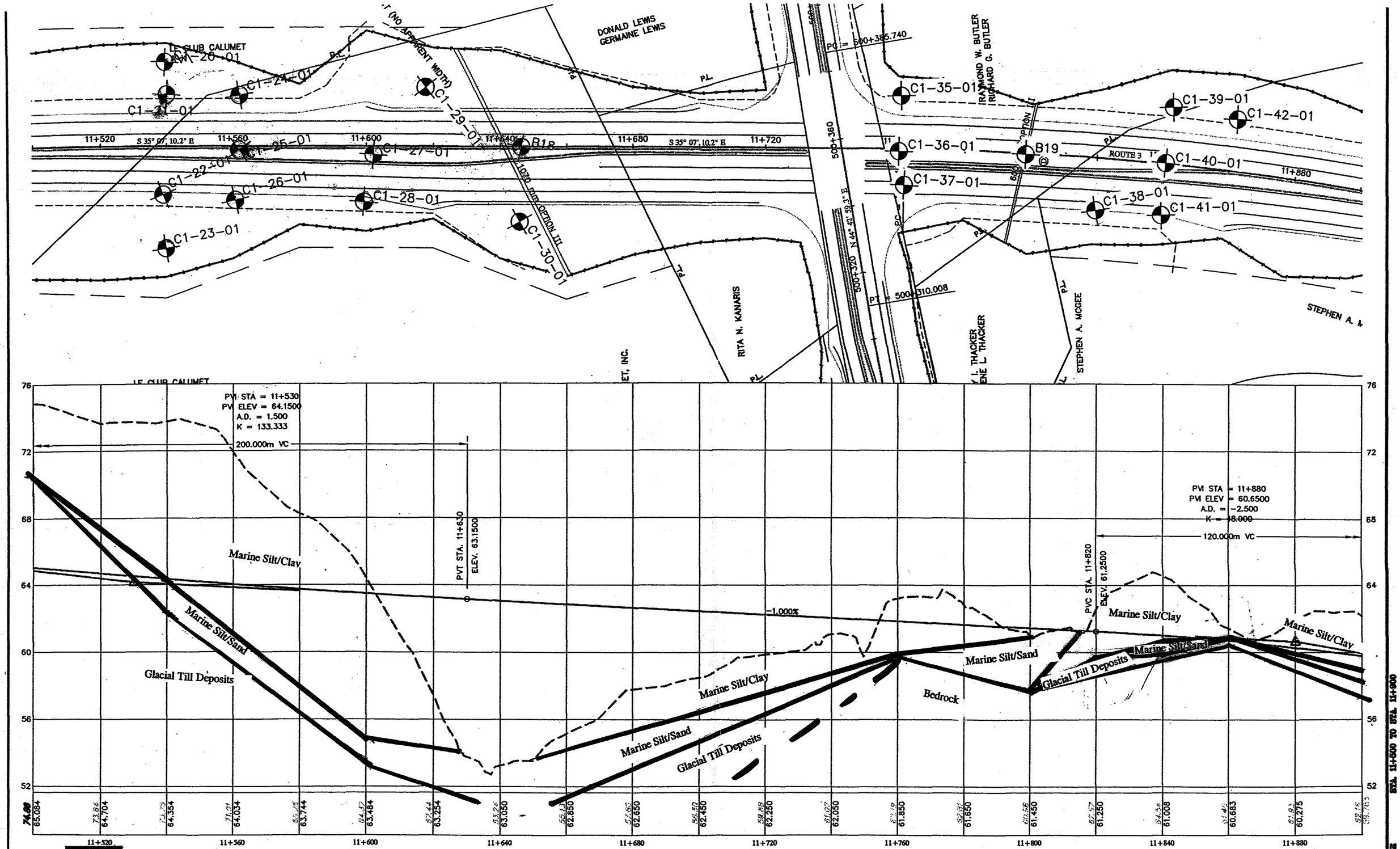

DONALD LEWIS
GERMAINE LEWIS
RAYMOND W. BUTLER
RICHARD G. BUTLER
RITA N. KANARIS
STEPHEN A. MCGEE
STEPHEN A.
ROUTE 3
PC = 500+385.740
PT = 500+310.008
500+360
500+320
N 34° 42' 55.2" E
S 35° 07' 10.2" E
11+520
11+560
11+600
11+640
11+680
11+720
11+880
C1-20-01
C1-21-01
C1-22-01
C1-23-01
C1-24-01
C1-25-01
C1-26-01
C1-27-01
C1-28-01
C1-29-01
C1-30-01
C1-35-01
C1-36-01
C1-37-01
C1-38-01
C1-39-01
C1-40-01
C1-41-01
C1-42-01
B18
B19
100D MID OPTION III
PVI STA = 11+530
PVI ELEV = 64.1500
A.D. = 1.500
K = 133.333
200.000m VC
PVT STA. 11+630
ELEV. 63.1500
PVI STA = 11+880
PVI ELEV = 60.6500
A.D. = -2.500
K = 48.000
120.000m VC
PVC STA. 11+820
ELEV. 61.2500
-1.000%
Marine Silt/Clay
Marine Silt/Sand
Glacial Till Deposits
Bedrock
76
72
68
64
60
56
52
65.084
64.704
64.354
64.034
63.744
63.484
63.254
63.050
62.850
62.650
62.450
62.250
62.050
61.850
61.650
61.450
61.250
61.008
60.683
60.275
11+520
11+560
11+600
11+640
11+680
11+720
11+760
11+800
11+840
11+880
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
STA. 11+500 TO STA. 11+900
PROFILE
AUGUSTA (RTE. 3)

FIGURE 13

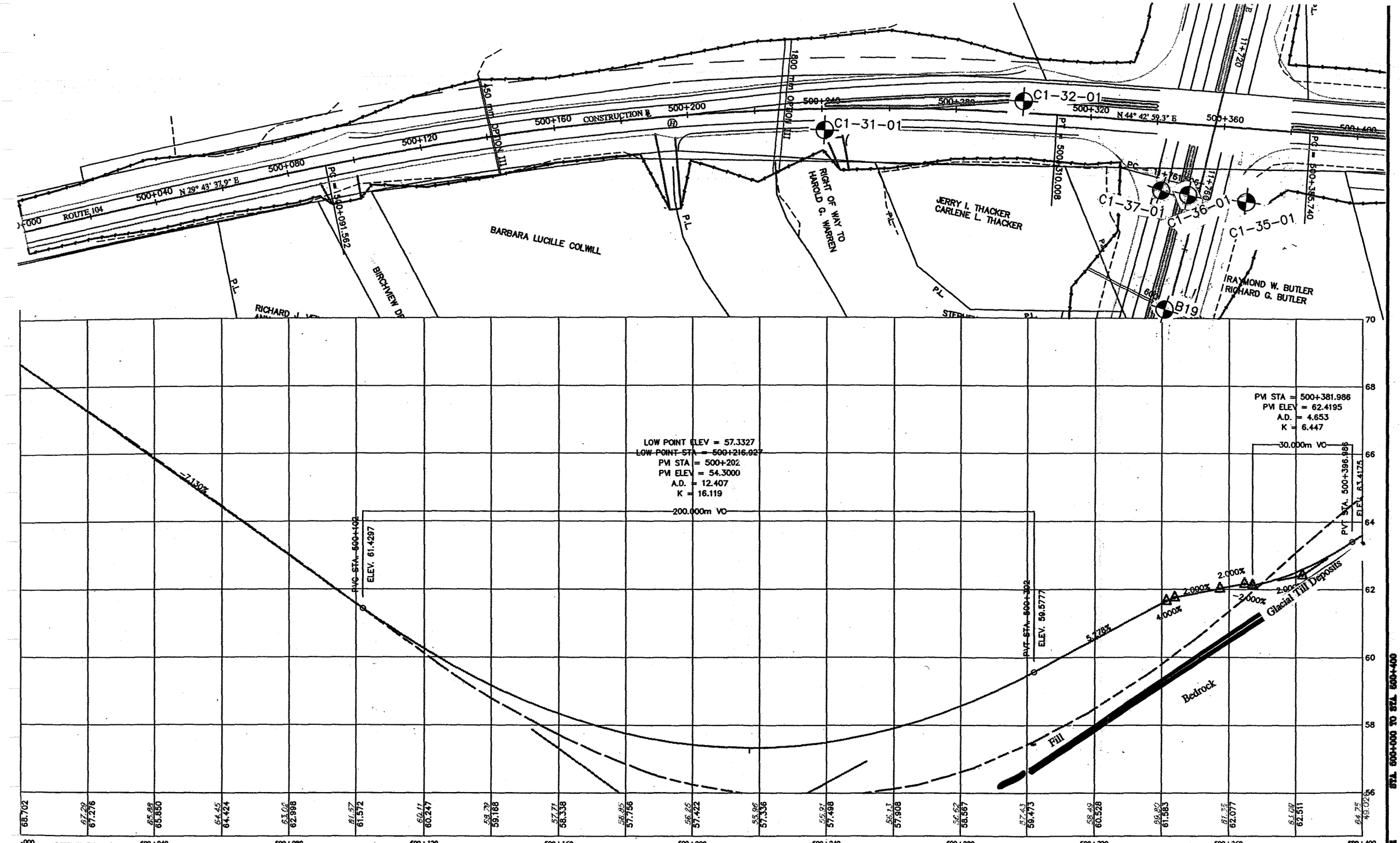
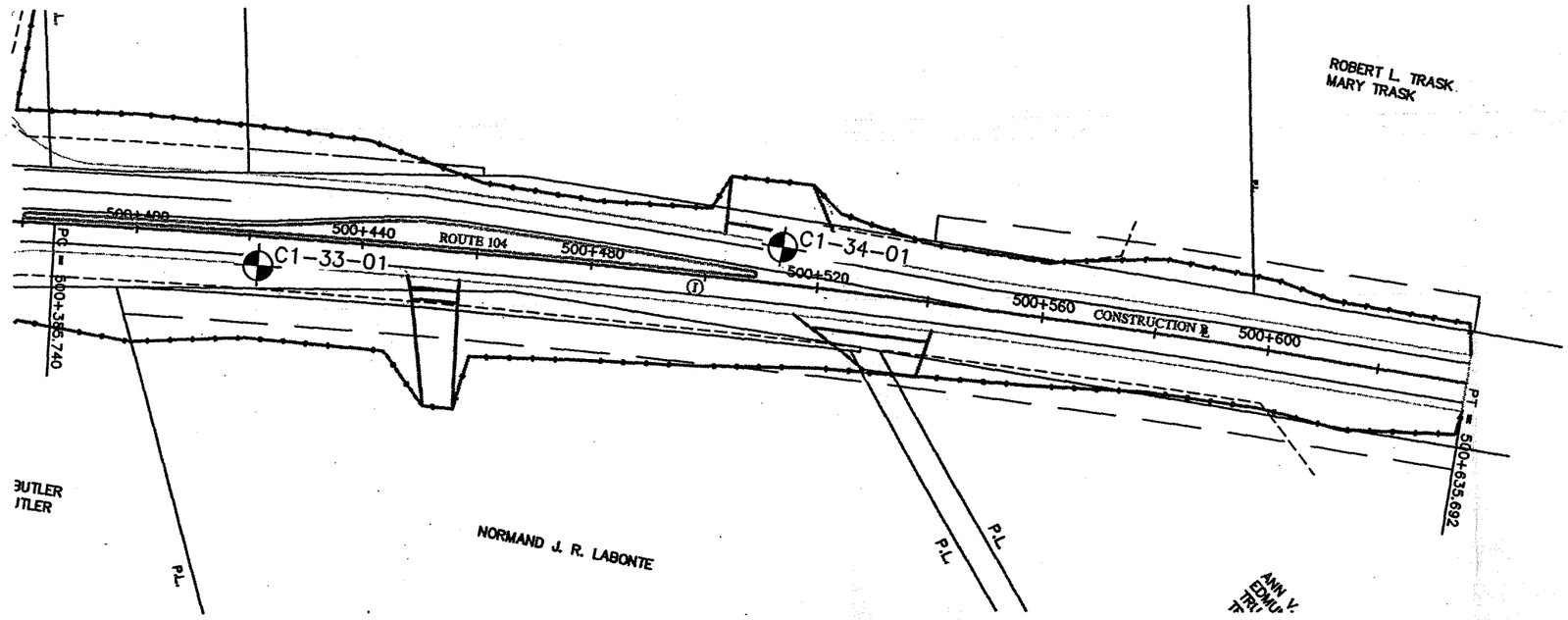
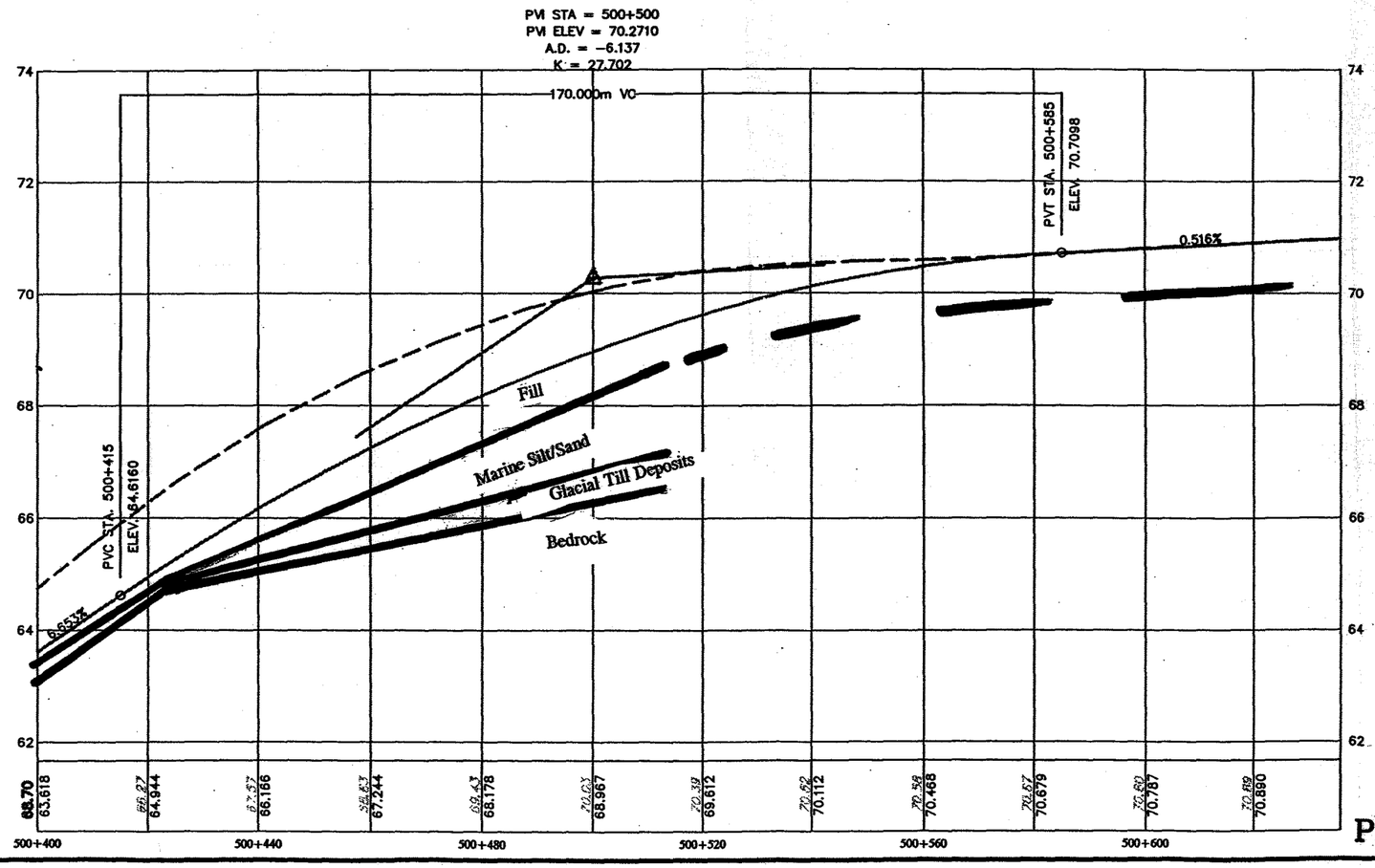

ROUTE 104
N 29° 43' 37.9" E
N 44° 42' 59.3" E
CONSTRUCTION
SECTION III
1800 mm OPTION III
PC = 500+091.562
PT = 500+310.008
PC = 500+385.740
C1-31-01
C1-32-01
C1-37-01
C1-36-01
C1-35-01
B19
BARBARA LUCILLE COLWILL
RIGHT OF WAY TO HAROLD G. WARREN
JERRY L. THACKER
CARLENE L. THACKER
RAYMOND W. BUTLER
RICHARD G. BUTLER
BIRCHVIEW DR
P.L.
LOW POINT ELEV = 57.3327
LOW POINT STA = 500+216.927
PVI STA = 500+202
PVI ELEV = 54.3000
A.D. = 12.407
K = 16.119
200.000m VC
PVI STA = 500+381.986
PVI ELEV = 62.4195
A.D. = 4.653
K = 6.447
30.000m VC
PVC STA. 500+102
ELEV. 61.4297
PVT STA. 500+392
ELEV. 59.5777
PVT STA. 500+396.986
ELEV. 63.4175
-7.130%
5.728%
4.000%
2.000%
Glacial Till Deposits
Bedrock
Fill
STA. 500+000 TO STA. 500+400
PROFILE
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
HORZ. 10 0 10 20
VERT. 1 0 1 2
AUGUSTA (RTE. 104)

FIGURE 14




HALEY & ALDRICH

# PROFILE

HORZ. 10 0 10 20
VERT. 1 0 1 2

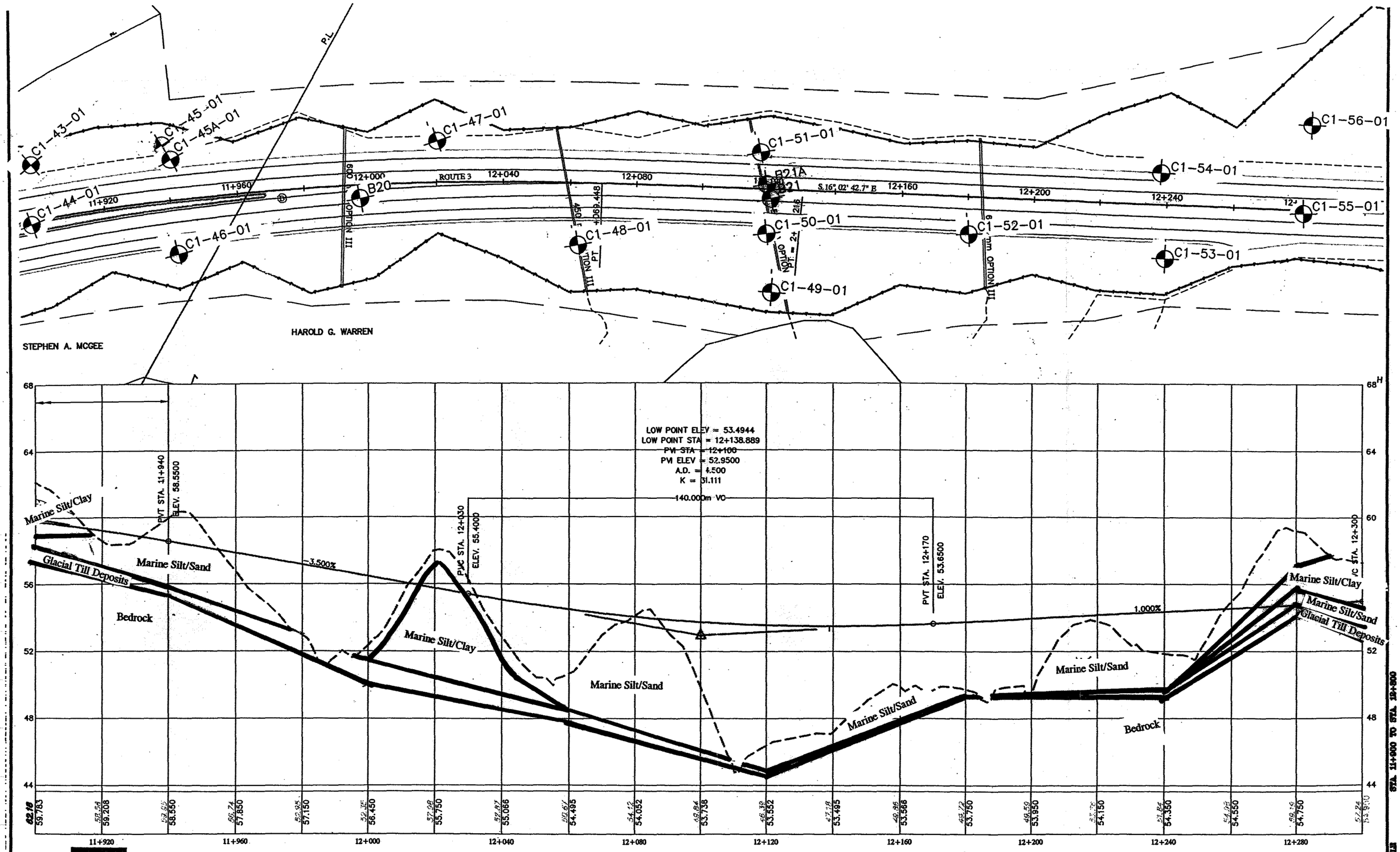
AUGUSTA (RTE. 104)

FIGURE 15

STA. 500+400 TO STA. 500+600

PROFILE

NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.


C1-43-01
C1-45-01
C1-45A-01
C1-44-01
C1-46-01
C1-47-01
C1-48-01
C1-49-01
C1-50-01
C1-51-01
C1-52-01
C1-53-01
C1-54-01
C1-55-01
C1-56-01
B20
B21A
B21
ROUTE 3
12+000
12+040
12+080
12+160
12+200
12+240
11+960
11+920
S.16° 02' 42.7" E
OPTION III
STEPHEN A. MCGEE
HAROLD G. WARREN
LOW POINT ELEV = 53.4944
LOW POINT STA = 12+138.889
PVI STA = 12+100
PVI ELEV = 52.9500
A.D. = 4.500
K = 31.111
140.000m VC
PVT STA. 11+940
ELEV. 58.5500
PVC STA. 12+030
ELEV. 55.4000
PVT STA. 12+170
ELEV. 53.6500
VC STA. 12+300
-3.500%
1.000%
Marine Silt/Clay
Marine Silt/Sand
Glacial Till Deposits
Bedrock
68
64
60
56
52
48
44
11+920
11+960
12+000
12+040
12+080
12+120
12+160
12+200
12+240
12+280
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
AUGUSTA TERR. 83
FIGURE 16

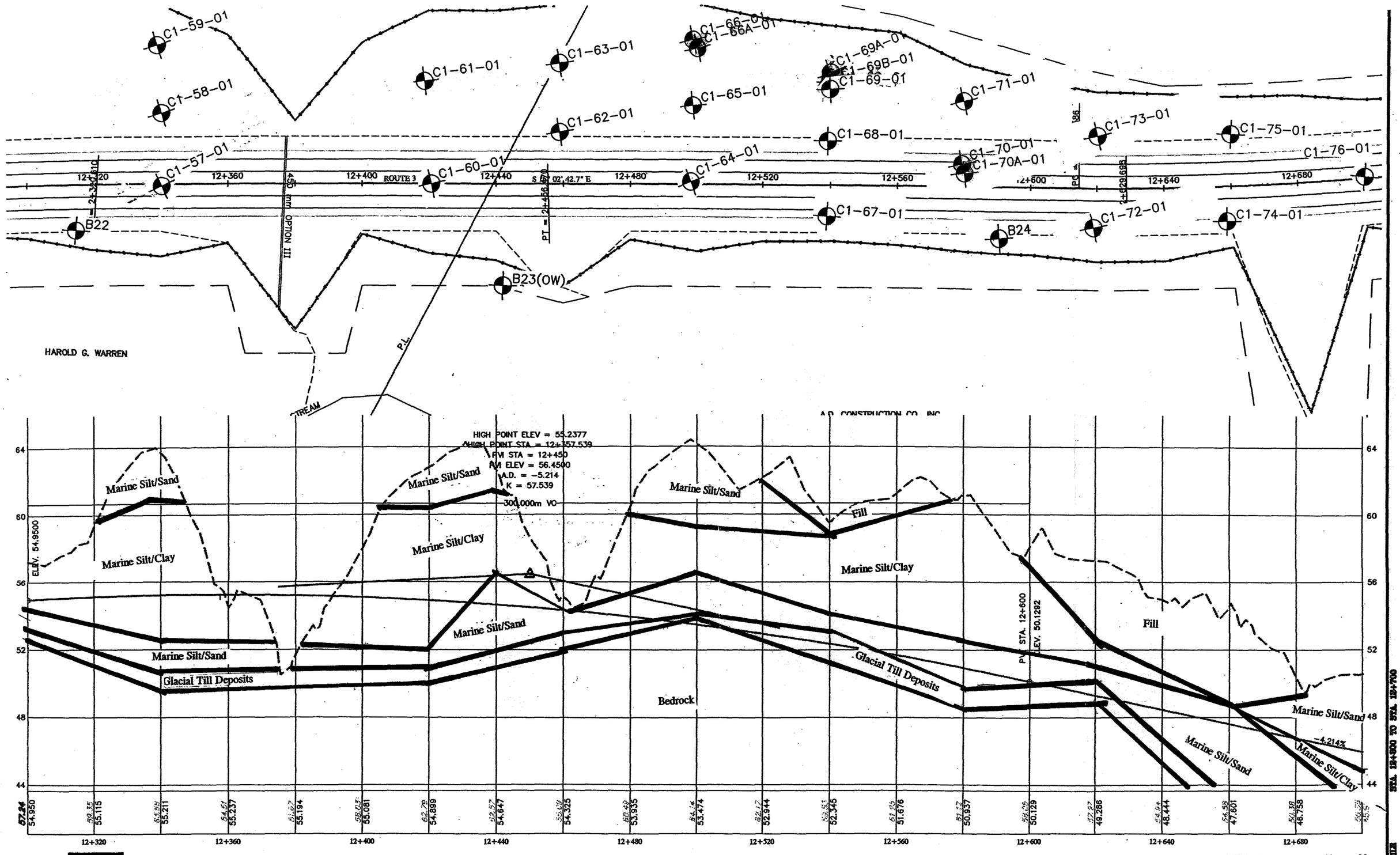

C1-59-01
C1-58-01
C1-61-01
C1-63-01
C1-66-01
C1-66A-01
C1-69A-01
C1-69B-01
C1-69-01
C1-65-01
C1-71-01
C1-62-01
C1-68-01
C1-73-01
C1-75-01
C1-76-01
C1-57-01
C1-60-01
C1-64-01
C1-70-01
C1-70A-01
C1-67-01
C1-72-01
C1-74-01
B22
B23(OW)
B24
12+320
12+360
12+400
ROUTE 3
12+440
12+480
12+520
12+560
12+600
12+640
12+680
450 mm OPTION III
PT = 2+456.670
S 45° 02' 42.7" E
PC
P.L.
HAROLD G. WARREN
A.D. CONSTRUCTION CO. INC.
HIGH POINT ELEV = 55.2377
HIGH POINT STA = 12+357.539
PVI STA = 12+450
PVI ELEV = 56.4500
A.D. = -5.214
K = 57.539
300.000m VC
ELEV. 54.9500
Marine Silt/Sand
Marine Silt/Clay
Glacial Till Deposits
Bedrock
Fill
PVI STA. 12+600
ELEV. 50.1292
-4.214%
64
60
56
52
48
44
54.950
55.115
55.211
55.237
55.194
55.081
54.899
54.647
54.325
53.935
53.474
52.944
52.345
51.676
50.937
50.129
49.286
48.444
47.601
46.758
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0 2 4
AUGUSTA (RTE. 3)
STA. 12+320 TO STA. 12+700
ELEVATION

FIGURE 17

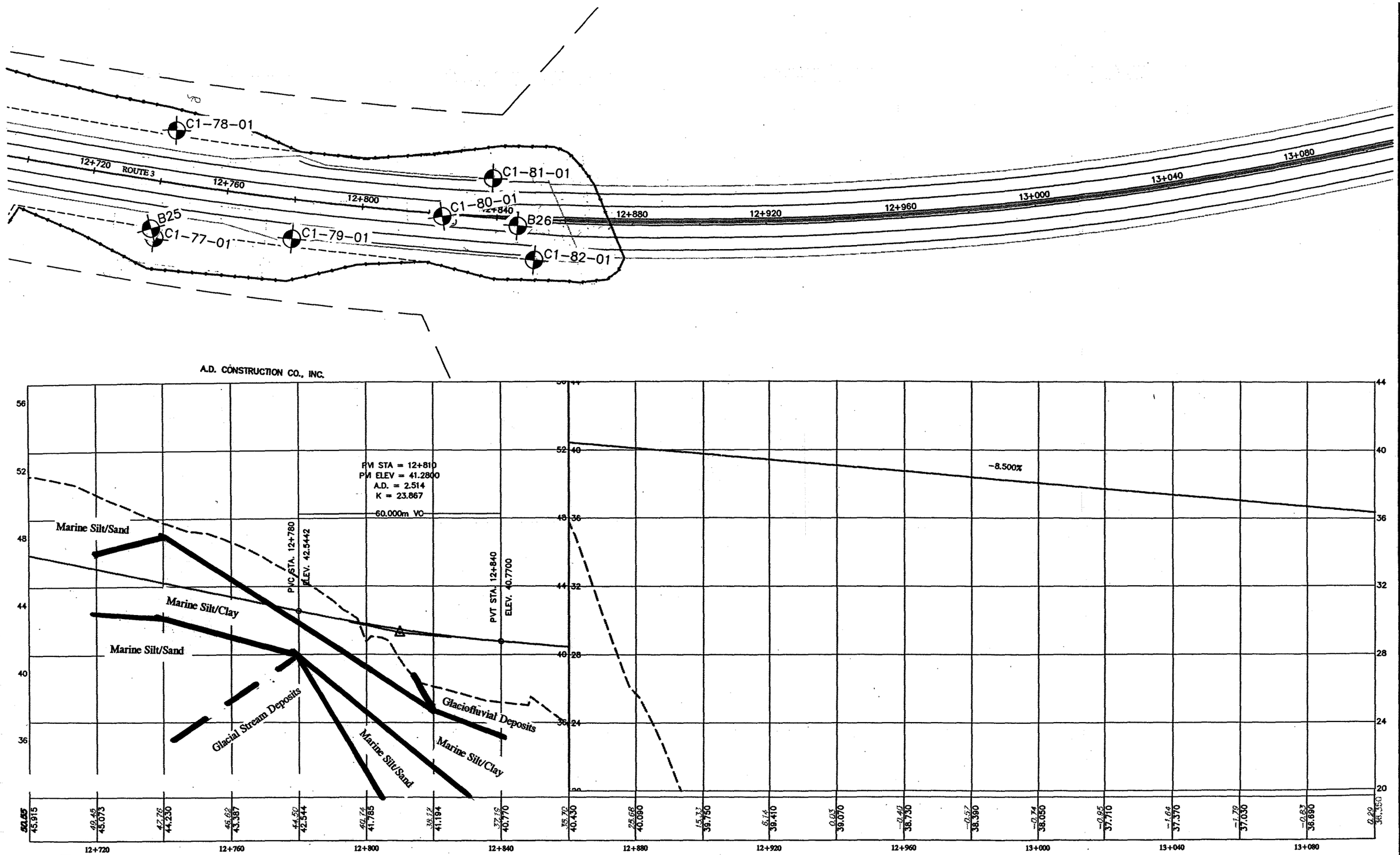
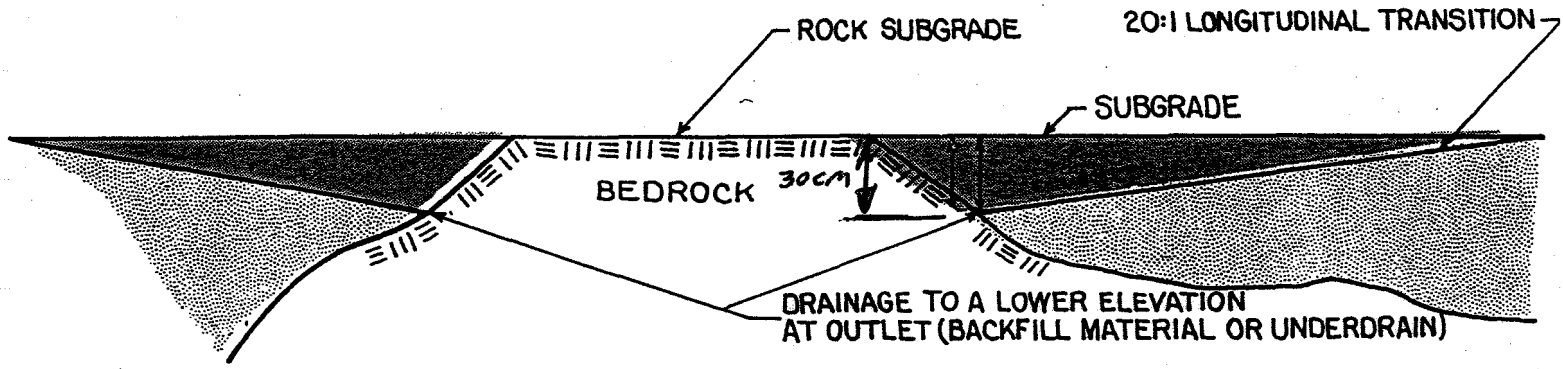

C1-78-01
C1-81-01
C1-80-01
B25
C1-77-01
C1-79-01
B26
C1-82-01
12+720
ROUTE 3
12+760
12+800
12+840
12+880
12+920
12+960
13+000
13+040
13+080
A.D. CONSTRUCTION CO., INC.
PVI STA = 12+810
PVI ELEV = 41.2800
A.D. = 2.514
K = 23.867
60.000m VC
PVC STA. 12+780
ELEV. 42.5442
PVT STA. 12+840
ELEV. 40.7700
-8.500%
Marine Silt/Sand
Marine Silt/Clay
Marine Silt/Sand
Glacial Stream Deposits
Marine Silt/Sand
Glaciofluvial Deposits
Marine Silt/Clay
56
52
48
44
40
36
44
40
36
32
28
24
20
50.65 45.915
49.45 45.073
47.76 44.230
46.62 43.387
44.50 42.544
40.74 41.785
38.14 41.194
37.18 40.770
35.70 40.430
35.68 40.090
15.33 39.750
6.14 39.410
0.03 39.070
-0.40 38.730
-0.57 38.390
-0.74 38.050
-0.95 37.710
-1.64 37.370
-1.79 37.030
-0.83 38.690
0.29 38.350
12+720
12+760
12+800
12+840
12+880
12+920
12+960
13+000
13+040
13+080
HALEY & ALDRICH
NOTE: SEE FIGURE 1 FOR GENERAL NOTES AND LEGEND.
PROFILE
HORZ. 10 0 10 20
VERT. 2 0
AUGUSTA (RTE. 3)
STA. 12+700 TO STA. 13+100
PROFILE

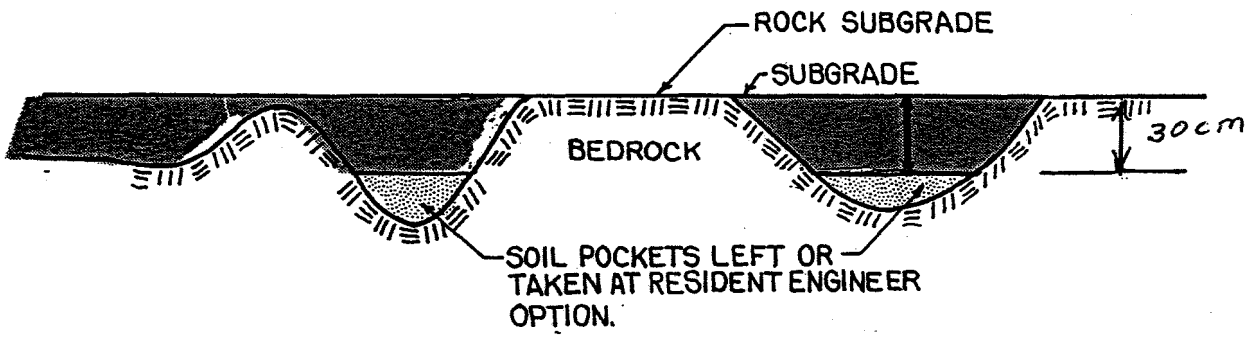
FIGURE 18

# PROFILE OF UNDERCUT OF FROST SUSCEPTIBLE SOILS OVER LEDGE

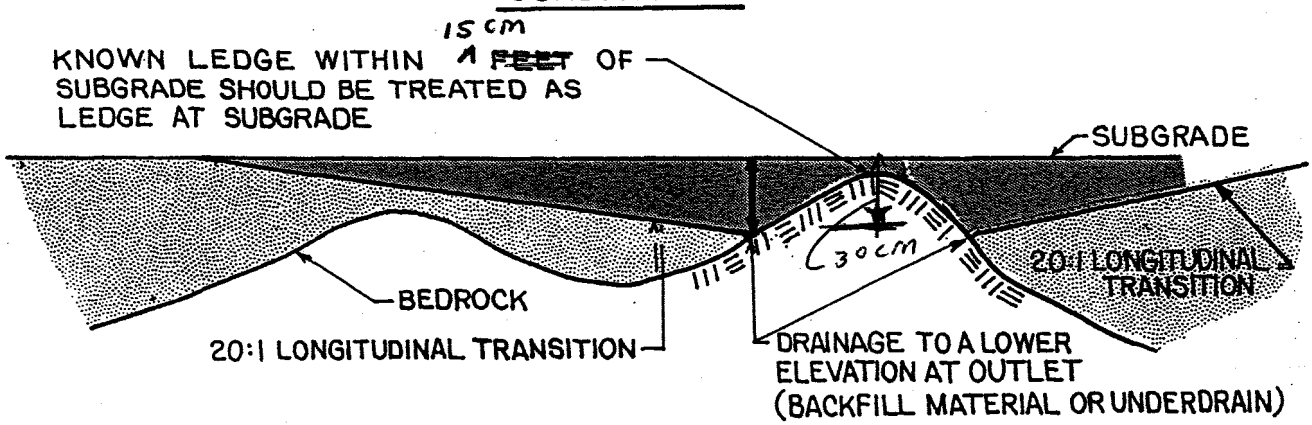
## CONDITION 1




## CONDITION 2




## CONDITION 3

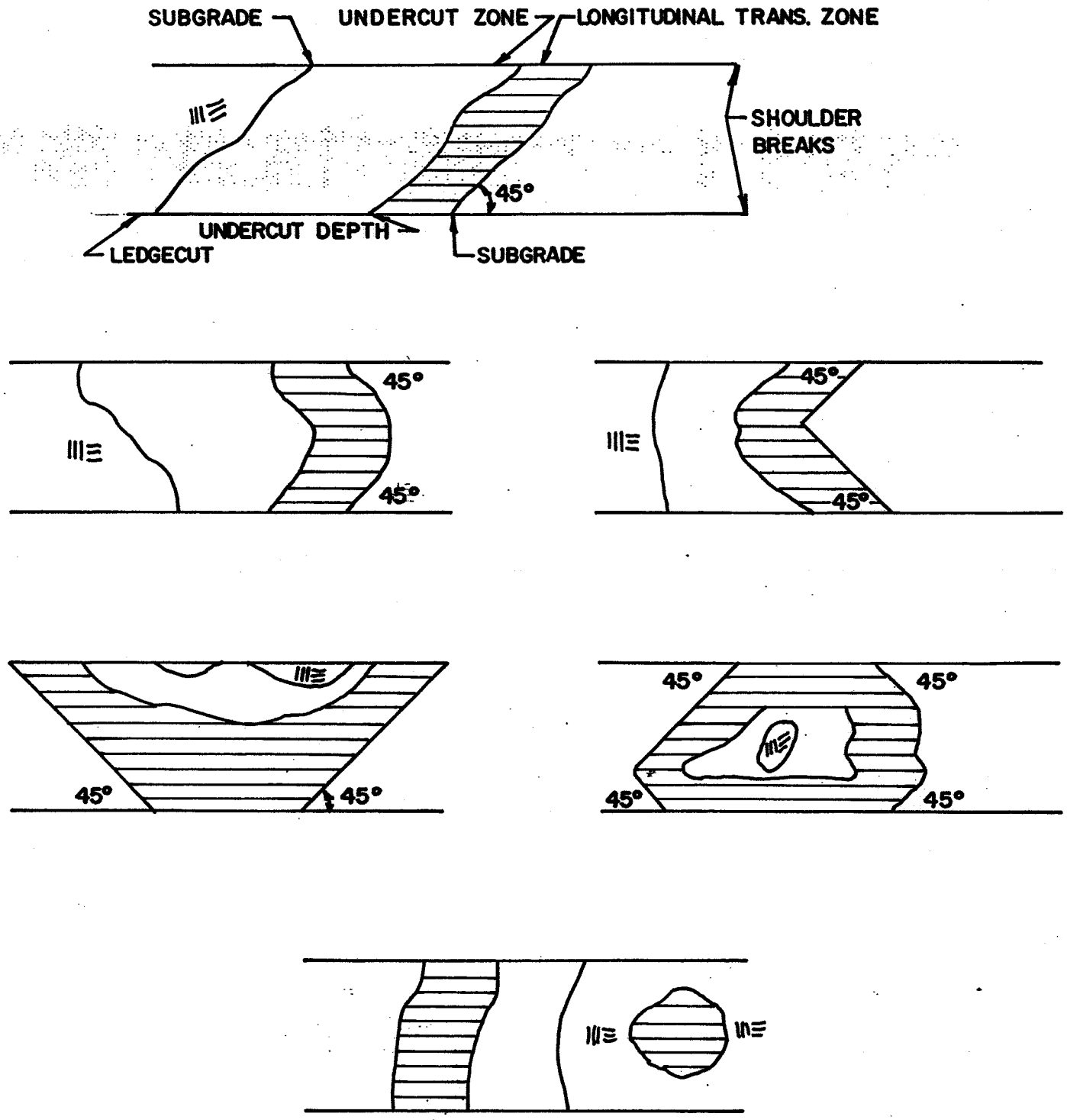



IF A SOIL SECTION BETWEEN LEDGE SUBGRADE IS OF SUCH LENGTH THAT THE TRANSITION FROM EACH EDGE WOULD MEET IT SHOULD BE TREATED AS AN EARTH POCKET

FROST SUSCEPTIBLE SOIL TO BE UNDERCUT AND REPLACED WITH NON FROST SUSCEPTIBLE MATERIAL.

FROST SUSCEPTIBLE SOIL

FIGURE 19




PLAN VIEW OF UNDERCUT OF FROST SUSCEPTIBLE SOILS OVER BEDROCK WITHIN THE FROST PENETRATION ZONE.

NOTE: THE UNDERCUT SHOULD BE FROM SHOULDER BREAK TO SHOULDER BREAK AND FROM THE LONGITUDINAL EXTREMETIES OF THE LEDGE AT THE UNDERCUT DEPTH, PARALLEL TO THIS LEDGE DEPTH AND/OR ON AN ANGLE OR ANGLES NOT LESS THAN 45° FROM ℄.

FIGURE 20

Appendix A

# APPENDIX A

## Logs of Phase I Test Borings

HALEY & ALDRICH

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B1

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 0+037, 298L

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER -

ELEVATION 72.66
DATUM NGVD
START 18 May 2000
FINISH 18 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 3 5 4 | S1 36 | 0.09 0.88 | 72.39 0.27 | Loose, brown silty fine SAND, trace medium sand -TOPSOIL- Loose, brown fine sandy SILT(some gray mottling), trace clay, trace roots -MARINE DEPOSIT- |
| 1.0 | | 7 7 8 9 | S2 61 | 1.52 2.13 | 70.84 1.83 | Stiff, gray-brown mottled clayey SILT |
| 2.0 | | | | | 70.74 1.92 | Medium dense, brown finely stratified fine SAND partings Stiff brown mottled clayey SILT -MARINE DEPOSIT- |
| 3.0 | | 2 1 3 3 | S3 61 | 3.05 3.66 | 69.52 3.14 | Soft to medium stiff, gray silty CLAY, occasional fine sand seams and layers |
| 4.0 | | WOH 2 1 2 | S4 61 | 4.57 5.18 | | Soft to medium stiff, gray silty CLAY, occasional fine sand seams and layers -MARINE DEPOSIT- |
| 5.0 | | | | | | |
| 6.0 | | WOR WOH WOH 35 | S5 61 | 6.10 6.71 | 66.05 6.61 | Soft to medium stiff, gray silty CLAY, occasional fine sand seams and layers, gravel in tip of sampler -PROBABLE GLACIAL TILL- |
| 7.0 | | | | | 65.44 7.22 | Auger refusal at 7.22m. Bottom of Exploration |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/18/00 | 1400 | 0.25 | | 7.10 | 3.69 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 7.22
ROCK CORED (M)
SAMPLES 5S

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B2**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 0+055, 131L

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER -

ELEVATION 71.20
DATUM NGVD
START 18 May 2000
FINISH 18 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 3 5 19 | S1 46 | 0.09 0.70 | 70.96 0.24 | Loose, dark brown fine sandy SILT, trace roots -TOPSOIL- |
| 1.0 | | | | | 69.62 1.58 | Loose, brown-gray slightly mottled fine sandy SILT, trace clay -MARINE DEPOSIT- |
| 2.0 | | 2 4 4 4 | S2 61 | 1.52 2.13 | | Medium stiff, gray-brown mottled clayey SILT, frequent medium to fine sand partings -MARINE DEPOSIT- |
| 3.0 | | 3 2 1 4 | S3 61 | 3.05 3.66 | 67.79 3.41 | Soft to medium stiff, gray silty CLAY -MARINE DEPOSIT- |
| 4.0 | | | | | | |
| 5.0 | | 1 1 2 2 | S4 61 | 4.57 5.18 | 65.96 5.24 | Soft to medium stiff, gray silty CLAY |
| | | | | | | Split spoon and Auger refusal at 5.24m. Bottom of Exploration |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/18/00 | 1200 | 0.25 | | 5.24 | Dry |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 5.24
ROCK CORED (M)
SAMPLES 4S

H&A **METRIC LOG**

M_PORH4A 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B3

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 0+091, 24L

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER -

ELEVATION 77.39
DATUM NGVD
START 18 May 2000
FINISH 18 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 77.30 | Loose, dark brown fine sandy SILT, trace |
| | | 4 | 51 | 0.61 | 0.09 | roots, trace medium sand |
| | | 6 | | | | -TOPSOIL- |
| | | 9 | | | | Soft to medium stiff, brown-gray slightly mottled SILT, trace fine sand, trace clay |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | | | | | 75.86 | |
| | | 4 | S2 | 1.52 | 1.52 | Soft to medium stiff, brown finely |
| | | 4 | 48 | 2.13 | | stratified layers and seams of fine sandy |
| | | 5 | | | | SILT, silty fine SAND, clayey SILT |
| 2.0 | | 5 | | | | -MARINE DEPOSIT- |
| 3.0 | | 2 | S3 | 3.05 | | Loose, brown silty fine SAND, trace clay, |
| | | 3 | 56 | 3.66 | | finely stratified |
| | | 3 | | | 73.88 | |
| | | 3 | | | 3.51 | Medium stiff, gray clayey SILT, trace fine sand (finely stratified) |
| 4.0 | | | | | | -MARINE DEPOSIT- |
| | | 2 | S4 | 4.57 | | |
| | | 3 | 46 | 5.18 | | |
| | | 3 | | | 72.36 | |
| 5.0 | | 4 | | | 5.03 | Medium stiff, gray-brown silty CLAY |
| | | | | | 72.12 | |
| | | | | | 5.27 | Sample taken from auger: Brown medium to fine SAND, trace silt, trace gravel -GLACIAL TILL- |
| | | | | | 71.51 | |
| | | | | | 5.88 | Auger refusal at 5.88m. Bottom of Exploration |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/18/00 | 1020 | 0.25 | 5.88 | 5.88 | Dry |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 5.88
ROCK CORED (M)
SAMPLES 4S

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B4

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta.0+244, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER -

ELEVATION 74.49
DATUM NGVD
START 18 May 2000
FINISH 18 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1<br>1<br>2<br>10 | S1<br>28 | 0.00<br>0.61 | 74.40<br>0.09 | Very loose, dark brown fine sandy SILT, roots<br>-TOPSOIL-<br>Soft to stiff, brown-gray SILT, trace fine sand, clay<br>-MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | | 6<br>7<br>11<br>12 | S2<br>58 | 1.52<br>2.13 | 72.79<br>1.71 | Very stiff, brown-gray mottled clayey SILT |
| 2.0 | | | | | | |
| 3.0 | | 1<br>1<br>WOH<br>1 | S3<br>61 | 3.05<br>3.66 | 71.41<br>3.08 | Soft to medium stiff, gray silty CLAY<br>-MARINE DEPOSIT- |
| 4.0 | | | | | | |
| | | 12<br>24<br>50/.06 | S4<br>23 | 4.57<br>5.18 | 70.16<br>4.33<br>69.56<br>4.94 | Very dense, brown coarse to fine SAND, trace silt, trace gravel<br>-GLACIAL TILL-<br>Split spoon refusal at 4.94m.<br>Bottom of Exploration |

Note: Water levels listed below are artesian.

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/18/00 | 0826 | 0.25 | 4.57 | 4.94 | 0.15 |
| 5/18/00 | 0845 | 0.50 | | 4.42 | 0.15 |

SAMPLE IDENTIFICATION

| | |
|---|---|
| O | OPEN END ROD |
| T | THIN WALL TUBE |
| U | UNDISTURBED SAMPLE |
| S | SPLIT SPOON |

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 4.94 |
| ROCK CORED (M) | |
| SAMPLES | 4S |

H&A METRIC LOG

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B5 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+360, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m.; NW Casing from 7.22-10.49m. |

ELEVATION 75.90
DATUM NGVD
START 17 May 2000
FINISH 17 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 75.77 | Loose, dark brown loamy fine sandy SILT, trace roots |
| | | 2 | 38 | 0.61 | 0.12 | -TOPSOIL- |
| | | 4 | | | | Loose, brown silty fine SAND |
| | | 4 | | | | -FILL- |
| 1.0 | | | | | 74.52 | |
| | | | | | 1.37 | Medium stiff, gray clayey SILT |
| | 12 | 4 | S2 | 1.52 | 74.34 | Stiff, gray-brown mottled clayey SILT, frequent fine sand partings |
| | | 5 | 41 | 2.13 | 1.55 | |
| | | 10 | | | | |
| 2.0 | 19 | 11 | | | | -MARINE DEPOSIT- |
| | 27 | | | | | |
| | 22 | | | | | |
| | 24 | | | | | |
| 3.0 | 14 | 4 | S3 | 3.05 | | Medium stiff, gray-brown finely stratified clayey SILT and silty CLAY layers, occasional fine sand partings |
| | | 3 | 61 | 3.66 | | |
| | 12 | 3 | | | | |
| | | 2 | | | | -MARINE DEPOSIT- |
| | 14 | | | | | |
| 4.0 | 14 | | | | | |
| | 14 | | | | | |
| | 22 | PUSH | U1 | 4.57 | | Medium stiff to stiff, gray silty CLAY, trace fine sand |
| | | | 61 | 5.18 | | |
| 5.0 | 14 | | | | | |
| | 17 | | | | | |
| | 18 | | | | | |
| | 109 | | | | 69.95 | |
| 6.0 | | | | | 5.94 | Very stiff, gray silty CLAY, little coarse to fine angular gravel, trace coarse to fine sand with occasional fine sand partings |
| | 17 | 14 | S4 | 6.10 | | |
| | | 13 | 41 | 6.71 | | |
| | 45 | 13 | | | | -GLACIAL TILL- |
| | | 33 | | | | |
| | 94 | | | | | |
| 7.0 | | | | | | |
| | 265 | | | | 68.67 | |
| | | | | | 7.22 | Note: Cored through boulder, then continued boring with 8cm. casing |
| | 207/.3 | | | | 68.34 | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/17/00 | 0709 | 0.2 | | 1.52 | 0.79 |
| 5/17/00 | 1740 | 10.5 | 10.58 | 13.90 | 0.61 |
| 5/17/00 | 1811 | 11.0 | 0.00 | 7.77 | 0.61 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 10.49 |
| ROCK CORED (M) | 3.23 |
| SAMPLES | 4S, 1U, 3C |

H&A METRIC LOG

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B5<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 3 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | | | | 7.56 | Note: Advanced roller bit to 9.14m. Washed through many cobbles and boulders and advanced casing to 9.14m. |
| | - | | | | | |
| 8.0 | - | | | | | |
| | 44 | | | | | |
| | 32 | | | | | |
| 9.0 | 34 | | | | | |
| | 7 | 31<br>35<br>36 | S5<br>18 | 9.14<br>9.60 | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| | 27 | | | | | -GLACIAL TILL- |
| 10.0 | 64 | | | | | |
| | 36 | | | | | |
| | 115/.7 | | | | 65.41<br>10.49 | Top of Bedrock at 10.49m.<br>See Core Boring Report |

| H&A | METRIC LOG |
|---|---|

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | CORE BORING REPORT | BORING NO. B5<br>FILE NO. 80765-000<br>SHEET NO. 3 OF 3 |
|---|---|---|---|

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Top of Bedrock at 10.49m.<br>Advanced roller bit to 10.67<br>Begin NX rock core |
| 10.0 | | | | | | | 65.4<br>10.5 | |
| | 1.5 | C1 | 10.7<br>11.7 | 1.1<br>0.5 | 100<br>43 | Fr.-Mod. | | C1: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is low angle, extremely close to moderate, rough, undulating, discolored, open. Secondary joint set is high angle, extremely close to moderate, rough, stepped and undulating, tight, discolored. |
| 11.0 | 1 | | | | | | | |
| | 1 | | | | | | | |
| | 2 | C2 | 11.7<br>12.4 | 0.7<br>0.5 | 100<br>71 | Fr.-Mod. | | C2: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is high angle and low angle, very close to wide, rough, undulating, tight to open, discolored. |
| 12.0 | 1 | | | | | | | |
| | 2 | C3 | 12.4<br>13.9 | 1.5<br>1.3 | 100<br>86 | Fr.-Sl. | | C3: Very hard to hard freshly to moderately weathered white to gray fine grained GRANITE. Primary joint set is low angle, very close to moderate, rough, undulating, discolored, tight to open. |
| | 2 | | | | | | | |
| 13.0 | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 1 | | | | | | 62.0<br>13.9 | Bottom of Exploration at 13.90m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B6 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+393, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 77.60
DATUM NGVD
START 15 May 2000
FINISH 16 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 77.45 | Loose, dark brown loamy coarse to fine sandy |
| | | 2 | 33 | 0.61 | 0.15 | SILT, roots |
| | | 4 | | | | -TOPSOIL- |
| | | 7 | | | | Loose, brown silty fine SAND, trace roots |
| 1.0 | | | | | | -FILL- |
| | 12 | 3 | S2 | 1.52 | | Loose, brown silty fine SAND |
| | | 7 | 43 | 2.13 | 75.71 | |
| | | 4 | | | | |
| 2.0 | 11 | 3 | | | 1.89 | Medium stiff, brown-gray mottled clayey SILT |
| | 6 | | | | | -FILL- |
| | 11 | | | | | |
| | 14 | | | | | |
| 3.0 | 17 | 3 | S3 | 3.05 | | |
| | | 4 | 48 | 3.66 | 74.25 | |
| | 44 | 15 | | | 3.35 | Dense, gray finely stratified fine sandy |
| | | 16 | | | 74.13 | SILT, trace organics, root fibers from |
| | 49 | | | | 3.47 | 3.35m.-3.44m.(Probable former topsoil) Wood |
| 4.0 | | | | | | from 3.44m-3.47m. |
| | 40 | | | | | |
| | 28 | | | | | |
| | 32 | 3 | S4 | 4.57 | 72.91 | Medium stiff, gray clayey SILT |
| | | 4 | 61 | 5.18 | 4.69 | Stiff, brown(slightly mottled to gray) |
| 5.0 | 46 | 6 | | | | clayey SILT |
| | | 7 | | | | -MARINE DEPOSIT- |
| | 47 | | | | | |
| | 48 | | | | | |
| 6.0 | 43 | | | | 71.48 | |
| | 27 | WOH | S5 | 6.10 | 6.13 | Medium stiff gray silty CLAY |
| | | WOH | 61 | 6.71 | | |
| | 45 | 1 | | | | -MARINE DEPOSIT- |
| | | 7 | | | | |
| | 91 | | | | 70.59 | |
| 7.0 | | | | | 7.01 | |
| | 220 | | | | | -GLACIAL TILL- |
| | 137 | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/16/00 | 0815 | 0.50 | 8.47 | 11.52 | 1.77 |
| 5/16/00 | 0830 | 0.75 | | 8.08 | 1.71 |

SAMPLE IDENTIFICATION

| | |
|---|---|
| O | OPEN END ROD |
| T | THIN WALL TUBE |
| U | UNDISTURBED SAMPLE |
| S | SPLIT SPOON |

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 8.47 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 6S, 2C |

H&A METRIC LOG

ML_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B6
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 25 | S6 | 7.62 | | Very stiff, gray clayey SILT, little gravel |
| | | 37 | 10 | 8.23 | 69.68 | |
| 8.0 | | 33 | | | 7.92 | -GLACIAL TILL- |
| | | 16 | | | | Very dense, brown-tan gravelly coarse to |
| | | | | | 69.22 | fine SAND |
| | | | | | 8.38 | Top of Bedrock at 8.38m. |
| | | | | | | Advanced roller bit into rock to 8.47m. |
| | | | | | | See Core Boring Report |

M_PORHA 80765-000

H&A METRIC LOG

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B6
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 7.0 | | | | | | | | |
| 8.0 | | | | | | | | Top of Bedrock at 8.38m. Advanced roller bit to 8.47m. |
| | | | | | | | 69.2 | Begin NX rock core |
| | | | | | | | 8.4 | |
| | 3 | C1 | 8.5 / 10.0 | 1.5 / 1.0 | 100 / 64 | Fr.-Sl. | | C1: Very hard to hard, fresh to slightly weathered white to gray fine grained GRANITE. Primary joint set is low angle, extremely close to moderate, rough, undulating to planar, fresh to discolored, tight to open. Secondary joint set is high angle, extremely close to moderate, rough, planar, fresh to discolored, tight to open. |
| 9.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| 10.0 | | C2 | 10.0 / 11.5 | 1.4 / 1.2 | 92 / 78 | Fr.-Sl. | | C2: Very hard to hard, fresh to slightly weathered white to gray fine grained GRANITE. Primary joint set is low angle to moderately dipping, very close to wide, rough, planar to undulating, fresh to discolored, tight to open. |
| | 2 | | | | | | | |
| | 1.5 | | | | | | | |
| | 1.5 | | | | | | | |
| 11.0 | 3 | | | | | | | |
| | 2 | | | | | | 66.1 | |
| | | | | | | | 11.5 | Bottom of Exploration at 11.52m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B7 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+442, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 75.80
DATUM NGVD
START 16 May 2000
FINISH 16 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 2 3 4 4 | S1 28 | 0.00 0.61 | 75.68 0.12 | Loose dark brown fine sandy SILT, trace roots, gravel -TOPSOIL- |
| | | | | | | Medium stiff, brown mottled clayey SILT -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | 42 | 5 5 8 13 | S2 48 | 1.52 2.13 | 73.91 1.89 | Stiff, brown mottled clayey SILT |
| 2.0 | 47 | | | | 73.67 2.13 | Medium dense, brown-gray mottled fine sandy SILT |
| | 44 | | | | | |
| | 40 | | | | | |
| | 40 | | | | | |
| 3.0 | 46 | 3 5 6 5 | S3 51 | 3.05 3.66 | | Stiff, brown (slightly mottled to gray) clayey SILT -MARINE DEPOSIT- |
| | 50 | | | | | |
| | 42 | | | | 71.84 3.96 | |
| 4.0 | 36 | | | | | |
| | 35 | | | | | |
| | 42 | WOH WOH WOH WOH | S4 61 | 4.57 5.18 | | Medium stiff, gray silty CLAY -MARINE DEPOSIT- |
| 5.0 | 38 | | | | | |
| | 36 | | | | | |
| | 50 | | | | 69.89 5.91 | |
| 6.0 | 72 | | | | | |
| | 10 | 16 54 52 30 | S5 15 | 6.10 6.71 | | Very dense, gray coarse to fine SAND, some silt -GLACIAL TILL- |
| | 18 | | | | | |
| | 54 | | | | | |
| 7.0 | 109/.9 | | | | 68.55 7.25 | Note: Washed ahead of casing through Till to 7.25m. Advanced roller bit through probable |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/16/00 | 1500 | 0.25 | 7.28 | 10.36 | 0.15 Artesian |
| 5/16/00 | 1500 | 0.50 | | 6.00 | 0.00 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 7.25 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 5S, 4C |

H&A **METRIC LOG**

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B7
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | | | | | Bedrock from 7.25m-7.28m.<br>Top of Bedrock at 7.25m.<br>See Core Boring Report |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B7
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 5.0 | | | | | | | | |
| 6.0 | | | | | | | | Top of Bedrock at 7.25m. Advanced roller bit to 7.32m. Begin NX rock core |
| 7.0 | | | | | | | 68.5 / 7.3 | |
| | 3 | C1 | 7.3 / 7.7 | 0.4 / 0.0 | 100 / 0 | Fr. | | C1: Very hard to hard, fresh to slightly weathered, white to gray fine grained GRANITE. Primary joint set is low angle, very close to close, rough, undulating, fresh, tight to open. |
| | 3 | C2 | 7.7 / 9.1 | 1.4 / 0.4 | 100 / 29 | Fr.-Sl. | | C2: Very hard to hard, fresh to slightly weathered, white to gray fine grained GRANITE. Primary joint set is low angle to moderately dipping, extremely close to close, rough, undulating and planar, discolored, tight to open. Secondary joint set is high angle, undulating, smooth to rough, discolored, tight. |
| 8.0 | 1.5 | | | | | | | |
| | 2 | | | | | | | |
| | 3 | | | | | | | |
| 9.0 | 2 | | | | | | | |
| | 3 | C3 | 9.1 / 9.7 | 0.5 / 0.1 | 96 / 18 | Fr.-Sl. | | C3: Same lithology as C2. Primary joint set is low angle, extremely close to very close, planar to undulating, rough, discolored, tight to open. Secondary joint set is high angle, rough, undulating, discolored, tight. |
| | 2 | | | | | | | |
| | 4 | C4 | 9.7 / 10.4 | 0.6 / 0.6 | 89 / 78 | Fr.-Sl. | | C4: Same lithology as C2. Primary joint set is low angle, close to moderate, rough, undulating, discolored, tight. |
| 10.0 | 1.5 | | | | | | 65.4 / 10.4 | Bottom of Exploration at 10.36m. |

METRIC

80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B8**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+482, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 75.59
DATUM NGVD
START 19 May 2000
FINISH 19 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 75.50 | Water |
| | | 1 | S1 | 0.09 | 0.09 | Very loose, dark brown fine sandy SILT, roots |
| | | 1 | 41 | 0.70 | 75.32 | |
| | | 3 | | | 0.27 | |
| | | 4 | | | 74.89 | -TOPSOIL- |
| | | | | | 0.70 | Loose, brown to gray silty fine SAND |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | 12 | 4 | S2 | 1.52 | | Stiff, brown mottled clayey SILT, frequent fine sand partings and layers |
| | | 5 | 61 | 2.13 | | |
| 2.0 | 15 | 6 | | | | |
| | | 7 | | | 73.30 | |
| | 9 | | | | 2.29 | |
| | 9 | | | | | |
| | 10 | | | | | |
| 3.0 | 16 | Push | U1 | 3.05 | | Medium stiff to stiff, gray silty CLAY |
| | | | 61 | 3.66 | | -MARINE DEPOSIT- |
| | 15 | | | | | |
| | 17 | | | | | |
| 4.0 | 16 | | | | | |
| | 12 | | | | | |
| | 53 | WOH | S3 | 4.57 | 70.81 | Medium stiff to stiff, gray silty CLAY |
| | | 12 | 38 | 5.18 | 4.79 | Dense, gray silty coarse to fine SAND, little gravel, trace clay |
| 5.0 | 218 | 31 | | | | |
| | | 44 | | | | -GLACIAL TILL- |
| | 99 | | | | | |
| | 95 | | C1 | 5.64 | | Cored through Glacial Till, cobbles and boulders from 5.64m. to 7.86m. |
| | | | 84 | 6.64 | | |
| 6.0 | 136 | | | | | |
| | | | C2 | 6.64 | | |
| | | | 46 | 7.47 | | |
| 7.0 | | | | | | |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/19/00 | | | 5.49 | 10.00 | 0.00 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 7.86 |
| ROCK CORED (M) | 4.36 |
| SAMPLES | 3S,1U,4C |

H&A **METRIC LOG**

NJ_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B8
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | | C3 | 7.47 | 67.73 | |
| | | | 56 | 7.86 | 7.86 | Top of Bedrock at 7.86m.<br>Advanced roller bit to 8.47m.<br>See Core Boring Report |

H6A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B8
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 7.0 | | | | | | | | |
| | | | | | | | | Top of Bedrock at 7.86m. Advanced roller bit to 8.47m. Begin NX rock core |
| | 3 | | | | | | 67.7 / 7.9 | |
| 8.0 | 2 | | | | | | | |
| | 3 | | | | | | | |
| | | C4 | 8.5 / 10.0 | 1.3 / 1.2 | 83 / 80 | | | Very hard, fresh, gray fine grained GRANITE. Primary joint set is low angle, very close to moderate, rough, undulating and planar, fresh, open. No secondary joint set. |
| | 2 | | | | | | | |
| 9.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | 65.6 / 10.0 | |
| | | | | | | | | Bottom of Exploration at 10.0m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B9 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 0+549, 183R

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER -

ELEVATION 79.71
DATUM NGVD
START 22 May 2000
FINISH 22 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 2 3 4 3 | S1 10 | 0.00 0.61 | 79.58 0.12 | Loose, brown fine sandy SILT, roots -TOPSOIL- |
| | | | | | | Loose, brown silty fine SAND, trace roots -FILL- |
| | | | | | 78.91 0.79 | Gray fine sandy SILT, trace clay, trace gravel |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | | | | | 78.18 1.52 | |
| | | 3 4 9 12 | S2 51 | 1.52 2.13 | | Stiff, gray-brown clayey SILT -MARINE DEPOSIT- |
| 2.0 | | | | | | |
| 3.0 | | 2 3 3 4 | S3 61 | 3.05 3.66 | | Medium stiff, brown(slightly mottled) clayey SILT, trace fine sand |
| | | | | | 75.68 4.02 | |
| 4.0 | | | | | 75.22 4.48 | Gray-brown gravelly fine SAND, trace silt and clay (retrieved from bottom of auger flights) |
| | | | | | | Bottom of Exploration at 4.48m. Auger refusal |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/22/00 | 1317 | .1 | 4.48 | 4.48 | 3.81 |
| 5/22/00 | 1330 | .25 | | 4.18 | 3.54 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 4.48
ROCK CORED (M)
SAMPLES 3S

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B10**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 0+640, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - FV= Field vane shear test 5.1cm.x17.8cm. |

ELEVATION 81.90
DATUM NGVD
START 22 May 2000
FINISH 22 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 81.69 | Loose, dark brown fine sandy SILT, roots -TOPSOIL- |
| | | 1 2 2 2 | S1 41 | 0.15 0.76 | 0.21 | Loose, brown silty fine SAND -MARINE DEPOSIT- |
| 1.0 | | | | | 80.83 1.07 | |
| | | 3 4 7 7 | S2 61 | 1.52 2.13 | | Stiff, brown-gray mottled clayey SILT |
| 2.0 | | | | | | |
| 3.0 | | 3 4 7 7 | S3 61 | 3.05 3.66 | | Stiff, brown-gray mottled clayey SILT |
| 4.0 | | | | | | |
| | | 3 5 5 3 | S4 61 | 4.57 5.18 | 76.96 4.94 | Stiff, brown-gray mottled clayey SILT, ocasional fine sand partings -MARINE DEPOSIT- |
| 5.0 | | | | | | Stiff, brown silty CLAY, finely stratified throughout |
| 6.0 | | WOR WOH WOH 1 | S5 61 | 6.10 6.71 | 75.77 6.13 | Soft to medium stiff, brown silty CLAY, finely stratified throughout Soft to medium stiff, gray silty CLAY -MARINE DEPOSIT- |
| 7.0 | | | | | | |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/22/00 | 1615 | 0.0 | 12.19 | 12.19 | NE |
| 5/22/00 | 1645 | 0.5 | | 9.48 | 2.71 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 12.19 |
| ROCK CORED (M) | |
| SAMPLES | 8S |

H&A **METRIC LOG**

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B10
FILE NO. 80765-000
SHEET NO. 2 OF 2

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | WOR<br>WOR<br>WOR<br>WOR | S6<br>61 | 7.62<br>8.23 | | Soft to medium stiff gray silty clay<br>FV1: 7.62m.-7.83m. Su=17.7 KPa<br>FV2: 7.83m.-8.05m. Su=47.8 KPa |
| 8.0 | | | | | | |
| 9.0 | | | | | | |
| | | WOR<br>WOH<br>WOH<br>3 | S7<br>61 | 9.14<br>9.75 | | Soft to medium stiff, gray silty CLAY, frequent fine sand partings<br>-MARINE DEPOSIT- |
| 10.0 | | | | | | |
| | | WOR<br>WOH<br>1<br>3 | S8<br>61 | 10.67<br>11.28 | | Stiff gray silty CLAY, frequent fine sand partings<br>FV3:10.7m.-10.9m. Su= 53.1 KPa<br>FV4:10.9m.-11.1m. (couldn't turn vane) |
| 11.0 | | | | | 70.62<br>11.28 | Auger action indicates GLACIAL TILL DEPOSIT- gravelly coarse to fine SAND recovered from auger flights |
| 12.0 | | | | | 69.71<br>12.19 | Bottom of Exploration at 12.19m.<br>Auger refusal |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B11**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 0+792, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 79.61
DATUM NGVD
START 22 May 2000
FINISH 23 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1<br>2<br>2<br>4 | S1<br>48 | 0.09<br>0.70 | 79.37<br>0.24 | Loose, dark brown fine sandy SILT, roots<br>-TOPSOIL-<br>Loose, brown silty fine SAND grading to fine sandy SILT |
| 1.0 | | | | | 78.09 | |
| | | 5<br>11<br>14<br>18 | S2<br>61 | 1.52<br>2.13 | 1.52 | Very stiff, brown-gray mottled clayey SILT<br>-MARINE DEPOSIT- |
| 2.0 | | | | | | |
| 3.0 | | 1<br>2<br>3<br>3 | S3<br>61 | 3.05<br>3.66 | 76.44<br>3.17 | Medium stiff, brown mottled fine sandy SILT<br>-MARINE DEPOSIT- |
| 4.0 | | | | | | |
| | | WOR<br>WOR<br>3<br>1 | S4<br>61 | 4.57<br>5.18 | 74.83<br>4.79<br>74.65<br>4.97 | Medium stiff brown clayey SILT and silty fine SAND interbeds<br>Soft to medium stiff gray silty CLAY |
| 5.0 | | | | | | |
| 6.0 | | WOR<br>WOR<br>1<br>2 | S5<br>61 | 6.10<br>6.71 | | Soft to medium stiff, gray silty CLAY, frequent silt seams and occasional fine sand layers |
| 7.0 | | | | | | |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/23/00 | 0800 | 0 | 10.67 | 11.28 | NE |
| 5/23/00 | 0830 | .50 | | 10.27 | 3.35 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 11.28 |
| ROCK CORED (M) | |
| SAMPLES | 8S |

H&A **METRIC LOG**

ML_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B11<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 2 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | WOR | S6 | 7.62 | | Soft to medium stiff, gray silty CLAY |
| | | WOR | 61 | 8.23 | | |
| 8.0 | | WOH | | | | |
| | | 1 | | | | |
| 9.0 | | | | | | |
| | | WOR | S7 | 9.14 | | Soft to medium stiff, gray silty CLAY |
| | | WOR | 61 | 9.75 | | -MARINE DEPOSIT- |
| | | WOR | | | | |
| | | WOH | | | | |
| 10.0 | | | | | | |
| | | WOR | S8 | 10.67 | 68.70 | Soft to medium stiff, gray silty CLAY, occasional fine sand seams |
| | | 7 | 41 | 11.28 | 10.91 | Dense, gray gravelly coarse to fine SAND |
| 11.0 | | 25 | | | 68.34 | -GLACIAL TILL- |
| | | 21 | | | 11.28 | Bottom of Exploration at 11.28m. |
| | | | | | | No refusal |

| | H&A | METRIC LOG |
|---|---|---|

M_FORM4 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B12 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 0+838, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - FV= Field vane shear test 8.9cm.x17.8cm.;Solid stem auger 0-1.52m. |

ELEVATION 79.03
DATUM NGVD
START 5 May 2000
FINISH 8 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 78.88 | Loose, dark brown loamy fine sandy SILT, |
| | | 3 | 48 | 0.61 | 0.15 | roots |
| | | 5 | | | | -TOPSOIL- |
| | | 8 | | | | Medium stiff, brown-gray slightly mottled SILT, some clay, trace fine sand |
| 1.0 | | | | | 77.97 | -MARINE DEPOSIT- |
| | | | | | 1.07 | |
| | | 7 | S2 | 1.52 | | Very stiff, olive-brown mottled clayey SILT |
| | 20 | 9 | 46 | 2.13 | | |
| | | 10 | | | | -MARINE DEPOSIT- |
| 2.0 | 38 | 11 | | | | |
| | 31 | | | | | |
| | 22 | | | | | |
| | 27 | | | | | |
| 3.0 | | 3 | S3 | 3.05 | | Stiff, gray-brown mottled clayey SILT |
| | 23 | 6 | 51 | 3.66 | | |
| | | 6 | | | | |
| | 29 | 5 | | | | |
| | 28 | | | | | |
| 4.0 | | | | | | |
| | 30 | | | | | |
| | 29 | | | | | |
| | | 1 | S4 | 4.57 | 74.28 | Medium stiff, gray-brown mottled clayey SILT |
| | 33 | 1 | 61 | 5.18 | 4.75 | Medium stiff, gray silty CLAY |
| | | 1 | | | | |
| 5.0 | 28 | 1 | | | | -MARINE DEPOSIT- |
| | 27 | | | | | |
| | 23 | | | | | |
| 6.0 | 21 | | | | | |
| | | Push | U1 | 6.10 | | Medium stiff, gray silty CLAY |
| | 38 | | 56 | 6.71 | | |
| | 25 | | | | | |
| | 24 | | | | | |
| 7.0 | | | | | | |
| | 20 | | | | | |
| | 23 | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/8/00 | 0900 | 69 | 6.10 | 4.57 | 0.43 |
| 5/9/00 | 0700 | 91 | | | 3.11 |
| 5/9/00 | 1400 | 98 | 12.80 | 15.91 | 14.17 |

SAMPLE IDENTIFICATION

| | |
|---|---|
| O | OPEN END ROD |
| T | THIN WALL TUBE |
| U | UNDISTURBED SAMPLE |
| S | SPLIT SPOON |

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 12.71 |
| ROCK CORED (M) | 2.96 |
| SAMPLES | 8S,U1,2C |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B12
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | 28 | WOH<br>WOH | S5<br>61 | 7.62<br>8.23 | | Medium stiff, gray silty CLAY, occasional fine sand partings |
| 8.0 | 26 | 1<br>4 | | | | FV1: 7.62-7.80m. Su = 30.6KPa |
| | 28 | | | | | -MARINE DEPOSIT- |
| | 27 | | | | | |
| 9.0 | 32 | | | | | |
| | 41 | WOH<br>14 | S6<br>61 | 9.14<br>9.75 | 69.68<br>9.36 | Medium stiff, gray silty CLAY, frequent fine sand partings |
| | 292 | 15<br>18 | | | 69.59<br>9.45 | FV2: 9.14-9.33m. Su = 33.5KPa<br>Medium dense, gray silty fine SAND, trace clay |
| 10.0 | 112 | | | | | Dense, gray silty coarse to fine SAND, some gravel |
| | 39 | | | | | |
| | 78 | | | | | -GLACIAL TILL- |
| | 56 | 27<br>32 | S7<br>15 | 10.67<br>11.28 | | Very dense, gray gravelly coarse to fine SAND, some silt |
| 11.0 | 75 | 22<br>23 | | | | |
| | 104 | | | | | |
| | 76 | | | | | |
| 12.0 | 99 | | | | | |
| | 64 | 77<br>53 | S8<br>18 | 12.19<br>12.71 | | |
| | 121 | 82<br>150/.06 | | | 66.32<br>12.71 | Top of Bedrock at 12.71m.<br>Advanced roller bit to 12.86m.<br>See Core Boring Report |

M_PORHA 80765-000

H&A METRIC LOG

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B12
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 11.0 | | | | | | | | |
| 12.0 | | | | | | | | Top of Bedrock at 12.71m. Advanced roller bit to 12.86m. Begin NX rock core |
| | | | | | | | 66.2 12.9 | |
| 13.0 | | C1 | 12.9 / 14.4 | 1.5 / 1.1 | 98 / 70 | Fr.-Sl. | | Very hard, fresh to slightly weathered, white, gray fine grained GRANITE. Primary joint set is moderately dipping to low angle, extremely close to moderately close, rough, planar, fresh to discolored, tight to open |
| 14.0 | | | | | | | | |
| | | C2 | 14.4 / 15.8 | 1.4 / 1.4 | 100 / 100 | Fr. | | C2: Same lithology as C1, primary joint set is low angle, wide, rough, undulating, fresh, open. |
| 15.0 | | | | | | | | |
| | | | | | | | 63.2 15.8 | Bottom of Exploration at 15.82m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B13 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta.0+888, 2R

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 75.62
DATUM NGVD
START 9 May 2000
FINISH 10 May 2000
DRILLER M. Gunning
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 2 | S1 | 0.00 | 75.56 | Loose, brown clayey SILT, some fine sand, roots |
| | | 2 | 43 | 0.61 | 0.06 | -TOPSOIL- |
| | | 3 | | | | Medium stiff, brown-gray mottled clayey SILT, trace fine sand |
| | | 3 | | | | |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | | 2 | S2A | 1.52 | | Medium stiff, gray slightly mottled clayey SILT, trace organics |
| | | 2 | S2B | 2.13 | 73.79 | |
| | | 12 | 53 | | 1.83 | Very stiff, gray-brown mottled clayey SILT, trace organics |
| 2.0 | 6 | 28 | | | | |
| | 40 | | | | | |
| | 79 | | | | | |
| | 124 | | | | | |
| 3.0 | Open hole | 7 | S3 | 3.05 | | Very stiff, gray-brown slightly mottled clayey SILT |
| | | 14 | 43 | 3.66 | | |
| | | 13 | | | 72.12 | |
| | | 18 | | | 3.51 | Very stiff, gray silty CLAY |
| 4.0 | | | | | | |
| | | 6 | S4 | 4.57 | | Very stiff, gray slightly mottled to brown silty CLAY |
| | | 9 | 61 | 5.18 | | |
| 5.0 | | 12 | | | | -MARINE DEPOSIT- |
| | | 11 | | | | |
| 6.0 | | Push | U1 | 6.10 | | Medium stiff, gray silty CLAY |
| | | | 61 | 6.71 | | |
| 7.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/10/00 | 0700 | 14.0 | 1.52 | 2.13 | 0.24 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 10.55 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 6S,2C |

H&A METRIC LOG

M_FORM-A 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B13<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 3 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 4 | S5 | 7.62 | 67.85 | Attempted field vane, but could not |
| | | 43 | 56 | 8.23 | 7.77 | penetrate soil |
| 8.0 | | 19 | | | | Very dense, gray-brown gravelly coarse to |
| | | 20 | | | | fine SAND |
| | | | | | | -GLACIAL TILL- |
| 9.0 | | | | | | |
| | | 26 | S6 | 9.14 | | Dense, gray-brown gravelly coarse to fine |
| | | 22 | 25 | 9.75 | | SAND, trace silt |
| | | 18 | | | | |
| | | 35 | | | | -GLACIAL TILL- |
| 10.0 | | | | | | |
| | | | | | 65.07 | |
| | | | | | 10.55 | Top of Bedrock at 10.55m. |
| | | | | | | See Core Boring Report |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B13
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATH-ERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 10.0 | | | | | | | | Top of Bedrock at 10.55m. Advanced roller bit to 10.67m. Begin NX rock core |
| | | | | | | | 65.0 | |
| | 3 | C1 | 10.7 / 12.2 | 1.5 / 1.4 | 97 / 90 | Fr. | 10.7 | C1: Hard to very hard, fresh, white to gray, fine grained GRANITE(medium grained from 10.67m.-10.79m.) Primary joint set is moderately dipping to low angle, wide to very close, rough, undulating, fresh, tight. |
| 11.0 | 3 | | | | | | | |
| | 3 | | | | | | | |
| | 2 | | | | | | | |
| 12.0 | 1 | | | | | | | |
| | 2 | C2 | 12.2 / 13.7 | 1.3 / 1.2 | 85 / 83 | Fr.-Sl. | | C2: Same as C1 lithology. Secondary joint set is high angle(nearly vertical), rough, planar, open, discolored. |
| | 1 | | | | | | | |
| 13.0 | 2 | | | | | | | |
| | 3 | | | | | | | |
| | 3 | | | | | | 61.9 | |
| | | | | | | | 13.7 | Bottom of Exploration at 13.72m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B14 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 1+042, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER - FV= Field vane shear test 5.1cm.x17.8cm.

ELEVATION 70.80
DATUM NGVD
START 23 May 2000
FINISH 24 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 70.68 | Loose, dark brown fine sandy SILT, roots |
| | | 4 | 43 | 0.61 | 0.12 | -TOPSOIL- |
| | | 7 | | | | Stiff, brown fine sandy SILT, trace clay |
| | | 9 | | | 70.25 | |
| | | | | | 0.55 | Stiff, olive-brown mottled clayey SILT |
| | | | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | | 4 | S2 | 1.52 | | Stiff, olive-brown mottled clayey SILT |
| | | 6 | 61 | 2.13 | | |
| | | 8 | | | | |
| 2.0 | | 8 | | | | |
| 3.0 | | 3 | S3 | 3.05 | | Medium stiff, finely stratified seams and partings of CLAY, clayey SILT, silty fine SAND, occasional layers of silty fine SAND and fine sandy SILT |
| | | 3 | 61 | 3.66 | | |
| | | 3 | | | | |
| | | 6 | | | | -MARINE DEPOSIT- |
| 4.0 | | | | | | |
| | | WOH | S4 | 4.57 | | Medium stiff, gray silty CLAY with frequent fine sand partings |
| | | 2 | 61 | 5.18 | | |
| | | 1 | | | | |
| 5.0 | | 2 | | | | |
| 6.0 | | WOR | S5 | 6.10 | | Medium stiff, gray silty CLAY |
| | | WOR | 61 | 6.71 | | FV1: 6.10m.-6.31m. Su= 33.5 KPa |
| | | WOR | | | | FV2: 6.31m.-6.52m. Su= 35.4 KPa |
| | | WOH | | | | |
| 7.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/23/00 | 0825 | 0.0 | 12.34 | 12.80 | 8.23 |
| 5/23/00 | 0930 | 0.5 | | 10.30 | 4.15 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 12.80 |
| ROCK CORED (M) | |
| SAMPLES | 9S |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B14
FILE NO. 80765-000
SHEET NO. 2 OF 2

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | WOR<br>WOR<br>WOH<br>2 | S6<br>58 | 7.62<br>8.23 | | Medium stiff, gray CLAY |
| 8.0 | | | | | | |
| 9.0 | | | | | | |
| | | WOR<br>WOH<br>1<br>3 | S7<br>61 | 9.14<br>9.75 | | Medium stiff, gray silty CLAY<br>-MARINE DEPOSIT- |
| 10.0 | | | | | | |
| | | | | | 60.13<br>10.67 | |
| | | WOR<br>WOR<br>WOH<br>3 | S8<br>61 | 10.67<br>11.28 | | Very loose, gray fine sandy SILT, trace clay (Attempted field vane-could not penetrate soils) |
| 11.0 | | | | | 59.61<br>11.19 | Loose, brown silty fine SAND |
| 12.0 | | | | | | |
| | | 25<br>16<br>27 | S9<br>13 | 12.34<br>12.95 | 58.24<br>12.56<br>58.00<br>12.80 | Dense, brown silty fine SAND<br>Dense, brown gravelly coarse to fine SAND, trace silt<br>-GLACIAL TILL-<br>Bottom of Exploration at 12.8m. |

H&A METRIC LOG

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B15 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 1+158, 3R

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 75.04
DATUM NGVD
START 24 May 2000
FINISH 24 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 74.89 | Loose, dark brown fine sandy SILT, roots |
| | | 1 | 43 | 0.61 | 0.15 | -TOPSOIL- |
| | | 4 | | | | Loose, brown silty fine SAND |
| | | 9 | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | 73.46 | |
| | | 8 | S2 | 1.52 | 1.58 | Stiff, brown mottled clayey SILT, frequent fine sand partings |
| | | 7 | 51 | 2.13 | | |
| | | 8 | | | | |
| 2.0 | | 9 | | | 72.91 | |
| | | | | | 2.13 | Medium dense, gray-brown gravelly coarse to fine SAND, trace silt |
| | | | | | | Note: Auger resisting on probable boulder |
| 3.0 | | 5 | S3 | 3.05 | | |
| | | 11 | 13 | 3.66 | | |
| | | 10 | | | 71.54 | |
| | | | | | 3.51 | Bottom of Exploration at 3.51m. No refusal |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/24/00 | 1030 | 0.0 | 3.05 | 3.51 | NE |
| 5/24/00 | 1100 | 0.5 | | 2.29 | 1.68 |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 3.51 |
| ROCK CORED (M) | |
| SAMPLES | 3S |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B16**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 1+362, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | NX |
| INSIDE DIAMETER (CM) | 8 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 77.74
DATUM NGVD
START 24 May 2000
FINISH 24 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 77.65 | Very loose, dark brown fine sandy SILT, roots |
| | | 2 | 36 | 0.61 | 0.09 | -TOPSOIL- |
| | | 2 | | | | Loose, brown silty fine SAND |
| | | 5 | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | 76.22 | |
| | | 12 | S2 | 1.52 | 1.52 | Medium dense, brown silty fine SAND (finely stratified throughout) |
| | 6 | 10 | 28 | 2.13 | | |
| | | 14 | | | | |
| 2.0 | 19 | 17 | | | | -MARINE DEPOSIT- |
| | 27 | | | | | |
| | 31 | | | | | |
| | 30 | | | | | |
| 3.0 | | 7 | S3 | 3.05 | | |
| | 5 | 15 | 23 | 3.66 | 74.36 | |
| | 7/.1 | 50/.03 | | | 3.38 | Top of Bedrock at 3.38m. See Core Boring Report |
| 4.0 | | | | | | |
| 5.0 | | | | | | |
| 6.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/24/00 | 1130 | 0.0 | 3.38 | 6.46 | 3.84 |
| 5/24/00 | 1200 | 0.5 | 0.00 | 6.46 | 4.63 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 3.38 |
| ROCK CORED (M) | 3.05 |
| SAMPLES | 3S,2C |

H&A **METRIC LOG**

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | CORE BORING REPORT | BORING NO. B16<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 2 |
|---|---|---|---|

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 2.0 | | | | | | | | |
| | | | | | | | | Top of Bedrock at 3.38m.<br>Advanced roller bit to 3.41m.<br>Begin NX rock core |
| 3.0 | 3 | | | | | | | |
| | 3 | C1 | 3.4<br>4.9 | 1.5<br>0.8 | 100<br>50 | Fr.-Sl. | 3.4 | C1: Medium hard, fresh to slightly weathered, gray aphanitic SLATE with calcite stringers throughout. Primary joint set is low angle to moderately dipping, very close to close, rough and smooth, stepped and undulating, tight, fresh and discolored. |
| | 2 | | | | | | | |
| 4.0 | 3 | | | | | | | |
| | 4 | | | | | | | |
| | 2 | | | | | | | |
| 5.0 | 2 | C2 | 4.9<br>6.5 | 1.5<br>0.1 | 100<br>8 | Fr.-Sl. | | C2: Same as C1 lithology. Primary joint set is high angle to vertical, very close to close, rough and smooth, stepped and undulating, tight, fresh and discolored. Secondary set is low angle to moderately dipping, very close to close, rough and smooth, stepped, tight, fresh and discolored. |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| 6.0 | 2 | | | | | | | |
| | 2 | | | | | | | |
| | | | | | | | 6.5 | Bottom of Exploration at 6.46m. |

METRIC

80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B17(OW)**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 1+457, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HW | SS | NX |
| INSIDE DIAMETER (CM) | 10 | 3 | 5 |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 74.03
DATUM NGVD
START 24 May 2000
FINISH 24 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 73.88 | Very loose, dark brown fine sandy SILT, roots |
| | | 1 | S1 | 0.09 | 0.15 | -TOPSOIL- |
| | | 1 | 46 | 0.40 | | Loose, brown fine sandy SILT |
| | | 3 | | | | |
| | | 6 | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | | | | | 72.48 | |
| | | 7 | S2 | 1.52 | 1.55 | Very stiff, brown mottled clayey SILT, occasional fine sand partings |
| | 51 | 8 | 61 | 2.13 | | |
| | | 10 | | | | |
| 2.0 | 53 | 11 | | | | |
| | 51 | | | | | |
| | 54 | | | | | |
| | 53 | | | | | |
| 3.0 | | | | | | |
| | 33 | 3 | S3 | 3.05 | | |
| | | 7 | 56 | 3.66 | 70.68 | |
| | 62 | 14 | | | 3.35 | Medium dense, brown silty fine SAND, |
| | | 22 | | | 70.46 | frequent silt seams |
| | 159/.2 | | | | 3.57 | Fine gravel in spoon tip |
| | | | | | 70.04 | -GLACIAL TILL- |
| 4.0 | | | | | 3.99 | Top of Bedrock at 3.99m. See Core Boring Report |
| 5.0 | | | | | | |
| 6.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/24/00 | 1610 | 0 | 3.90 | 6.86 | 1.01 |
| 5/24/00 | 1710 | 1.0 | 0.00 | 4.88 | 0.12 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 3.99 |
| ROCK CORED (M) | 2.87 |
| SAMPLES | 3S,2C |

H&A **METRIC LOG**

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B17(OW)
FILE NO. 80765-000
SHEET NO. 2 OF 2

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 3.0 | | | | | | | | Top of Bedrock at 3.99m.<br>Begin NX rock core |
| 4.0 | 3 | C1 | 4.0<br>5.5 | 1.3<br>1.0 | 83<br>63 | Fr.-Sl. | 4.0 | C1: Medium hard, fresh to slightly weathered, gray aphanitic PHYLLITE with calcite stringers throughout. Primary joint set is low to high angle, very close to moderate, rough to smooth, planar, fresh to discolored, tight. |
| | 4 | | | | | | | |
| | 1 | | | | | | | |
| 5.0 | 1.5 | | | | | | | |
| | 1.5 | | | | | | | |
| | 2 | C2 | 5.5<br>6.9 | 1.5<br>1.3 | 113<br>96 | Fr.-Sl. | | C2: Same as C1 lithology. Primary joint set is moderately dipping to low angle, close to wide, rough to smooth, undulating, fresh, open to tight. |
| 6.0 | 1 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| | 1 | | | | | | 6.9 | Bottom of Exploration at 6.86m. |

METRIC

80765-000

# OBSERVATION WELL INSTALLATION REPORT

HALEY & ALDRICH

| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing | Observation Well | B17(OW) |
| City/State | Augusta, Maine | Test Boring | B17(OW) |
| Client | Maine Department of Transportation | Installation Date | 24-May-00 |
| Contractor | Maine Test Borings, Inc. | Location | Sta. 1+457, CL |
| Foreman | M. Porter | H&A File No. | 80765-000 |
| | | H&A Rep. | S. Wiercinski |

Ground El. 74.03m.

El. Datum NGVD

SOIL/ROCK CONDITIONS | BOREHOLE BACKFILL

(Numbers refer to elevation/depth from ground surface in meters)

(not to scale)

Topsoil

0.15

-MARINE DEPOSIT-

3.63

-GLACIAL TILL-

3.99

-BEDROCK-

6.9

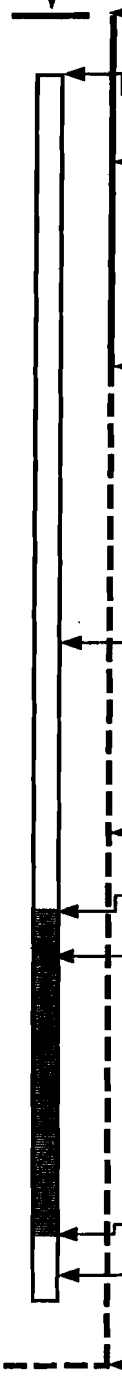
Bentonite

1.22

Filter sand

6.9

Bottom of Exploration



Type of protective cover/lock: Twist cap

Height of top of casing above ground surface: N/A m

Height of top of riser pipe above ground surface: 0.9 m

Type of protective casing: N/A

Length: m

Inside diameter: mm

Depth of bottom of casing: m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite | 0.0 | 1.2 |
| | | |
| | | |
| | | |

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 38.1 mm

Type of backfill around riser: Filter sand

Diameter of borehole: 101.6 mm

Depth of top of wellpoint: 1.8 m

Type of point or manufacturer: Schedule 40 PVC

Screen gauge or size of openings: 2.540 mm

Diameter of wellpoint: 50.8 mm

Type of backfill around point: Filter sand

Depth of bottom of wellpoint: 4.9 m

Silt trap

Depth of bottom of borehole: 6.9 m

(Depths refer to ground surface)

Remarks:

G:\forms\ow.wb2

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
**B17(OW)**



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-000 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | S. Wiercinski |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 24-May-00 |
| ELEVATION SUBTRAHEND | 74.0 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 6/5/2000 | 1100 | 16 | 4.1 m | 69.9 m | | SXW |
| 6/9/2000 | 1145 | 20 | 4.2 m | 69.8 m | | SXW |
| 8/8/2001 | 1035 | | 4.5 m | 69.5 m | | TJE |
| 8/26/2001 | 1200 | | 4.5 m | 69.5 m | | BKL |

Form #3170

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B18 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 1+646, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HW | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 53.19
DATUM NGVD
START 24 May 2000
FINISH 24 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 52.97 | Very loose, dark brown fine sandy SILT, roots |
| | | WOH | 51 | 0.61 | 0.21 | -TOPSOIL- |
| | | 3 | | | | Very loose, brown fine sandy SILT |
| | | 5 | | | 52.46 | |
| | | | | | 0.73 | -MARINE DEPOSIT- |
| 1.0 | | | | | | Medium dense, gray coarse sandy medium to fine SAND |
| | | 2 | S2 | 1.52 | 51.60 | |
| | 8 | 5 | 46 | 1.98 | 1.58 | Medium dense, gray and brown finely stratified silty fine SAND, occasional partings of medium to fine sand |
| 2.0 | 19 | 6 | | | | |
| | 18 | | | | | |
| | 16 | | | | | |
| | 41 | | | | 50.20 | |
| 3.0 | | 32 | S3 | 3.05 | 2.99 | Dense, gray coarse to fine sandy SILT, little gravel |
| | dropped | 23 | 23 | 3.51 | | |
| | 12 | 25 | | | | -GLACIAL TILL- |
| | 23 | | | | | |
| 4.0 | 26 | | | | | |
| | 42 | | | | | |
| | | 45 | S4 | 4.57 | | Very dense, gray coarse to fine sandy SILT, little gravel |
| | | 36 | 10 | 5.03 | | |
| 5.0 | | 42 | | | 48.16 | |
| | | | | | 5.03 | Bottom of Exploration at 5.03m. No refusal |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/25/00 | 1555 | 0 | | 1.52 | 0.61 |
| 5/25/00 | 1730 | 1.5 | 4.57 | 5.03 | 1.04 |
| 5/25/00 | 1745 | 1.75 | | 1.31 | 0.34 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 5.03 |
| ROCK CORED (M) | |
| SAMPLES | 4S |

H&A **METRIC LOG**

M_FORM/A 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B19 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 1+798, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | NW | SS | NX | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 8 | 3 | 5 | BIT TYPE Roller bit |
| HAMMER WEIGHT (KG) | 136 | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | 61 | 76 | - | OTHER - Solid stem auger 0-1.52m. |

ELEVATION 61.11
DATUM NGVD
START 5 June 2000
FINISH 5 June 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 60.99 | Very loose, dark brown fine sandy SILT, |
| | | 3 | 33 | 0.61 | 0.12 | roots |
| | | 3 | | | | -TOPSOIL- |
| | | 5 | | | | Loose, brown silty fine SAND |
| | | | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | | WOH | S2 | 1.52 | 59.41 | Loose, brown silty fine SAND, trace organics |
| | 2 | 1 | 48 | 2.13 | 1.71 | Loose, gray silty fine SAND |
| | | 3 | | | | |
| 2.0 | 9 | 5 | | | | -MARINE DEPOSIT- |
| | 14 | | | | | |
| | 24 | | | | | |
| | 37 | | | | | |
| 3.0 | | | | | 58.00 | |
| | 14/.06 | 50/.06 | NR | 3.05 | 3.11 | Top of Bedrock at 3.11m. |
| | | | 0 | 3.11 | | See Core Boring Report |
| 4.0 | | | | | | |
| 5.0 | | | | | | |
| 6.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 6/5/00 | 1435 | 0 | | 1.52 | 0.98 |
| 6/5/00 | 1623 | 1.75 | 3.05 | 6.22 | 2.56 |
| 6/5/00 | 1633 | 2.0 | | 6.22 | 0.79 |

SAMPLE IDENTIFICATION

| | |
|---|---|
| O | OPEN END ROD |
| T | THIN WALL TUBE |
| U | UNDISTURBED SAMPLE |
| S | SPLIT SPOON |

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 3.11 |
| ROCK CORED (M) | 3.11 |
| SAMPLES | 2S,2C |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# CORE BORING REPORT

BORING NO. B19
FILE NO. 80765-000
SHEET NO. 2 OF 2

| DEPTH (M) | DRILLING RATE MIN./0.30M | RUN NO. | DEPTH (M) | RECOVERY/RQD M | RECOVERY/RQD % | WEATHERING | ELEV./DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|---|---|
| 2.0 | | | | | | | | |
| 3.0 | | | | | | | 15.5 | Top of Bedrock at 3.10m. |
| | 2 | C1 | 3.1 / 4.6 | 1.6 / 1.5 | 100 / 98 | Fr. | 3.1 | Begin NX rock core<br>C1: Medium hard, fresh, gray fine grained to aphanitic SCHIST. Gray GRANITE layer from 4.51-4.71m. Primary joint set is low angle, close to wide, rough, undulating, fresh to discolored, open. |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| 4.0 | 2 | | | | | | | |
| | 1 | | | | | | | |
| | 3 | C2 | 4.6 / 6.2 | 1.5 / 1.2 | 98 / 80 | Fr.-Sl. | | C2: Same lithology as C1, except fresh to slightly weathered. Primary joint set is low angle to moderately dipping, rough, planar to undulating, fresh to discolored, tight to open. |
| 5.0 | 3 | | | | | | | |
| | 2 | | | | | | | |
| | 2 | | | | | | | |
| 6.0 | 2 | | | | | | 12.4 | |
| | | | | | | | 6.2 | Bottom of Exploration at 6.22m. |

METRIC

80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B20 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 1+996, 2R

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | SSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 10 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 51.90
DATUM NGVD
START 2 June 2000
FINISH 2 June 2000
DRILLER N. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 51.75 | Very loose, dark brown loamy fine sandy SILT |
| | | 1 | 33 | 0.46 | 0.15 | -TOPSOIL- |
| | | 4 | | | 51.32 | Loose, brown and gray silty fine SAND -MARINE DEPOSIT- |
| | | | | | 0.58 | Note: Drilling action suggests cobbles and gravelly material |
| 1.0 | | | | | | -GLACIAL TILL- |
| | | 39 | S2 | 1.62 | | Very dense, brown silty fine SAND, little coarse to medium sand, some gravel |
| | | 45 | 28 | 2.07 | | |
| 2.0 | | 32 | | | 49.68 | |
| | | | | | 2.23 | Bottom of Exploration at 2.23m. Auger refusal on probable bedrock |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 6/2/00 | 1017 | 0 | | 2.07 | 1.34 |
| 6/2/00 | 1027 | .1 | | 1.65 | 1.28 |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 2.23 |
| ROCK CORED (M) | |
| SAMPLES | 2S |

H&A **METRIC LOG**

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B21 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 2+120, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 45.63
DATUM NGVD
START 1 June 2000
FINISH 1 June 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 | S1 | 0.00 | 45.42 | Very loose, dark brown fine sandy SILT, |
| | | 1 | 56 | 0.61 | 0.21 | roots |
| | | 4 | | | | -TOPSOIL- |
| | | 3 | | | | Loose, brown and gray silty fine SAND |
| | | | | | | -MARINE DEPOSIT- |
| | | | | | 44.65 | |
| 1.0 | | | | | 0.98 | Note: Auger cuttings-silty fine SAND, trace |
| | | | | | 44.41 | gravel |
| | | | | | 1.22 | Bottom of Exploration at 1.22m. |
| | | | | | | Auger refusal on probable bedrock |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 6/1/00 | 1120 | | | 1.22 | NE |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 1.22 |
| ROCK CORED (M) | |
| SAMPLES | 1S |

H&A METRIC LOG

NJ_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B21A |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 1
LOCATION Sta. 2+120, 1L

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 45.63
DATUM NGVD
START 1 June 2000
FINISH 1 June 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 45.42 | -TOPSOIL- |
| | | | | | 0.21 | |
| | | 8 | S1 | 0.61 | | Medium dense, brown and gray silty fine |
| | | 11 | 28 | 0.91 | | SAND, trace gravel |
| 1.0 | | 14 | S2 | 0.91 | | |
| | | 54 | 43 | 1.37 | | -MARINE DEPOSIT- |
| | | 64 | | | 44.20 | |
| | | | | | 1.43 | Auger grinding through hard soil |
| | | | | | 44.14 | Bottom of Exploration at 1.49m. |
| | | | | | 1.49 | Auger refusal on probable bedrock |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 6/1/00 | 1200 | | | 1.49 | NE |

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

| | |
|---|---|
| OVERBURDEN (M) | 1.49 |
| ROCK CORED (M) | |
| SAMPLES | 2S |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B22**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 2+316, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER -

ELEVATION 57.88
DATUM NGVD
START 31 May 2000
FINISH 31 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 57.73 | |
| | | 2 | S1 | 0.09 | 0.15 | Loose, dark brown fine sandy SILT, roots |
| | | 5 | 30 | 0.40 | 57.61 | -TOPSOIL- |
| | | 5 | | | 0.27 | Loose, brown fine sandy SILT |
| | | 5 | | | | Medium stiff, brown-gray-olive mottled clayey SILT |
| 1.0 | | | | | | -MARINE DEPOSIT- |
| | | 5 | S2 | 1.52 | | Very stiff, brown-gray-olive mottled clayey SILT, frequent fine sand partings |
| | | 8 | 61 | 2.13 | | |
| | | 11 | | | | |
| 2.0 | | 13 | | | | |
| 3.0 | | 4 | S3 | 3.05 | | Stiff, brown-gray-olive mottled clayey SILT, frequent fine sand partings |
| | | 7 | 61 | 3.66 | | |
| | | 7 | | | | |
| | | 10 | | | | |
| 4.0 | | | | | | |
| | | 2 | S4 | 4.57 | | Stiff, brown-gray-olive mottled clayey SILT, frequent fine sand partings |
| | | 4 | 61 | 5.18 | | |
| | | 4 | | | | |
| 5.0 | | 5 | | | | |
| 6.0 | | | | | | |
| | | 2 | S5 | 6.10 | 51.63 | |
| | | 4 | 53 | 6.71 | 6.25 | Medium dense, brown silty fine SAND, frequent gray silt seams, occasional silt layers |
| | | 6 | | | | |
| | | 11 | | | | |
| 7.0 | | | | | | -MARINE DEPOSIT- |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/31/00 | 1600 | 0.0 | 8.29 | 8.29 | 8.20 |
| 5/31/00 | 1615 | 0.25 | | 7.28 | 7.13 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 8.29
ROCK CORED (M)
SAMPLES 6S

H&A **METRIC LOG**

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B22<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 2 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 3 | S6 | 7.62 | | Medium dense, brown silty fine SAND, |
| | | 5 | 61 | 8.23 | | frequent gray silt laminae and seams |
| 8.0 | | 5 | | | | |
| | | 8 | | | | |
| | | | | | 49.59 | |
| | | | | | 8.29 | Bottom of Exploration at 8.29m. |
| | | | | | | Auger refusal on probable top of bedrock |



M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B23 (OW)**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 2+443, 12R

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 55.87
DATUM NGVD
START 30 May 2000
FINISH 30 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 3 5 7 8 | S1 48 | 0.00 0.61 | 55.78 0.09 | Loose, dark brown fine sandy SILT, roots -TOPSOIL- |
| | | | | | | Medium dense, gray-brown fine sandy SILT -MARINE DEPOSIT- |
| | | | | | 54.96 0.91 | |
| 1.0 | | | | | | |
| | | 4 6 8 9 | S2 61 | 1.52 2.13 | | Stiff, gray-brown mottled clayey SILT, frequent fine sand partings, seams, layers |
| 2.0 | | | | | | |
| 3.0 | | 3 3 4 5 | S3 61 | 3.05 3.66 | | Medium stiff, brown mottled clayey SILT, frequent fine sand partings |
| 4.0 | | | | | | |
| | | 2 3 4 8 | S4 61 | 4.57 5.18 | | Medium stiff, brown mottled clayey SILT, frequent fine sand partings, silt laminae -MARINE DEPOSIT- |
| 5.0 | | | | | | |
| 6.0 | | | | | 49.77 | |
| | | 2 2 4 5 | S5 61 | 6.10 6.71 | 6.10 49.47 6.40 | Medium stiff, gray silty CLAY with frequent fine sand partings; Medium stiff, brown mottled clayey SILT, frequent fine sand partings |
| 7.0 | | | | | | |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/30/00 | 1615 | 0.0 | 12.04 | 12.04 | NE |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 12.04 |
| ROCK CORED (M) | |
| SAMPLES | 8S |

H&A **METRIC LOG**

M_PORH-A 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B23(OW)<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 2 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 2<br>3<br>5<br>8 | S6<br>61 | 7.62<br>8.23 | 48.19<br>7.68 | Soft, brown mottled clayey SILT, frequent fine sand partings |
| 8.0 | | | | | | Loose, brown finely stratified silty fine SAND layers, occasional brown silt layer, sample-wet<br><br>-MARINE DEPOSIT- |
| 9.0 | | | | | | |
| | | 2<br>7<br>10<br>13 | S7<br>48 | 9.14<br>9.75 | | Medium dense, gray-brown finely stratified silty fine SAND, occasional silt seams |
| | | | | | 45.96<br>9.91 | |
| 10.0 | | | | | | |
| | | 2<br>14<br>22<br>29 | S8<br>43 | 10.67<br>11.28 | | Dense, brown silty fine SAND, trace fine gravel seams |
| 11.0 | | | | | | -MARINE DEPOSIT- |
| 12.0 | | | | | 43.83<br>12.04 | Bottom of Exploration at 12.04m.<br>Auger refusal on probable top of bedrock |

M_PORHA 80765-000

H&A METRIC LOG

# OBSERVATION WELL INSTALLATION REPORT

HALEY & ALDRICH

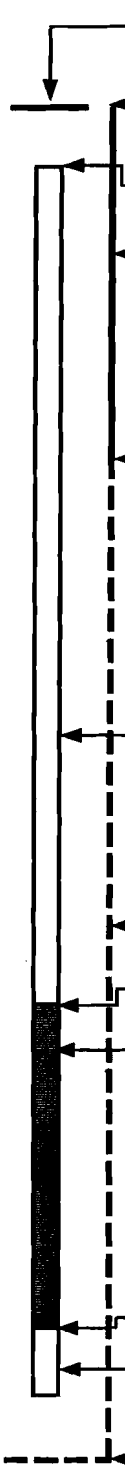
| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing | Observation Well | B23(OW) |
| City/State | Augusta, Maine | Test Boring | B23(OW) |
| Client | Maine Department of Transportation | Installation Date | 31-May-00 |
| Contractor | Maine Test Borings, Inc. | Location | Sta. 2+443, 12R |
| Foreman | M. Porter | H&A File No. | 80765-000 |
| | | H&A Rep. | S. Wiercinski |

Ground El. 55.88m.

El. Datum NGVD

| SOIL/ROCK CONDITIONS (Numbers refer to elevation/depth from ground surface in meters) (not to scale) | BOREHOLE BACKFILL |
|---|---|
| Topsoil | |
| 0.09 | |
| | Bentonite |
| | 1.0 |
| -MARINE DEPOSIT- | Borehole cuttings |
| | 8.23 |
| | Filter sand |
| 12.1 | 12.1 |

Bottom of Exploration



Type of protective cover/lock: Clean-out cap

Height of top of casing above ground surface: N/A m

Height of top of riser pipe above ground surface: 0.9 m

Type of protective casing: N/A

Length: m

Inside diameter: mm

Depth of bottom of casing: m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite | 0.0 | 1.0 |

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe: 38.1 mm

Type of backfill around riser: Filter sand

Diameter of borehole: 203.2 mm

Depth of top of wellpoint: 9.0 m

Type of point or manufacturer: Schedule 40 PVC

Screen gauge or size of openings: 2.540 mm

Diameter of wellpoint: 38.1 mm

Type of backfill around point: Filter sand

Depth of bottom of wellpoint: 12.1 m

Silt trap

Depth of bottom of borehole: 12.1 m

(Depths refer to ground surface)

Remarks:

G:\forms\ow.wb2

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
**B23(OW)**



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-000 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | S. Wiercinski |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 31-May-00 |
| ELEVATION SUBTRAHEND | 55.9 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 6/5/2000 | 1100 | 16 | 11.9 m | 44.0 m | | SXW |
| 6/9/2000 | 1130 | 20 | dry | NA | Silt on probe | SXW |
| 8/24/2001 | | | dry | NA | | TJE |
| 8/30/2001 | 1428 | | dry | NA | | TJE |

Form #3170

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. **B24**

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 2+591, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | HSA | SS | |
| INSIDE DIAMETER (CM) | 6 | 3 | |
| HAMMER WEIGHT (KG) | | 64 | - |
| HAMMER FALL (CM) | | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE
DRILL MUD
OTHER -

ELEVATION 55.60
DATUM NGVD
START 30 May 2000
FINISH 30 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1<br>3<br>5<br>5 | S1<br>41 | 0.00<br>0.61 | | Loose, brown fine sandy SILT with organics<br>-FILL-<br>(Reworked Marine Deposit) |
| | | | | | 54.68<br>0.91 | |
| 1.0 | | | | | | |
| | | 3<br>7<br>9<br>9 | S2<br>61 | 1.52<br>2.13 | | Very stiff, brown-gray-olive mottled clayey SILT<br>-MARINE DEPOSIT- |
| 2.0 | | | | | | |
| 3.0 | | 2<br>4<br>5<br>5 | S3<br>61 | 3.05<br>3.66 | 52.09<br>3.51 | Stiff, brown-gray-olive mottled clayey SILT<br>Medium dense, brown finely stratified silty fine SAND layers |
| 4.0 | | | | | | -MARINE DEPOSIT- |
| | | 2<br>4<br>9<br>9 | S4<br>61 | 4.57<br>5.18 | | Medium dense, brown finely stratified silty fine SAND with frequent gray silt laminae and seams |
| 5.0 | | | | | | |
| 6.0 | | 7<br>7<br>13<br>14 | S5<br>61 | 6.10<br>6.71 | 49.19<br>6.40 | Medium dense, brown finely stratified silty fine SAND with frequent gray silt seams and layers<br>Medium dense, brown silty fine SAND layers |
| 7.0 | | | | | | -MARINE DEPOSIT- |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/30/00 | 1215 | 0.0 | 9.14 | 9.60 | NE |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 9.60
ROCK CORED (M)
SAMPLES 7S

H&A **METRIC LOG**

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B24
FILE NO. 80765-000
SHEET NO. 2 OF 2

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 5 | S6 | 7.62 | | Medium dense, brown silty fine SAND layers |
| | | 10 | 53 | 8.23 | | |
| 8.0 | | 9 | | | | -MARINE DEPOSIT- |
| | | 8 | | | | |
| 9.0 | | | | | | |
| | | 7 | S7 | 9.14 | | Medium dense, brown silty fine SAND layers |
| | | 11 | 51 | 9.60 | | |
| | | 12 | | | 45.99 | |
| | | | | | 9.60 | Bottom of Exploration at 9.60m. |
| | | | | | | No refusal |

H&A METRIC LOG

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B25 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 2
LOCATION Sta. 2+743, CL

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL | DRILLING EQUIPMENT & PROCEDURES |
|---|---|---|---|---|
| TYPE | HSA | SS | | RIG TYPE Mobil B53 Bombardier |
| INSIDE DIAMETER (CM) | 6 | 3 | | BIT TYPE |
| HAMMER WEIGHT (KG) | | 64 | - | DRILL MUD |
| HAMMER FALL (CM) | | 76 | - | OTHER - |

ELEVATION 48.46
DATUM NGVD
START 26 May 2000
FINISH 26 May 2000
DRILLER M. Porter
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | | | | 48.28 | Very loose, brown fine sandy SILT, roots |
| | | 1 | S1 | 0.09 | 0.18 | -TOPSOIL- |
| | | 3 | 53 | 0.40 | | Loose, brown fine sandy SILT |
| | | 7 | | | | |
| | | 12 | | | | -MARINE DEPOSIT- |
| 1.0 | | | | | | |
| | | 3 | S2 | 1.52 | | Stiff, brown olive mottled clayey SILT, |
| | | 6 | 61 | 2.13 | | frequent sand partings and seams |
| | | 8 | | | | |
| 2.0 | | 9 | | | | |
| 3.0 | | | | | | |
| | | 2 | S3 | 3.05 | | Stiff, brown-olive interbedded mottled |
| | | 4 | 61 | 3.66 | | clayey SILT layers with silty fine SAND |
| | | 5 | | | | partings, seams and layers |
| | | 5 | | | | |
| 4.0 | | | | | | |
| | | 2 | S4 | 4.57 | | Stiff, brown-olive interbedded mottled |
| | | 8 | 61 | 5.18 | 43.59 | clayey SILT layers with silty fine SAND |
| | | 11 | | | 4.88 | partings, seams and layers |
| 5.0 | | 10 | | | | Medium dense, brown finely stratified silty |
| | | | | | | fine SAND partings and seams |
| | | | | | | -MARINE DEPOSIT- |
| 6.0 | | | | | | |
| | | 4 | S5 | 6.10 | | Dense, brown finely stratified silty fine |
| | | 14 | 23 | 6.71 | | SAND partings and seams |
| | | 16 | | | | |
| | | 16 | | | | |
| 7.0 | | | | | | |

**WATER LEVEL DATA**

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| | | | | | |

**SAMPLE IDENTIFICATION**

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

**SUMMARY**

| | |
|---|---|
| OVERBURDEN (M) | 9.75 |
| ROCK CORED (M) | |
| SAMPLES | 7S |

H&A **METRIC LOG**

M_PORHA 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B25<br>FILE NO. 80765-000<br>SHEET NO. 2 OF 2 |
|---|---|---|---|

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | | 5 | S6 | 7.62 | | Medium dense, brown finely stratified silty |
| | | 12 | 30 | 8.23 | | fine SAND partings and seams |
| 8.0 | | 15 | | | | |
| | | 14 | | | | -MARINE DEPOSIT- |
| 9.0 | | | | | | |
| | | 8 | S7 | 9.14 | | Dense, brown finely stratified silty fine |
| | | 16 | 51 | 9.75 | | SAND partings and seams |
| | | 12 | | | | |
| | | 12 | | | 30.71 | |
| | | | | | 9.75 | Bottom of Exploration at 9.75m.<br>No refusal |

H&A METRIC LOG

ML_FORM4A 80765-000

| HALEY & ALDRICH | South Portland, Maine | TEST BORING REPORT | BORING NO. B26 |
|---|---|---|---|

PROJECT: Kennebec River Crossing Project
LOCATION: Augusta, Maine
CLIENT: Maine Dept. of Transportation CONTRACTOR: Maine Test Borings, Inc.

FILE NO. 80765-000
SHEET NO. 1 OF 3
LOCATION Sta. 2+849, 11L

| ITEM | CASING | DRIVE SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| INSIDE DIAMETER (CM) | 8 | 3 | |
| HAMMER WEIGHT (KG) | 136 | 64 | - |
| HAMMER FALL (CM) | 61 | 76 | - |

DRILLING EQUIPMENT & PROCEDURES
RIG TYPE Mobil B53 Bombardier
BIT TYPE Roller bit
DRILL MUD
OTHER - Solid stem auger 0-1.52m.

ELEVATION 36.97
DATUM NGVD
START 11 May 2000
FINISH 11 May 2000
DRILLER M. Gunning
H&A REP S. Wiercinski

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| 0.0 | | 1 5 7 9 | S1 30 | 0.00 0.61 | | Medium dense, brown coarse to fine SAND, trace silt -GLACIOFLUVIAL DEPOSIT- |
| 1.0 | | | | | | |
| | 2 3 | 2 2 4 4 | S2 61 | 1.52 2.13 | 35.20 1.77 | Medium stiff, brown-gray clayey SILT -MARINE DEPOSIT- |
| 2.0 | 2 5 7 | | | | 34.53 2.44 | |
| 3.0 | 3 4 5 9 10 | WOH 2 2 3 | S3 61 | 3.05 3.66 | | Medium stiff, gray silty CLAY |
| 4.0 | 12 12 13 16 18 | WOH WOH 3 5 | S4 61 | 4.57 5.18 | | Medium stiff, gray silty CLAY |
| 5.0 | 14 15 17 19 18 | 2 2 3 5 | S5 61 | 6.10 6.71 | | Medium stiff, gray silty CLAY, frequent fine sand partings -MARINE DEPOSIT- |
| 6.0 | | | | | | |
| 7.0 | | | | | | |

WATER LEVEL DATA

| DATE | TIME | ELAPSED TIME (HR) | DEPTH (M) TO: BOTTOM OF CASING | BOTTOM OF HOLE | WATER |
|---|---|---|---|---|---|
| 5/12/00 | 0700 | 11.0 | 18.29 | 18.29 | 17.83 |

SAMPLE IDENTIFICATION
O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY
OVERBURDEN (M) 25.30
ROCK CORED (M)
SAMPLES 17S

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B26
FILE NO. 80765-000
SHEET NO. 2 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | 21 | 3<br>5 | S6<br>61 | 7.62<br>8.23 | 29.20<br>7.77 | Medium stiff, gray silty CLAY, frequent fine sand partings |
| 8.0 | 30 | 9<br>10 | | | | -MARINE DEPOSIT- |
| | 39 | | | | | Medium dense, gray silty CLAY seams interbedded with brown fine SAND layers and seams |
| | 52 | | | | | -MARINE DEPOSIT- |
| 9.0 | 73 | | | | | |
| | 29 | 8<br>12 | S7<br>36 | 9.14<br>9.75 | | Dense, brown, tan, gray, orange finely stratified clayey SILT, silty CLAY, fine SAND, silty fine sand laminae, partings and seams |
| | 51 | 28<br>46 | | | | |
| 10.0 | 75 | | | | | |
| | 86 | | | | | |
| | 105 | | | | | |
| | 51 | 29<br>40 | S8<br>33 | 10.67<br>11.28 | | Very dense, brown, tan, gray, orange finely stratified clayey SILT, silty CLAY, fine SAND, silty fine sand laminae, partings and seams |
| 11.0 | 60 | 40<br>36 | | | | |
| | 63 | | | | | |
| | 66 | | | | | |
| 12.0 | 71 | | | | | |
| | 37 | 13<br>16 | S9<br>28 | 12.19<br>12.80 | | Very dense, brown, orange, gray finely stratified fine SAND |
| | 63 | 52<br>98 | | | | |
| 13.0 | 118 | | | | 23.87<br>13.11 | |
| | 151 | | | | | |
| | 267 | | | | | |
| | 50 | 60<br>136 | S10<br>23 | 13.72<br>14.02 | | Very dense, brown coarse to fine SAND, trace silt |
| 14.0 | 36 | | | | | -GLACIAL TILL- |
| | 27 | | | | | |
| | 26 | | | | | |
| 15.0 | 30 | | | | | |
| | 48 | 41<br>63 | S11<br>18 | 15.24<br>15.67 | | Very dense, brown/orange coarse to fine SAND, some gravel, trace silt |
| | 30 | 50/.4 | | | | |
| 16.0 | 28 | | | | | |
| | 51 | | | | | |
| | 46 | | | | | |
| | 55 | 81<br>200/.3 | S12<br>10 | 16.76<br>17.01 | | Very dense, brown/orange coarse to fine SAND, some gravel, trace silt |
| 17.0 | 55 | | | | | |
| | 46 | | | | | |
| | 32 | | | | | |
| 18.0 | 27 | | | | | |

H&A METRIC LOG

M_PORHA 80765-000

HALEY & ALDRICH

South Portland, Maine

# TEST BORING REPORT

BORING NO. B26
FILE NO. 80765-000
SHEET NO. 3 OF 3

| DEPTH (M) | CASING BLOWS PER 0.30M | SAMPLER BLOWS PER 0.15M | SAMPLE NUMBER & REC. (CM) | SAMPLE DEPTH (M) | ELEV./ DEPTH (M) | VISUAL DESCRIPTION AND REMARKS |
|---|---|---|---|---|---|---|
| | 48 | 21<br>55<br>62 | S13<br>10 | 18.29<br>18.75 | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| | 46 | | | | | -GLACIAL TILL- |
| 19.0 | 45 | | | | | |
| | 56 | | | | | |
| | 71 | | | | | |
| 20.0 | 71 | 69<br>94 | S14<br>10 | 19.81<br>20.12 | | Very dense, brown gravelly coarse to fine SAND |
| | 91 | | | | | |
| | 118 | | | | | |
| | 165 | | | | | |
| 21.0 | 243 | | | | | |
| | 65 | | | | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| | 52 | 61<br>97<br>110 | S15<br>13 | 21.64<br>22.10 | | -GLACIAL TILL- |
| 22.0 | 50 | | | | | |
| | 60 | | | | | |
| | 132 | | | | | |
| 23.0 | 48 | 58<br>75/.4 | S16<br>10 | 22.86<br>23.13 | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| | 35 | | | | | -GLACIAL TILL- |
| | 63 | | | | | |
| 24.0 | 89 | | | | | |
| | 109 | | | | | |
| | | 45<br>60<br>70 | S17<br>15 | 24.38<br>24.84 | | Very dense, brown gravelly coarse to fine SAND, trace silt |
| 25.0 | | | | | | -GLACIAL TILL- |
| | | | | | 11.67 | Washed ahead of casing to 25.3m. |
| | | | | | 25.30 | Bottom of Exploration at 25.3m.<br>No refusal |

M_PORHA 80765-000

H&A METRIC LOG

Appendix B

# APPENDIX B

## Logs of Phase II Test Borings

HALEY & ALDRICH

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-1-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |
| Driller: Darrel McKeen | Elevation (m): 81.25 | Auger ID/OD: | – / 20.32 cm |
| Operator: Maine Test Borings | Datum: NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: Tim Erickson | Rig Type: Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: 9/6/01 / 9/6/01 | Drilling Method: HSA Spin | Core Barrel: | -- |
| Boring Location: Station 200 + 226, 8 R | Casing ID/OD: – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/25.4 | 0.00 - 0.61 | 1/3/8/19 | 11 | | 81.19 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Tan, dry, stiff, SILT with trace fine sand & roots, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 80.18 | | 1.07 | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 15/23/34/24 | 57 | | | | Olive-brown, dry, hard, clayey SILT, non-plastic, mottled & foliated -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | 78.96 | | 2.29 | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 8/9/10/13 | 19 | | | | Olive-gray, damp, very stiff sandy CLAY , slightly plastic -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| 5 | D4 | 61.0/61.0 | 4.57 - 5.18 | 4/4/5/7 | 9 | | | | Brown-gray, damp, stiff, sandy CLAY, slightly to moderately plastic, sand lenses are frequent -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 5/7/6/6 | 13 | | 75.15 | | 6.10 | |
| 7 | | | | | | | | | Gray, moist, medium stiff, sandy CLAY, highly plastic, frequent 2.5-5.1 cm thick sand lenses -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 2/4/3/4 | 7 | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-1-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 81.25 | **Auger ID/OD:** | -- / 20.32 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/6/01 / 9/6/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 200 + 226, 8 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | 2/3/4/6 | 7 | | | | Gray, moist, medium stiff, CLAY with some sand, highly plastic, occasional 1-3 mm thick sand lenses -MARINE DEPOSIT-(CL) | |
| | | | | | | 17 | | | | |
| | | | | | | 19 | | | Note: Rod probe used from 9.75 to the bottom of exploration. See "Casing Blows" colum for rod probe values. | |
| 10 | | | | | | 17 | | | Note: Possible strata change at 11.28 m<br>Note: Strata change at 13.86 m | |
| | | | | | | 19 | | | | |
| | | | | | | 22 | | | | |
| 11 | | | | | | 31 | | | | |
| | | | | | | 31 | | | | |
| | | | | | | 37 | | | | |
| 12 | | | | | | 39 | | | | |
| | | | | | | 40 | | | | |
| | | | | | | 40 | | | | |
| 13 | | | | | | 40 | | | | |
| | | | | | | 41 | | | | |
| | | | | | | 100(15) | | | | |
| 14 | | | | | | | 67.35 | | 13.90<br>Bottom of Exploration at 13.90 m below ground surface.<br>Rod probe refusal on possible bedrock | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-2-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 74.77 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/6/01 | **Drilling Method:** | HSA Spi / Rod Probe | **Core Barrel:** | -- |
| **Boring Location:** | Station 200 + 418, 1.5 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/10.2 | 0.00 - 0.61 | 4/6/5/17 | 11 | | 74.74 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Brown, dry, stiff SILT, little roots, trace fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 73.40 | | 1.37 | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 15/15/18/25 | 33 | | | | Olive-brown, dry to damp, hard, clayey SILT, mottled -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | | | Olive-brown, dry to damp, very stiff, clayey SILT, mottled -MARINE DEPOSIT-(ML) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/9/14/21 | 23 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 6/9/14/21 | 23 | | 70.08 | | 4.69 | |
| 5 | | | | | | | | | Gray-brown, damp, medium dense, clayey SAND, some silt, poorly-graded, stratified -MARINE DEPOSIT-(SC) | |
| 6 | | | | | | | 68.67 | | 6.10 | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/WOH/WOH/5 | WOH | | | | Gray, damp, medium stiff, CLAY, little fine sand, trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | V1 | | 7.01 - 7.14 | 34.7/6.3 kPa | | | | | Note: Shear vane test taken at 7.01 m | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/WOH/2 | WOH | | | | Gray, moist, very stiff, CLAY, trace sand & silt, moderately plastic, frequent sand lenses | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-2-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 74.77 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/6/01 | **Drilling Method:** | HSA Spi / Rod Probe | **Core Barrel:** | -- |
| **Boring Location:** | Station 200 + 418, 1.5 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | -MARINE DEPOSIT-(CL) | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | WOH/WOH/WOH/2 | WOH | | | | Gray, moist, medium soft, CLAY, trace sand & silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | | | Note: Shear vane taken at 10.05 m and 10.36 m | |
| 10 | V2 | | 10.05 - 10.16 | 37.8/7.8 kPa | | | | | Note: Rod probe used from 10.36-10.76 m See "Casing Blows" Colum for rod probe values. | |
| | V3 | | 10.36 - 10.47 | 47.3/7.8 kPa | | | | | | |
| | | | | | | 62 | 64.13 | | 10.64 | |
| | | | | | | 100 | 63.83 | | -GLACIAL TILL- 10.94 | |
| 11 | | | | | | | | | Bottom of Exploration at 10.94 m below ground surface. | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-3-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 71.45 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/6/01 / 9/6/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 100 + 528, 1 R | **Casing ID/OD:** | – | **Water Level*:** | 0.76 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 3/8/10/10 | 18 | | 71.36 | -TOPSOIL- 0.09 | |
| | | | | | | | | Gray-brown, damp, very stiff, clayey SILT, little fine SAND, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 70.38 | 1.07 | |
| | | | | | | | | Note: Auger spoils pile indicates a strata change to gray moderately plastic clay at 1.06 m | |
| | D2 | 61.0/22.9 | 1.52 - 2.13 | 10/32/22/22 | 54 | | 69.84 | 1.62 | |
| 2 | | | | | | | | Yellow-brown, wet, very dense, sandy GRAVEL, some silt, poorly-graded -GLACIAL TILL DEPOSIT-(GM) | |
| 3 | D3 | 61.0/25.4 | 3.05 - 3.66 | 12/20/31/27 | 51 | | 68.40 | 3.05 | |
| | | | | | | | | Brown, wet, very dense, gravelly, SAND, little silt, well graded, loosely to moderately bonded -GLACIAL TILL DEPOSIT-(SW) | |
| 4 | | | | | | | 67.49 | 3.96 | |
| | | | | | | | | **Bottom of Exploration at 3.96 m below ground surface.** Auger refusal on possible bedrock | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-3-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-4-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 71.70 | Auger ID/OD: | 5.715 cm / 11.43 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 9/6/01 / 9/6/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 100 + 626, 1 R | Casing ID/OD: | -- | Water Level*: | 3.81 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/20.3 | 0.00 - 0.61 | 3/12/29/25 | 41 | | 71.64 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Light-brown, tan, dry, hard, SILT, trace roots, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 12/13/14/14 | 27 | | 69.90 | | 1.80 | |
| 2 | | | | | | | | | Olive-brown, dry to damp, very stiff, silty CLAY, very slightly plastic, slightly mottled -MARINE DEPOSIT-(CL) | |
| 3 | | | | | | | 68.65 | | 3.05 | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | WOH/WOH/WOH/3 | WOH | | | | Gray, damp, medium stiff, CLAY, trace silt, slightly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | | | Note: Shear vane test taken at 3.96 m and 4.27 m | |
| 4 | V1 | | 3.96 - 4.09 | 33.1/4.7 kPa | | | | | Gray, damp, medium stiff, CLAY, trace silt, slightly plastic -MARINE DEPOSIT-(CL) | |
| | V2 | | 4.27 - 4.39 | 31.5/6.3 kPa | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | WH/WH/WH/3 | WH | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | 65.60 | | 6.10 | |
| | D5 | 53.3/35.6 | 6.10 - 6.63 | 8/17/24/50(7.6) | 41 | | | | Gray, saturated, dense, gravelly SAND, trace silt, well-graded, -GLACIAL TILL DEPOSIT-(SW) | |
| | | | | | | | 65.05 | | 6.64 | |
| 7 | | | | | | | | | Bottom of Exploration at 6.64 m below ground surface. Spoon refusal on probable cobble or bedrock | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-5-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 73.49 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/5/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 9 + 913, 4 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/35.6 | 0.00 - 0.61 | 2/4/6/15 | 10 | | 73.46 | -TOPSOIL- (0.03) | |
| | | | | | | | | Tan, dry, stiff SILT, little roots, trace fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 72.57 | (0.91) Olive-brown, damp, very stiff, clayey SILT, non-plastic -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 8/10/15/17 | 25 | | | | |
| 2 | | | | | | | 71.35 | (2.13) Olive-brown, damp, very stiff, fine sandy CLAY, trace silt, stratified, slightly plastic -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 5/7/8/11 | 15 | | 70.13 | (3.35) Gray, damp, fine sandy CLAY (CL) -MARINE DEPOSIT- | |
| 4 | | | | | | | 68.92 | (4.57) Gray, damp, stiff, CLAY, some fine sand, moderately plastic -MARINE DEPOSIT-(CL) Note: Sand lenses observed throughout sample | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/3/5/7 | 8 | | | | |
| 5 | | | | | | | | | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/WOH/WOH/4 | WOH | | 67.39 | (6.10) Gray, damp, medium stiff, CLAY, trace silt, highly plastic -MARINE DEPOSIT-(CL) Note: Shear vane test taken at 7.01 m | |
| 7 | V1 | | 7.01 - 7.14 | 37.8/3.9 kPa | | | 66.48 | (7.01) Note: Cobble from 7.16-7.31 m Gray, very dense, saturated SAND, some fine gravel, well graded -GLACIAL STREAM DEPOSIT-(SW) | |
| | D6 | 33.0/33.0 | 7.62 - 7.95 | 21/67/50(3) | 117 | | | | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-5-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 73.49 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/5/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 9 + 913, 4 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 65.53 | | 7.96 **Bottom of Exploration at 7.96 m below ground surface.** Split spoon refusal | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-6-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 75.75 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/5/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 10 + 017, 4 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/50.8 | 0.00 - 0.61 | 3/6/9/13 | 15 | | 75.72 | -TOPSOIL- (0.03) | |
| | | | | | | | | Gray-brown, damp, very stiff, SILT, some clay, trace fine sand, clay non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 74.77 | (0.98) | |
| | | | | | | | | Gray-brown, damp, very stiff, SILT, some clay, trace fine sand, non-plastic, mottled, layered -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 8/10/12/16 | 22 | | | | |
| 2 | | | | | | | 73.86 | (1.89) | |
| | | | | | | | | Olive-brown, damp, stiff, silty CLAY, very slightly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | | Gray-brown, damp, stiff, silty CLAY, very slightly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | | Note: Drill action indicates sand lenses & layers from 3.96-4.05 m | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/7/7/10 | 14 | | | | |
| 4 | | | | | | | | | |
| | D4 | 43.2/17.8 | 4.57 - 5.00 | 10/36/50(13) | 86 | | 71.05 | (4.69) | |
| 5 | | | | | | | | Brown, wet, very dense, gravelly SAND, little silt, poorly-graded -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | | | Note: Frequent gravel & cobbles encountered from 5.0-6.10 m | |
| | | | | | | | | Brown, wet, very dense, gravelly SAND, little silt, poorly-graded -GLACIAL TILL DEPOSIT-(SP) | |
| 6 | D5 | 30.5/15.2 | 6.10 - 6.40 | 27/100/50(0) | 150 | | 69.35 | (6.40) | |
| | | | | | | | | **Bottom of Exploration at 6.40 m below ground surface.** Spoon refusal on possible bedrock | |
| 7 | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-7-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 74.55 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/7/01 / 8/7/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 340, 15 R | **Casing ID/OD:** | 7.6 cm/(NW) | **Water Level*:** | 1.71 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | 4/7/18/23 | 25 | | | | -TOPSOIL- | |
| | | | | | | | 74.30 | | 0.24 | |
| | | | | | | | | | Gray-brown, damp, very stiff sandy SILT, poorly-graded, slightly plastic, sand lenses present | |
| | | | | | | | 73.91 | | -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | 0.64 | |
| 1 | | | | | | | | | Gray brown, damp to moist,very dense, silty SAND with little gravel, poorly- graded, moderate bonding<br>-GLACIAL TILL DEPOSIT-(SM) | |
| | D2 | 40.6/35.6 | 1.52 - 1.93 | 33/69/100(7.6) | 169 | 75 | | | | |
| | R1 | 61.0/50.8 | 1.92 - 2.53 | RQD = 77% | | | 72.63 | | 1.92 | |
| 2 | | | | | | | | | Gray-light purple aphanitic to medium grained, metamorphic, medium hard, fresh to very slight, joints dipping horizontally, moderate to close, tight, no filling, RMD good, Recovery 83%<br>-PHYLLITE- | |
| | R2 | 152.4/152.4 | 2.53 - 4.05 | RQD = 80% | | | | | | |
| 3 | | | | | | | | | Gray/Light purple,aphanitic to medium grained, metamorphic,medium hard, fresh to very slight, joints horizontal to low angle, very close to moderately close, tight to open quartz infilling (medium grained,clear to white), RMD good, Recovery 100%<br>-PHYLLITE- | |
| 4 | | | | | | | 70.49 | | 4.05 | |
| | | | | | | | | | **Bottom of Exploration at 4.05 m below ground surface.** | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-8-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 75.70 | **Auger ID/OD:** | SSA 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/3/01 / 8/6/01 | **Drilling Method:** | SSA Spin Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 340, 15 R | **Casing ID/OD:** | 7.6cm/(NW) | **Water Level*:** | 0.61 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 1/2/14/28 | 16 | Spin | 75.55 | | 15.2 cm of organic soil — 0.15 | |
| | | | | | | | | | Tan dry to moist, very stiff, sandy, SILT with trace gravel, non plastic, trace organic matter -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 74.79 | | 0.91 | |
| | | | | | | | | | Note: frequent cobbles from 0.91 m to 1.52 m depth | |
| | | | | | | | | | Gray, moist, very dense,silty GRAVEL, poorly-graded, moderately bonded -GLACIAL TILL DEPOSIT- | |
| 2 | D2 | 61.0/53.3 | 1.68 - 2.29 | 56/54/57/63 | 111 | 41 | | | Same as above except sandy GRAVEL -GLACIAL TILL DEPOSIT- | |
| | | | | | | 71 | | | | |
| | | | | | | 140 | 73.29 | | 2.41 | |
| | R1 | 63.5/55.9 | 2.53 - 3.16 | RQD = 0% | | 63(5.1) | | | Top of Bedrock at 2.40 m | |
| 3 | R2 | 121.9/121.9 | 3.17 - 4.39 | RQD = 17% | | | | | Gray, aphanitic to fine grained, metamorphic very hard, fresh to moderate, steep to vertical dip, spacing is very close to close, open, -SLATE-, RMD very poor, Recovery 88% | |
| | | | | | | | | | Advanced rollerbit to 2.52 m | |
| 4 | | | | | | | | | Gray, aphanitic to fine grained, metamorphic hard,fresh to moderate, joints are steep to vertical, very close to close, open, no infilling, -SLATE-, RMD very poor, Recovery 100% | |
| | | | | | | | | | Note:Rock was cored at 1 FPM | |
| | | | | | | | 71.31 | | 4.39 | |
| 5 | | | | | | | | | **Bottom of Exploration at 4.39 m below ground surface.** | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-8-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-9-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 77.79 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/7/01 / 8/7/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 380, 15 R | **Casing ID/OD:** | 7.6cm (NW) | **Water Level*:** | 3.20 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/33.0 | 0.00 - 0.61 | 2/2/4/8 | 6 | | 77.73 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Gray-brown, damp, medium stiff, sandy SILT, slightly plastic, sand seams present -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 76.88 | | 0.91 | |
| | | | | | | | | | Note: Auger brought up SAND with gravel (fine) and trace silt starting at 0.91 m | |
| | | | | | | | | | Light brown, dry to damp, medium, dense, SAND with some gravel & trace silt, well-graded w/ 2.5-5.1 cm thick fine & medium grained sand layers alternating in bottom 10 cm of spoon -GLACIO FLUVIAL DEPOSIT-(SW) | |
| | D2 | 61.0/30.5 | 1.52 - 2.13 | 6/13/13/20 | 26 | 12 | | | | |
| 2 | | | | | | 32 | | | | |
| | | | | | | 35 | | | No recovery | |
| | | | | | | 58 | | | Note: Change is noted at 3.87 m from auger spoils | |
| 3 | | | | | | 86 | | | | |
| | D3 | 12.7/25.4 | 3.05 - 3.18 | 150(12.7) | | 37 | | | | |
| | | | | | | 58 | | | | |
| | | | | | | 92 | | | | |
| 4 | | | | | | 193 | 73.92 | | 3.87 | |
| | | | | | | 140 | | | Gray-brown, moist to wet, very dense, silty GRAVEL with little sand, poorly-graded -GLACIAL TILL DEPOSIT-(GM) | |
| | D4 | 10.2/10.2 | 4.57 - 4.67 | 150(10.2) | | | 73.13 | | 4.66 | |
| | R1 | 152.4/124.5 | 4.66 - 6.19 | RQD = 0% | | | | | Gray, aphanitic to fine grained, metamorphic, moderately hard, fresh to slightly weathered, joints dip horizontal to vertical (1 horiz. set, 1 vert. set) very close to close, tight to open, no infilling, RMD very poor, Recovery 82% -SLATE- | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | 71.60 | | 6.19 | |
| | | | | | | | | | **Bottom of Exploration at 6.19 m below ground surface.** | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80785-001

**Boring No.:** C1-10-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 78.91 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/7/01 / 8/7/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 380, 15 L | **Casing ID/OD:** | 7.6cm/(NW) | **Water Level*:** | 5.39 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
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Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/22.9 | 0.00 - 0.61 | 1/4/3/4 | 7 | | 78.69 | | -TOPSOIL- 0.21 | |
| | | | | | | | | | Yellow brown , dry to damp, loose, silty SAND, well graded | |
| | | | | | | | 78.30 | | 0.61 | |
| | | | | | | | | | Note: Auger spoils show a change to gravelly SAND at 0.61 m | |
| 1 | | | | | | | | | Brown, dry to damp, dense, gravelly SAND with trace silt, poorly-graded, -GLACIO FLUVIAL DEPOSIT-(SP) | |
| | D2 | 61.0/33.0 | 1.52 - 2.13 | 13/21/29/51 | 50 | 37 | | | | |
| | | | | | | 50 | | | | |
| 2 | | | | | | | | | Gray-brown, moist to wet, dense, SAND with some gravel and trace silt, poorly- graded -GLACIO FLUVIAL DEPOSIT-(SP) | |
| | | | | | | 44 | | | | |
| | | | | | | 60 | | | | |
| | | | | | | 32 | | | | |
| 3 | D3 | 61.0/33.0 | 3.05 - 3.66 | 18/18/28/32 | 46 | 4 | | | | |
| | | | | | | 20 | | | | |
| | | | | | | 42 | | | | |
| 4 | | | | | | 63 | | | | |
| | | | | | | 61 | | | | |
| | D4 | 61.0/27.9 | 4.57 - 5.18 | 28/40/16/24 | | 9 | 74.33 | | 4.57 | |
| | | | | | | | | | Gray-brown,moist to wet, dense SAND with some gravel and trace silt, poorly-graded -GLACIAL TILL DEPOSIT-(SP) | |
| 5 | | | | | | 42 | | | | |
| | | | | | | 55 | | | | |
| | R1 | 152.4/142.2 | 5.33 - 6.86 | RQD = 62% | | | 73.57 | | 5.33 | |
| | | | | | | | | | Gray, aphanitic to medium grained, metamporphic, moderately hard to hard, fresh to moderate, joints dipping horizontal to steep, very close to moderately close, tight to open, no infilling, RMD fair, Recovery 93% -BIOTITE SCHIST- | |
| 6 | | | | | | | | | | |
| | | | | | | | 72.05 | | 6.86 | |
| 7 | | | | | | | | | Bottom of Exploration at 6.86 m below ground surface. | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-10-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: | Kennebec River Crossing | Boring No.: | C1-11-01 |
| Location: | Augusta, Maine | PIN: | 556.21 |
| File No. | 80765-001 | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrell McKeen | Elevation (m): | 77.48 | Auger ID/OD: | 5.715 cm / 11.43 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/7/01 / 8/7/01 | Drilling Method: | SSA Spin / Casing | Core Barrel: | NQ |
| Boring Location: | Station 11 + 400, CL | Casing ID/OD: | 7.6cm/(NW) | Water Level*: | 3.99 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 1/3/8/11 | 11 | | 77.42 | | -TOPSOIL- (0.06) | |
| | | | | | | | | | Gray-brown,dry to damp, stiff, sandy SILT, slightly plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 76.59 | | (0.88) Gray-brown, damp to moist, stiff SILT, with some sand, moderately plastic, 1mm thick sand lenses every 10.2-15.2 cm -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 4/5/6/7 | 11 | 6 | | | Note: Auger spoils indicates a strata change at 0.22 m | |
| 2 | | | | | | 11 | | | | |
| | | | | | | 20 | | | | |
| | | | | | | 35 | 74.89 | | (2.59) Light brown damp to moist, medium dense fine grained SAND trace silt, well- graded -MARINE DEPOSIT-(SW) | |
| 3 | | | | | | 40 | | | | |
| | D3 | 61.0/25.4 | 3.05 - 3.66 | 9/13/16/18 | 29 | 10 | | | | |
| | | | | | | 16 | | | | |
| | | | | | | 45 | 73.79 | | (3.69) Note: Auger spoils indicates a strata change at 3.68 m | |
| 4 | | | | | | 83 | | | Yellow-brown,moist to wet,very dense, gravelly SAND with little silt, poorly graded -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | 70 | | | | |
| | D4 | 61.0/20.3 | 4.57 - 5.18 | 24/39/32/25 | 71 | 32 | | | | |
| 5 | | | | | | 35 | | | | |
| | | | | | | 67 | | | | |
| | | | | | | 82 | | | | |
| | | | | | | 150 | | | | |
| 6 | R1 | 152.4/129.5 | 6.00 - 7.53 | RQD = 49% | | | 71.47 | | (6.00) Gray, aphanitic to medium grained, metamorphic, very hard, fresh to slightly weathered, joints dipping horizontal to moderate, very close to moderately close, tight to open, quartz & weathered quartz infilling (medium grained, white & clear) -BIOTITE SCHIST- RMD poor, Recovery 85% | |
| 7 | | | | | | | 69.95 | | (7.53) Bottom of Exploration at 7.53 m below ground surface. | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-11-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-12-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 77.48 | **Auger ID/OD:** | 5.35 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/8/01 / 8/9/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 420, 15 R | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 5.82 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/17.8 | 0.00 - 0.61 | 1/3/8/18 | 11 | | 77.36 | | -TOPSOIL- 0.12 | |
| | | | | | | | | | Light brown, dry to damp, medium dense, gravelly SAND with trace silt, poorly-graded -GLACIO FLUVIAL DEPOSIT-(SP) | |
| 1 | | | | | | | | | Note: Drill action indicates frequent cobbles from 1.06 m -1.37 m Light brown, dry to damp, dense, gravelly SAND, poorly-graded -GLACIO FLUVIAL DEPOSIT-(SP) | |
| | D2 | 61.0/17.8 | 1.52 - 2.13 | 19/19/19/58 | 11 | 24 | | | Note: Roller bit used to get through cobble at 2.62 m-2.77 m | |
| 2 | | | | | | 56 | | | | |
| | | | | | | 98 | | | | |
| | | | | | | 127 | | | | |
| | | | | | | 75 | 74.71 | | 2.77 Yellow-brown, moist, dense, sandy, GRAVEL with little silt, poorly-graded, moderate to well bonded, -GLACIAL TILL DEPOSIT-(GM) | |
| 3 | D3 | 61.0/40.6 | 3.05 - 3.66 | 38/62/90/68 | 152 | 5 | | | | |
| | | | | | | 7 | | | | |
| | | | | | | 4 | 73.67 | | 3.81 Light brown, moist, dense, gravelly SAND with little silt, poorly-graded, -GLACIAL TILL DEPOSIT-(SP) | |
| 4 | | | | | | 51 | | | | |
| | | | | | | 57 | | | | |
| | D4 | 61.0/45.7 | 4.57 - 5.18 | 13/14/18/100 | 32 | 19 | | | | |
| 5 | | | | | | 32 | | | | |
| | | | | | | 73 | | | | |
| | | | | | | 60 | | | | |
| | | | | | | 148 | | | | |
| 6 | MD | 7.6/0.0 | 6.10 - 6.17 | 50(7.6) | 50(7.6) | | 71.29 | | 6.19 Rollerbit to 6.25 m | |
| | R1 | 33.0/0.0 | 6.25 - 6.58 | | | | | | No Recovery-Core barrel blocked. Boulder recovered from 6.58 m to 7.46 m. Note: Could not advance casing beyond 7.46 m, core barrel could not be used due to bending of the casing by boulders. | |
| 7 | | | | | | | 70.01 | | 7.47 Bottom of Exploration at 7.47 m below ground surface. | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-12-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-13-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 76.44 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/8/01 / 8/8/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 420, 15 L | **Casing ID/OD:** | 7.6cm(NW) | **Water Level*:** | 0.67 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 3/6/10/20 | 16 | | 76.32 | | -TOPSOIL- 0.12 | |
| | | | | | | | | | Gray-brown, damp, very stiff, sandy SILT, slightly plastic, faint partings -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 75.46 | | 0.98 | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change to a more clay rich soil at 0.98 m | |
| | D2 | 33.0/33.0 | 1.52 - 1.85 | 10/14 | | 9 | | | Yellow-brown, moist, very stiff CLAY w/ little silt, slightly plastic -MARINE DEPOSIT-(CL) | |
| 2 | D2A | 27.9/27.9 | 1.86 - 2.14 | 16/21 | 37 | 18 | 74.58 | | 1.86 | |
| | | | | | | 40 | | | Brown, moist to wet, dense, silty SAND, well-graded, frequent sand lenses -MARINE DEPOSIT-(SM) | |
| | R1 | 127.0/127.0 | 2.56 - 3.83 | RQD = 62% | | 100(12.2 | 73.88 | | 2.56 | |
| 3 | | | | | | | | | Gray-purple, aphanitic to medium grained, metamorphic, moderately hard, fresh to very slight, joints are horizontal to steep, very close to close, open, some minor white quartz infilling, RMD fair, Recovery 100% -PHYLLITE- | |
| 4 | | | | | | | 72.60 | | 3.84 | |
| | | | | | | | | | Bottom of Exploration at 3.84 m below ground surface. | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-13-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-14-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 75.14 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/8/01 / 8/8/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 440, CL | **Casing ID/OD:** | 7.6 cm(NW) | **Water Level*:** | 2.01 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | 2/3/8/11 | 11 | | 75.11 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Yellow-brown to olive, damp, stiff, clayey SILT with trace fine sand, well graded, very slightly plastic, homogeneous throughout | |
| | | | | | | | 74.53 | | -MARINE DEPOSIT-(ML) | |
| | | | | | | | 74.35 | | Note: Strata change seen at 0.61 m in very bottom of spoon 0.61 | |
| 1 | | | | | | | | | -MARINE DEPOSIT-(CL) 0.79 | |
| | | | | | | | | | Olive, moist, very stiff, clayey SILT with some fine sand, very slightly plastic, stratified with 1mm thick sand lenses throughout | |
| | | | | | | | | | -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 4/7/10/15 | 17 | 5 | | | | |
| 2 | | | | | | 10 | | | | |
| | | | | | | 16 | | | | |
| | | | | | | 27 | | | Note:drilling action indicates a strata change to gravelly SAND at 2.74 m | |
| | | | | | | 105 | 72.43 | | 2.71 | |
| 3 | | | | | | | | | -PROBABLE GLACIAL TILL- | |
| | | | | | | | 72.09 | | 3.05 | |
| | | | | | | | | | -Weathered Rock- | |
| | MD | 5.1/0.0 | 3.35 - 3.40 | 50 | | 140 | | | | |
| | R1 | 78.7/58.4 | 3.51 - 4.29 | RQD = 0% | | | 71.63 | | 3.51 | |
| 4 | | | | | | | | | Gray,aphanitic to fine grained, metamorphic, moderately hard, fresh to moderately weathered, joints are low angle to vertical, very close to close, tight to open, no infilling, RMD very poor -Recovery 74% -PHYLLITE- | |
| | R2 | 91.4/78.7 | 4.30 - 5.21 | RQD = 17% | | | | | Gray,aphanitic to fine grained, metamorphic, moderately hard, fresh to moderately weathered, joints are low angle to vertical, very close to close, tight to open, no infilling, RMD very poor -Recovery 86% -PHYLLITE- | |
| 5 | | | | | | | 69.93 | | 5.21 | |
| | | | | | | | | | **Bottom of Exploration at 5.21 m below ground surface.** | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-14-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-15-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrell McKeen | **Elevation (m):** | 75.33 | **Auger ID/OD:** | 5.715 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/9/01 / 8/9/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 457, 15 R | **Casing ID/OD:** | 7.6 cm(NW) | **Water Level*:** | 4.63 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Tervane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 1/1/4/10 | 5 | | 75.30 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Gray-brown, damp medium stiff, SILT with some clay and sand, non-plastic, -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | Brown-gray, damp,stiff,silty CLAY with some sand, very slightly plastic, mottled,sand seams present (1mm) -MARINE DEPOSIT-(CL) | |
| 1 | | | | | | 14 | | | | |
| | D2 | | 1.52 - 2.13 | 4/6/8/9 | 14 | 19 | | | | |
| | | | | | | 35 | | | | |
| 2 | | | | | | 45 | | | | |
| | | | | | | | 72.89 | | 2.44 | |
| | | | | | | | | | Brown gray, damp to moist, medium dense, silty fine SAND trace clay, poorly-graded -MARINE DEPOSIT-(SM) | |
| | | | | | | 43 | | | | |
| 3 | D3 | | 3.05 - 3.66 | 4/5/5/9 | 10 | 55 | | | | |
| | | | | | | 125 | | | | |
| | | | | | | 170 | | | | |
| | | | | | | | 71.40 | | 3.93 | |
| 4 | | | | | | | | | Gray-brown, moist, very dense, gravelly SAND trace silt, poorly-graded, -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | 35 | | | | |
| | D4 | | 4.57 - 5.27 | 30/41/50(76.2) | 91 | 100(3 | | | | |
| 5 | | | | | | | | | | |
| | | | | | | | 70.06 | | 5.27 | |
| | R1 | | 5.33 - 6.87 | RQD = 53% | | 22.5 | | | Note: roller bit used from 5.27-5.33 m | |
| | | | | | | | | | Top of bedrock at 5.27 m<br>Note: graphite seen in wash water from 5.33-6.86 m | |
| 6 | | | | | | | | | Dark gray, aphanitic,to fine grained metamorphic w/ igneous quartz intrusions, moderately hard, fresh to slightly weathered, joints are dipping low angle to moderate, very close to moderately close, open, no infilling, RMD fair, Recovery 67% | |
| | | | | | | | 68.47 | | -SLATE- 6.86 | |
| 7 | | | | | | | | | Bottom of Exploration at 6.86 m below ground surface. | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-16-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 73.99 | **Auger ID/OD:** | |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/8/01 / 8/9/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 457, 15 L | **Casing ID/OD:** | 7.6 cm(NW) | **Water Level*:** | 3.16 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 1/2/4/9 | 6 | | 73.83 | | -TOPSOIL- 0.15 | |
| | | | | | | | | | Yellow-brown, damp, medium stiff, sandy SILT with trace clay, well-graded, non plastic, no structure -MARINE DEPOSIT-(ML) | |
| | | | | | | | 73.16 | | 0.82 | |
| 1 | | | | | | | | | Note: Auger spoils indicate a strata change to a more clayey soil at 8.35 m -MARINE DEPOSIT-(CL) | |
| | | | | | | | 72.46 | | 1.52 | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 7/12/13/15 | 25 | 15 | | | Gray-brown, damp, very stiff, clayey SILT with some sand, slightly plastic, sand lenses(1mm thick) -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | 12 | | | | |
| | | | | | | 16 | | | | |
| | | | | | | 20 | | | | |
| | | | | | | 30 | | | | |
| 3 | | | | | | | 70.94 | | 3.05 | |
| | D3 | 7.6/7.6 | 3.05 - 3.12 | 50 | | 50 | | | Light-brown, damp, very dense, silty SAND, trace clay, well-graded -MARINE DEPOSIT-(SM) Note: Cored through a boulder from 3.13 m - 3.57 m | |
| | | | | | | | 70.42 | | 3.57 | |
| | D4 | 43.2/30.5 | 3.66 - 4.09 | 36/66/133(127) | | | | | Gray-brown, moist to wet, very dense, gravelly SAND with little silt, poorly graded, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 4 | | | | | | | 69.87 | | Note:casing blows from 3.05 m - 3.29 m =179, so driller used rollerbit to clean hole from 3.29 m -4.11 m Note:casing advanced to 4.11 m then rollerbit used with no advance possibly due to boulder 4.11 | |
| 5 | | | | | | | | | Bottom of Exploration at 4.11 m below ground surface. | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-16-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-16A-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mike Porter | Elevation (m): | 73.99 | Auger ID/OD: | |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/9/01 / 8/9/01 | Drilling Method: | SSA Spin / Casing | Core Barrel: | NQ |
| Boring Location: | Station 11 + 457, 15.5 L | Casing ID/OD: | 7.6 cm(NW) | Water Level*: | 2.52 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: for overburden soils from surface level to 4.08 m refer to log C1-16-01 for descriptions | |
| | | | | | | | | | Note: No samples taken from 0 m -4.08 m | |
| 1 | | | | | | | | | Note: Wash from rollerbit & casing indicates weathered rock from 3.81 m - 3.95 m. | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | 69.90 | | 4.08 | |
| | R1 | 101.6/96.5 | 4.11 - 5.13 | RQD = 60% | | | | | Dark gray (nearly purple), aphanitic to medium grained, metamorphic, moderately hard, fresh to slightly weathered, discontinuities dipping low angle to vertical, very close to close, tight to open, no infilling, but white quartz stringers throughout, RMD fair, Recovery 95% -SLATE- | |
| 5 | R2 | 50.8/45.7 | 5.12 - 5.63 | RQD = 75% | | | | | Note: R2 is approximately 50 % Granite and 50 % Slate | |
| | | | | | | | 68.35 | | Dark gray (SLATE), light gray (GR.), aphanitic to coarse grained metamorphic (SL.), igneous (GR.), moderately hard (SL.), very hard (GR.), fresh to very slight, discontinuities are low angle, moderately close, open, no infilling, RMD good, Recovery 90% -GRANITE & SLATE- | |
| 6 | | | | | | | | | 5.64 | |
| | | | | | | | | | Bottom of Exploration at 5.64 m below ground surface. | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-16A-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-17-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mike Porter | Elevation (m): | 74.17 | Auger ID/OD: | 5.72 cm / 11.43 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/9/01 / 8/10/01 | Drilling Method: | SSA Spin / Casing | Core Barrel: | NQ |
| Boring Location: | Station 11 + 480, CL | Casing ID/OD: | 7.6 cm(NW) | Water Level*: | 4.60 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 1/1/2/7 | 3 | | 74.11 | -TOPSOIL- (0.06) | |
| | | | | | | | | Gray-brown, dry to damp, soft, sandy SILT -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 73.05 | (1.13) | |
| | | | | | | | | Brown-gray, moist, very stiff, silty CLAY, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/10/14/16 | 24 | 10 | | | |
| 2 | | | | | | 16 | | | |
| | | | | | | 22 | | | |
| | | | | | | 28 | | | |
| 3 | | | | | | 29 | | | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 4/5/6/8 | 11 | 20 | 71.09 | (3.08) | |
| | | | | | | 19 | | Brown-gray, moist, stiff, sandy SILT with trace clay, well graded, non-plastic, clay layer with mottling only seen in top .03 m, sand lenses seen every 10-20 cm, -MARINE DEPOSIT-(ML) | |
| | | | | | | 23 | | | |
| 4 | | | | | | 57 | 70.06 | (4.11) | |
| | | | | | | 77 | | Light brown, moist to wet, very dense, gravelly SAND with trace silt, poorly-graded -GLACIAL TILL DEPOSIT- | |
| | D4 | 17.8/12.7 | 4.57 - 4.75 | 100/50(25.4) | 150 | 59 | | Note: roller bit used from 5.69-6.09 m, then casing was driven | |
| 5 | | | | | | 83 | | Light brown, moist to wet, very dense, gravelly SAND with trace silt, poorly-graded -GLACIAL TILL DEPOSIT- | |
| | | | | | | 135 | | | |
| | | | | | | 275 | | Light brown, moist to wet, very dense, gravelly SAND with trace silt, poorly-graded, rock peice in tip of spoon -GLACIAL TILL DEPOSIT- | |
| 6 | | | | | | 57 | | | |
| | D5 | 22.9/10.2 | 6.10 - 6.32 | 60 77(76.2) | 137 | | | | |
| | R1 | 142.2/132.1 | 6.46 - 7.88 | RQD = 93% | | | 67.77 | (6.40) | |
| 7 | | | | | | | | Dark gray, aphanitic to fine grained, metamorphic,moderately hard, fresh, joint is horizontal, wide, tight, minor calcite infilling, RMD excellent, Recovery 93% -SLATE- | |
| | | | | | | | 66.28 | (7.89) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-17-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 74.17 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/9/01 / 8/10/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 480, CL | **Casing ID/OD:** | 7.6 cm(NW) | **Water Level*:** | 4.60 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | **Bottom of Exploration at 7.89 m below ground surface.** | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-18-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 75.26 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/10/01 / 8/13/01 | **Drilling Method:** | SSA Spin / Casing Hammer | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 500, 15R | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 7.92 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 1/2/3/3 | 5 | | 75.17 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Light brown, dry, medium stiff, SILT with some fine sand, non-plastic -MARINE DEPOSIT-(ML) Note:Auger spoils pile indicates a strata change at 1.22 m | |
| 1 | | | | | | | 74.04 | | 1.22 | |
| | | | | | | | | | Olive, damp, very stiff, clayey SILT with some sand, non-plastic, sand seams every 10-15 cm, mottling starting at 1.7 m -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 6/9/10/14 | 19 | 9 | | | | |
| 2 | | | | | | 20 | | | Note: rollerbit used to break through cobble from 3.0-3.2 m | |
| | | | | | | 29 | | | | |
| | | | | | | 28 | | | | |
| | | | | | | 45 | | | | |
| 3 | | | | | | | 72.21 | | 3.05 | |
| | D3 | 61.0/25.4 | 3.20 - 3.81 | 18/38/42/63 | 80 | 36 | | | Brown, moist, very dense gravelly SAND with little silt, poorly-graded, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | 23 | | | | |
| | | | | | | 50 | | | | |
| 4 | | | | | | 44 | 71.30 | | 3.96 | |
| | | | | | | | | | Brown, moist, very dense, sandy GRAVEL with trace silt, poorly-graded, loosely bonded -GLACIAL TILL DEPOSIT-(GP) | |
| | | | | | | 55 | | | | |
| | D4 | 61.0/25.4 | 4.57 - 5.18 | 45/38/35/63 | 73 | 33 | | | Note: rollerbit used to get through cobble from 5.2-5.3 m | |
| 5 | | | | | | 75 | | | Note: rollerbit used through boulder from 5.5-5.7 m | |
| | | | | | | 59 | | | | |
| | | | | | | 303 | | | | |
| | | | | | | 102 | | | | |
| 6 | D5 | 22.9/20.3 | 6.10 - 6.32 | 82/ 58(76.2) | | 35 | | | Light brown, moist, very dense, gravelly SAND with trace silt, poorly-graded, very well bonded -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | 29 | | | | |
| | | | | | | 84 | | | | |
| 7 | | | | | | 52 | | | | |
| | | | | | | 68 | | | | |
| | D6 | 50.8/27.9 | 7.62 - 8.13 | 58/105/80/5050.8 | | 44 | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-18-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 75.26 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/10/01 / 8/13/01 | **Drilling Method:** | SSA Spin / Casing Hammer | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 500, 15R | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 7.92 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | 110 | | | | |
| | | | | | | 30 | | | | |
| | | | | | | 32 | | | | |
| | | | | | | 58 | | | | |
| 9 | D7 | 61.0/30.5 | 9.14 - 9.75 | 26/29/45/55 | 74 | 33 | | | Gray-brown, moist, very dense, silty SAND with trace gravel, poorly-graded<br>-GLACIAL TILL DEPOSIT-(SM)<br><br>Note: rollerbit used from 10.85 m - 10.94 m | |
| | | | | | | 70 | | | | |
| 10 | | | | | | | | | | |
| | D8 | 17.8/17.8 | 10.67 - 10.85 | | 84 | | | | | |
| | R1 | | 10.94 - 12.34 | RQD = 0% | | | 64.32 | | 10.94<br>Gray, aphanitic to fine grained, metamorphic, moderately hard , fresh to moderate, joints dip horizontal to vertical, very close to close, tight to open, no infilling<br>-SLATE-<br>RMD very poor, Recovery 100% | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | 62.91 | | 12.34<br>**Bottom of Exploration at 12.34 m below ground surface.** | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80766-001

**Boring No.:** C1-19-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 72.87 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/10/01 / 8/13/01 | **Drilling Method:** | SSA Spin / Casing Hammer | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 500, 15L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 4.69 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/35.6 | 0.00 - 0.61 | 1/2/3/4 | 5 | | 72.75 | | -TOPSOIL- 0.12 | |
| | | | | | | | | | Gray-brown, damp, medium stiff, SILT with little sand & trace clay, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 71.65 | | 1.22 | |
| | D2 | 61.0/61.0 | 1.43 - 2.04 | 8/9/10/13 | 19 | 10 | | | Brown-gray, moist, very stiff, CLAY with some silt & little sand, moderately to highly plastic, mottled throughout most of spoon, sand seams (1mm thick) present in bottom 15 cm -MARINE DEPOSIT-(CL) | |
| | | | | | | 20 | | | | |
| 2 | | | | | | 24 | | | Brown-gray, moist, stiff, CLAY with some silt & sand, slightly to moderately plastic, sand seams present -MARINE DEPOSIT-(CL) | |
| | | | | | | 33 | | | | |
| | | | | | | 35 | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 7/7/65/70 | | 25 | | | | |
| | | | | | | 63 | | | | |
| | | | | | | | 69.30 | | 3.57 | |
| | | | | | | 123 | | | Note: From 3.6-3.7 m. weathered rock observed in spoon | |
| 4 | | | | | | 41 | 68.94 | | Note: rollerbit used through boulder from 3.8-3.9m 3.93 | |
| | | | | | | 63 | | | Note: rollerbit used from 3.8-4.6 m before advancing casing | |
| | D4 | 61.0/15.2 | 4.57 - 5.18 | 47/53/124/70 | 177 | 25 | | | Brown-gray, moist to wet, very dense, gravelly SAND with little silt, poorly graded, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 5 | | | | | | 92 | | | | |
| | | | | | | 105 | | | | |
| | | | | | | 125 | | | | |
| | | | | | | 92 | | | | |
| 6 | D5 | 61.0/22.9 | 6.10 - 6.71 | 27/18/21/28 | 39 | 31 | | | Brown-gray, moist to wet, dense, SAND with some silt & little gravel, well-graded, loosely bonded -GLACIAL TILL DEPOSIT-(SW) | |
| | | | | | | 33 | | | | |
| | | | | | | 82 | | | | |
| 7 | | | | | | 67 | | | | |
| | | | | | | 81 | | | | |
| | D6 | 38.1/25.4 | 7.62 - 8.00 | 45/67/120(80) | 187 | 46 | | | Gray brown, moist, very dense, gravelly SAND with little silt, poorly-graded, moderately bonded -GLACIAL TILL DEPOSIT-(SP) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-19-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 72.87 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/10/01 / 8/13/01 | **Drilling Method:** | SSA Spin / Casing Hammer | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 500, 15L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 4.69 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | R1 | 50.8/35.6 | 8.02 - 8.52 | RQD = 0% | | 50/6.11 | 64.85 | | 8.02 Gray, aphanitic to fine grained, metamorphic, moderately hard, very slight to moderately hard, very slight to moderately severe, joints are dipping horizontal to vertical, very close, open, no infilling, RMD very poor, Recovery 60% -SLATE- | |
| | R2 | 83.8/78.7 | 8.53 - 9.37 | RQD = 0% | | | | | Gray, aphanitic to fine grained metamorphic, moderately hard, fresh to very slight, joints are horizontal to steep, very close to close, tight to open, no infilling, RMD very poor, Recovery 94% -SLATE- | |
| 9 | | | | | | | 63.48 | | 9.39 **Bottom of Exploration at 9.39 m below ground surface.** | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-20-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 73.02 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/13/01 / 8/14/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 540, 25 L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 2.32 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 1/3/5/6 | 8 | | 72.93 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Light brown, dry to damp, medium stiff, sandy SILT, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 72.44 | | 0.58 | |
| | | | | | | | | | Note: color changes from light brown gray-brown at 0.3 m | |
| 1 | | | | | | | | | Note: composition changes to SILT with little sand & trace clay at 0.6 m | |
| | | | | | | | 71.80 | | 1.22 | |
| | | | | | | | | | Note: Auger spoils indicate a strata change at 1.2 m | |
| | D2 | 61.0/68.6 | 1.52 - 2.13 | 5/7/8/12 | 15 | 9 | | | Brown-gray, damp, very stiff, silty CLAY, slightly plastic -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | 16 | | | | |
| | | | | | | 26 | | | | |
| | | | | | | 32 | | | | |
| | | | | | | 39 | | | | |
| 3 | | | | | | | 69.97 | | 3.05 | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/9/10/11 | 19 | 20 | | | Brown-gray, moist, very stiff, CLAY with little silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | 26 | | | | |
| | | | | | | 30 | | | | |
| 4 | | | | | | 38 | | | | |
| | | | | | | 48 | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 7/7/9/12 | 16 | Open | | | Brown-gray, moist, very stiff CLAY, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 5/6/9/12 | 15 | | | | Brown-gray, moist, very stiff CLAY, moderately plastic to slightly plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 4/3/4/9 | 7 | | | | Brown-gray, moist, medium stiff, sandy CLAY, moderately plastic -MARINE CLAY-(CL) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-20-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 73.02 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/13/01 / 8/14/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 540, 25 L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 2.32 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 64.79 | | 8.23 Bottom of Exploration at 8.23 m below ground surface. | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-21-01 (OW)
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 74.77 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/14/01 / 8/14/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | |
| **Boring Location:** | Station 11 + 540, 15 L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 1.39 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | 2/3/3/4 | 6 | | 74.68 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Yellow-brown, dry to damp, loose, SAND with some silt, poorly-graded, -MARINE DEPOSIT-(SW) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 11/10/13/17 | 23 | 10 | 73.16 | | 1.62 | |
| 2 | | | | | | 18 | | | Gray-brown, damp, very stiff, silty CLAY, slighty plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | 23 | | | Gray-brown, moist,very stiff, CLAY with some silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | 24 | | | | |
| 3 | | | | | | 26 | | | | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 7/9/9/10 | 18 | 12 | | | | |
| | | | | | | 15 | | | | |
| | | | | | | 23 | | | | |
| 4 | | | | | | 24 | | | | |
| | | | | | | 25 | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/4/5/7 | 9 | 24 | 70.20 | | 4.57 | |
| 5 | | | | | | 30 | | | Brown-gray, moist, stiff, CLAY with little silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | 34 | | | | |
| | | | | | | 37 | | | | |
| 6 | | | | | | 37 | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 3/4/5/6 | 9 | 34 | | | Brown-gray, moist, stiff, CLAY with little silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | 37 | | | | |
| | | | | | | 36 | | | | |
| 7 | | | | | | 37 | | | | |
| | | | | | | 36 | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 1/2/WOH/4 | 2 | 39 | | | Gray, wet, medium stiff, CLAY with some silt & little sand, frequent, moderately plastic,sand lenses | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80785-001

**Boring No.:** C1-21-01 (OW)

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 74.77 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/14/01 / 8/14/01 | **Drilling Method:** | SSA Spin / Casing | **Core Barrel:** | |
| **Boring Location:** | Station 11 + 540, 15 L | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 1.39 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_V$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | 38 | | | -MARINE DEPOSIT-(CL) | |
| | | | | | | 37 | | | | |
| | | | | | | 37 | | | | |
| | | | | | | 35 | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | WOH/4/6/8 | 10 | 33 | | | | |
| | | | | | | 35 | 65.38 | | 9.39 | |
| | | | | | | 33 | 65.11 | | Brown, wet, stiff, clayey SILT with little sand, slightly to moderately plastic -MARINE DEPOSIT-(ML) 9.66 | |
| 10 | | | | | | 26 | | | Brown-gray, wet, medium stiff, silty CLAY, slightly to moderately plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | 27 | | | | |
| | D8 | 61.0/43.2 | 10.67 - 11.28 | 4/11/35/34 | 36 | 30 | | | | |
| 11 | | | | | | 38 | 63.83 | | 10.94 Light brown, wet, dense, silty SAND with trace clay, poorly-graded -MARINE DEPOSIT-(SM) | |
| | | | | | | 59 | 63.19 | | Note: fine gravel observed in wash along with sand at 11.5-11.6 m. | |
| 12 | | | | | | | | | Note: Rollerbit used from 10.7-11.5 m. to clean bore hole out for well installation 11.58 | |
| | | | | | | | | | **Bottom of Exploration at 11.58 m below ground surface.** Note: see C1-21-01 OW well installation report for well details | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# OBSERVATION WELL INSTALLATION REPORT

| | | | |
|---|---|---|---|
| **Project** | Kennebec River Crossing Project | **Observation Well** | C1-21-01 OW |
| **City/State** | Augusta, Maine | **Test Boring** | C1-21-01 |
| **Client** | Maine Department of Transportation | **Installation Date** | 14-Aug-01 |
| **Contractor** | Maine Test Borings, Inc. | **Location** | Station 11 + 540 |
| **Foreman** | Mike Porter | | 15 L |
| | | **H&A File No.** | 80765-001 |
| | | **H&A Rep.** | Tim Erickson |

**Ground El.** 74.77 m

**El. Datum** unknown

| SOIL/ROCK CONDITIONS (Numbers refer to elevation/depth from ground surface in meters) | BOREHOLE BACKFILL (not to scale) |
|---|---|
| TOPSOIL | FILTER SAND |
| | 0.03 |
| 0.91 | BENTONITE |
| MARINE SAND | 0.88 |
| 1.62 | |
| | FILTER SAND |
| MARINE CLAY | 7.32 |
| | BENTONITE |
| | 7.74 |
| 9.39 | |
| MARINE SILT | |
| 9.66 | |
| MARINE CLAY | FILTER SAND |
| 10.94 | |
| GLACIOFLUVIAL DEPOSIT | |
| 11.53 | 11.53 |
| Bottom of Exploration | |

Type of protective cover/lock: PVC Screw Cap

Depth of top of roadway box below ground surface _____ m

Height of top of riser pipe above ground surface 0.61 m

Type of protective casing: None

Length _____ m

Inside diameter _____ mm

Depth of bottom of roadway box _____ m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite Seal | 0.03 | 0.88 |
| Bentonite Seal | 7.32 | 0.43 |
| | | |
| | | |

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe 38.1 mm

Type of backfill around riser: Filter sand/ Bentonite

Diameter of borehole 127 mm

Depth of top of wellpoint 8.53 m

Type of Screen: Machine Slotted PVC

Screen gauge or size of openings 0.254 mm

Diameter of screen. 38.1 mm

Type of backfill around Scre Filter Sand

Depth of bottom of wellpoint 11.53 m

Silt trap

Depth of bottom of borehole 11.53 m

(Depths refer to ground surface)

Remarks:

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
C1-21-01(OW)



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-001 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | T. Erickson |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 14-Aug-01 |
| ELEVATION SUBTRAHEND | 74.77 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 8/15/2001 | 644 | 1 | 8.63 m | 66.14 m | | TJE |
| 8/16/2001 | 618 | 2 | 8.93 m | 65.84 m | | TJE |
| 8/26/2001 | 1200 | 12 | 9.75 m | 65.02 m | | BKL |

Form #3170

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-22-01 (OW) |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mike Porter | Elevation (m): | 72.75 | Auger ID/OD: | – / 11.43 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/14/01 / 8/14/01 | Drilling Method: | SSA Spin/Casing Hammer | Core Barrel: | – |
| Boring Location: | Station 11 + 540, 15 R | Casing ID/OD: | 7.6 cm (NW) | Water Level*: | 4.05 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 1/2/5/8 | 7 | | 72.63 | | -TOPSOIL- 0.12 | |
| | | | | | | | 72.48 | | Yellow-brown dry, loose, fine silty SAND, poorly-graded, -MARINE DEPOSIT-(SM) 0.27 | |
| 1 | | | | | | | | | Gray-brown, damp, medium-stiff, clayey -SILT-, very slightly plastic -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 4/6/6/8 | 12 | 7 | 71.07 | | 1.68 | |
| 2 | | | | | | 13 | | | Gray-brown,moist stiff, silty CLAY, very slightly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | 19 | | | Brown-gray, moist, stiff, CLAY with some silt, slightly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | 23 | | | | |
| 3 | | | | | | 24 | | | | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 3/4/5/6 | 9 | 22 | | | | |
| | | | | | | 17 | | | | |
| | | | | | | 16 | | | | |
| 4 | | | | | | 13 | | | | |
| | | | | | | 12 | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/4/4/5 | 8 | 12 | | | Brown-gray, moist, stiff, CLAY with some silt, slightly to moderately plastic -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | 11 | | | | |
| | | | | | | 10 | | | | |
| | | | | | | 9 | | | | |
| | | | | | | 7 | | | | |
| 6 | | | | | | | 66.65 | | 6.10 | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/WOH/1/2 | 1 | 7 | | | Gray, moist to wet, medium stiff, CLAY with some silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | 8 | | | | |
| | | | | | | 9 | | | | |
| 7 | | | | | | 7 | | | | |
| | | | | | | 5 | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/1/3 | 1 | 6 | | | Gray, moist to wet, medium stiff, CLAY with some silt, moderately plastic | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-22-01 (OW)

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-22-01 (OW)

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 72.75 | **Auger ID/OD:** | – / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/14/01 / 8/14/01 | **Drilling Method:** | SSA Spin/Casing Hammer | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 540, 15 R | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | 4.05 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_V$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | 5 | 64.58 | | -MARINE DEPOSIT-(CL) | |
| | | | | | | 5 | | | 8.17 | |
| | | | | | | 6 | | | | |
| 9 | | | | | | 5 | | | | |
| | D7 | 61.0/50.8 | 9.14 - 9.75 | 6/10/10/13 | 20 | 14 | | | Light-brown, wet, medium dense, silty SAND with trace gravel, poorly-graded, -MARINE DEPOSIT-(SM) | |
| | | | | | | 19 | | | | |
| | | | | | | 27 | | | Note: Cored through cobble from 10.24-10.49 m. Note: Rollerbit used from 10.49-11.22 m. | |
| 10 | | | | | | 70178 | | | | |
| | | | | | | | 62.26 | | 10.49 | |
| | | | | | | | | | Gray, wet, very dense, gravelly SAND with some silt, poorly-graded, well bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 11 | D8 | 10.2/10.2 | 11.22 - 11.32 | 100(4) | 100 | | | | Note: rollerbit used to get through cobble from 11.33-11.49 m. to clean hole for well installation from 11.49-11.53 m | |
| | | | | | | | 61.17 | | 11.58 | |
| 12 | | | | | | | | | **Bottom of Exploration at 11.58 m below ground surface.** Note: see well installation report C1-22-01 OW for well details | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-22-01 (OW)

# OBSERVATION WELL INSTALLATION REPORT

HALEY & ALDRICH

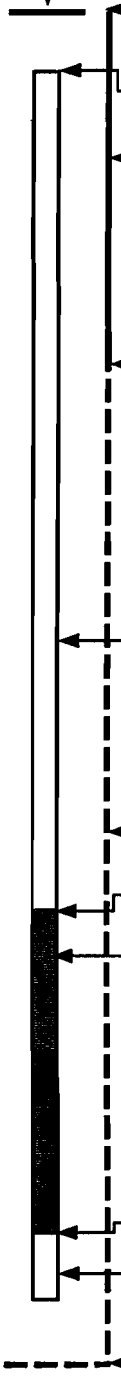
| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing Project | Observation Well | C1-22-01 OW |
| City/State | Augusta, Maine | Test Boring | C1-22-01 |
| Client | Maine Department of Transportation | Installation Date | 14-Aug-01 |
| Contractor | Maine Test Borings, Inc. | Location | Station 11+ 540 |
| Foreman | Mike Porter | | 15 R |
| | | H&A File No. | 80765-001 |
| | | H&A Rep. | Tim Erickson |

Ground El. 72.75 m

El. Datum unknown

| SOIL/ROCK CONDITIONS (Numbers refer to elevation/depth from ground surface in meters) | BOREHOLE BACKFILL (not to scale) |
|---|---|
| TOPSOIL 0.12 | |
| MARINE SAND 0.27 | BENTONITE 0.61 |
| MARINE SILT 1.68 | NATURAL SAND 7.62 |
| MARINE CLAY 8.16 | BENTONITE 7.92 |
| GLACIOFLUVIAL DEPOSIT 10.49 | FILTER SAND 11.53 |
| GLACIAL TILL DEPOSIT 11.53 | |

Bottom of Exploration



Type of protective cover/lock: PVC Screw Cap

Depth of top of roadway box below ground surface ____ m

Height of top of riser pipe above ground surface 0.61 m

Type of protective casing: None

Length ____ m

Inside diameter ____ mm

Depth of bottom of roadway box ____ m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite Seal | 0.00 | 0.61 |
| Bentonite Seal | 7.62 | 0.30 |
| | | |
| | | |

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe 38.1 mm

Type of backfill around riser: Filter sand/ Bentonite

Diameter of borehole 127 mm

Depth of top of wellpoint 8.53 m

Type of Screen: Machine Slotted PVC

Screen gauge or size of openings 0.254 mm

Diameter of screen. 38.1 mm

Type of backfill around Scre Filter Sand

Depth of bottom of wellpoint 11.53 m

Silt trap

Depth of bottom of borehole 11.53 m

(Depths refer to ground surface)

Remarks:

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
C1-22-01(OW)



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-001 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | T. Erickson |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 14-Aug-01 |
| ELEVATION SUBTRAHEND | 72.75 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 8/15/2001 | 651 | 1 | 7.28 m | 65.47 m | | TJE |
| 8/16/2001 | 621 | 2 | 7.56 m | 65.19 m | | TJE |
| 8/26/2001 | 1200 | 12 | 7.53 m | 65.22 m | | BKL |

Form #3170

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-23-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 73.72 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/13/01 / 8/13/01 | **Drilling Method:** | SSA Spin/Casing | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 540, 30 R | **Casing ID/OD:** | 7.6 cm (NW) | **Water Level*:** | -- |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 1/3/4/4/ | 7 | | 73.63 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Yellow-brown, dry, loose, silty SAND, poorly-graded, -MARINE DEPOSIT-(SM) | |
| | | | | | | | | | Note: auger spoils pile indicates a strata change at 1.2 m | |
| 1 | | | | | | | 72.50 | | 1.22 | |
| | | | | | | | | | Brown-gray, moist, stiff, clayey SILT, very slightly plastic, mottled -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 4/5/7/8 | 12 | 5 | | | | |
| 2 | | | | | | 16 | | | | |
| | | | | | | 20 | 71.59 | | 2.13 | |
| | | | | | | | | | Note: drill action indicates a strata change at 2.1 m. | |
| | | | | | | 22 | | | Brown-gray, moist to wet, stiff, CLAY with little silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | 27 | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 5/6/7/8 | 13 | 19 | | | | |
| | | | | | | 24 | | | | |
| | | | | | | 30 | | | | |
| 4 | | | | | | 29 | | | | |
| | | | | | | 27 | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/4/4/5 | 8 | | | | Brown-gray, moist, stiff, CLAY moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 5.18 - 5.79 | 4/4/8/9 | 12 | | | | Brown-gray, moist, stiff, CLAY moderately plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | 67.93 | | 5.79 | |
| 6 | | | | | | | | | **Bottom of Exploration at 5.79 m below ground surface.** | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-24-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 70.54 | **Auger ID/OD:** | 6.35 cm / 14.60 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 562, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | 9.14 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | 3/6/21/34 | 27 | | 70.39 | | -TOPSOIL- 0.15 | |
| | | | | | | | 70.24 | | Brown, loose, dry silty fine sand, poorly-graded -MARINE DEPOSIT-(SM) 0.30 | |
| 1 | | | | | | | | | Gray-brown, very stiff, dry, SILT with trace fine sand -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 20/24/26/36 | 50 | | 68.95 | | 1.58 | |
| 2 | | | | | | | | | Gray-brown, hard, dry to damp, clayey SILT, non-plastic, mottled -MARINE DEPOSIT-(ML) Note: Auger spoils pile indicates a strata change at 2.38 m | |
| | | | | | | | 68.16 | | 2.38 | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 10/13/16/20 | 29 | | | | Brown-gray, very stiff, damp CLAY with some silt, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/5/7/11 | 12 | | 65.94 | | 4.60 | |
| 5 | | | | | | | | | Brown-gray, stiff, damp, CLAY with little silt & trace fine sand, slightly to moderately plastic, mottled from 4.57-4.60 m -MARINE DEPOSIT-(CL) | |
| | | | | | | | 65.21 | | 5.33 | |
| 6 | | | | | | | | | Gray, very soft, moist, CLAY with little silt, highly-plastic -MARINE DEPOSIT-(CL) | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 2/WOH/2/6 | 2 | | | | | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/38.1 | 7.62 - 8.23 | 5/14/18/24 | 32 | | 62.80 | | 7.74 | |
| | | | | | | | | | Light brown, moist, dense, silty fine SAND, poorly-graded | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-24-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-24-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 70.54 | **Auger ID/OD:** | 6.35 cm / 14.60 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 562, 15 L | **Casing ID/OD:** | – | **Water Level*:** | 9.14 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | -MARINE DEPOSIT-(SM) | |
| | | | | | | | 62.01 | | 8.53 | |
| | | | | | | | | | Light brown, moist to wet, very dense, SAND with little silt & trace gravel, well-graded<br>-MARINE DEPOSIT-(SW) | |
| 9 | D7 | 61.0/38.1 | 9.14 - 9.75 | 3/19/33/52 | 52 | | | | | |
| 10 | | | | | | | 60.48 | | 10.06 | |
| | | | | | | | | | Brown-gray, moist to wet, very dense SAND with some silt & gravel, poorly-graded, moderate to well bonded<br>-GLACIAL TILL DEPOSIT-(SP) | |
| 11 | D8 | 61.0/30.5 | 10.67 - 11.28 | 12/28/33/125 | 61 | | | | Note: Till has less gravel starting at 11.00 m<br>Note: Augered down to 12.10 m<br>-GLACIAL TILL DEPOSIT- | |
| 12 | | | | | | | 58.44 | | 12.10 | |
| | | | | | | | | | **Bottom of Exploration at 12.10 m below ground surface.** | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-25-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 72.30 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/16/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 560, CL | **Casing ID/OD:** | -- | **Water Level*:** | 8.77 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/61.0 | 0.00 - 0.61 | 5/29/30/23 | 59 | | 72.21 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Brown light gray, dry, hard, SILT with trace sand -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 71.23 | | 1.07 | |
| | | | | | | | | | Auger spoils pile indicates a compositional change at 1.01 m | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 13/17/19/26 | 36 | | | | Gray-brown, damp, hard, clayey SILT, moderately plastic, mottled -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | 69.25 | | 3.05 | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 7/11/17/23 | 28 | | | | Gray-brown, damp, hard, silty CLAY with little sand, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | | 68.73 | | 3.57 | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 6/9/9/12 | 18 | | | | Brown-gray, moist, very stiff, sandy SILT, some clay, very slightly plastic, mottled -MARINE DEPOSIT-(ML) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 4/4/4/8 | | | | | | |
| | | | | | | | 65.90 | | 6.40 | |
| | | | | | | | | | Gray, moist, stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | Note: Shear vane taken at 7.01 and 7.22 m | |
| | V1 | | 7.01 - 7.19 | 40.7/17.7 kPa | | | | | Gray, moist, stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | V2 | | 7.22 - 7.40 | 53.1/28.2 kPa | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOR/WOH/WOH/3 | WOH | | | | Note: Sample in jar S8 is of the CLAY with sand layer from 10.7-11.2 m | |

**Remarks:**

Shear Vane: 2" x 7" Field Vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-25-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 72.30 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/16/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 560, CL | **Casing ID/OD:** | – | **Water Level*:** | 8.77 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | WOR/WOH/WOH/5 | WOH | | | | Gray, moist, stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 10 | | | | | | | | | | |
| 11 | D8 | 61.0/61.0 | 10.67 - 11.28 | 1/3/6/24 | 9 | | 61.60 | | 10.70 Brown gray, moist, stiff, CLAY with some sand & trace silt, moderate to high plasticity, frequent sand layers(2- 3 mm thick) -MARINE DEPOSIT-(CL) | |
| | | | | | | | 61.14 | | 11.16 Light brown, wet, dense, SAND with trace silt & clay, poorly-graded -MARINE DEPOSIT-(SP) | |
| 12 | D9 | 61.0/45.7 | 12.19 - 12.80 | 1/8/17/50 | 25 | | 60.72 | | 11.58 Light brown, wet, dense, SAND with some silt & trace fine gravel, well-graded -MARINE DEPOSIT-(SP) Note: Split spoon encountered probable cobble at 12.80 m | |
| 13 | | | | | | | 59.50 | | 12.80 Bottom of Exploration at 12.80 m below ground surface. | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 2" x 7" Field Vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-26-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 68.93 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 560, 15 R | **Casing ID/OD:** | -- | **Water Level*:** | 7.62 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 1/8/11/12 | 19 | | 68.84 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Gray-brown, dry to damp, medium dense, fine SAND with some silt, minor layering -MARINE DEPOSIT-(SM) | |
| 1 | | | | | | | 67.86 | | 1.07 | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change at 1.01 m | |
| | D2 | 61.0/53.3 | 1.52 - 2.13 | 3/5/7/9 | 12 | | | | Gray-brown, damp, stiff, silty CLAY slightly plastic -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | | | | Brown-gray, damp, stiff, CLAY with little silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 3/4/4/6 | 8 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 1/1/1/1 | 2 | | | | | |
| 5 | | | | | | | 63.90 | | 5.03 | |
| | | | | | | | | | Gray, moist, medium stiff, CLAY with little silt, highly plastic -MARINE DEPOSIT-(CL) | |
| | | | | | | | | | Gray, mosit, medium stiff, CLAY with little silt, highly plastic -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 1/WOR/WOR/1 | WOR | | | | | |
| 7 | | | | | | | 61.46 | | 7.47 | |
| | D6 | 61.0/25.4 | 7.62 - 8.23 | 12 / 50(100) | 73 | | | | Brown, moist, very dense, gravelly SAND with trace silt, poorly-graded, moderate bonding -GLACIAL TILL DEPOSIT-(SP) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-26-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 68.93 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 560, 15 R | **Casing ID/OD:** | -- | **Water Level*:** | 7.62 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | No recovery | |
| | | | | | | | | | Note: Top of probable bedrock at 8.86 m | |
| 9 | D7 | 2.5/0.0 | 8.84 - 8.86 | 100 (25) | 100 | | 60.06 | | 8.87 Bottom of Exploration at 8.87 m below ground surface. | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-27-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 64.80 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 601, 1.4 R | **Casing ID/OD:** | -- | **Water Level*:** | 9.91 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Inslitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Inslitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/25.4 | 0.00 - 0.61 | 1/4/10/10 | 14 | | 64.77 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Brown-gray, dry stiff, SILT with trace fine sand, mottled from 0.57-0.61 m, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 63.58 | | 1.22 | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 4/5/8/8 | 13 | | | | Gray-brown, moist stiff, CLAY with some silt, mottled, slightly plastic -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | | 62.21 | | 2.59 | |
| | | | | | | | | | Brown-gray, moist, medium stiff, CLAY with trace sand, slightly to moderately plastic, mottled 1mm thick sand lenses -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 3/3/4/6 | 7 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/3/4/7 | 7 | | | | Brown-gray, moist, medium stiff, CLAY with trace sand, slightly to moderately plastic, mottled 1mm thick sand lenses -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | Note: Auger spoils pile indicates a compositional change at 5.79 m | |
| | | | | | | | 59.01 | | 5.79 | |
| 6 | | | | | | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, sand lenses present from 6.43 to 6.71 m -MARINE DEPOSIT-(CL) | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 1/2/3/3 | 5 | | | | Note: Shear vane test taken at 6.77 m | |
| | V1 | 45.2/45.2 | 6.71 - 7.16 | 35.4/17.7 kPa | | | | | Gray, moist, medium stiff, CLAY with a trace of sand, moderately plastic, -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 1/1/2/2 | 3 | | | | | |

**Remarks:**

Shear Vane: 2" X 7" Field Vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-27-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 64.80 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 601, 1.4 R | **Casing ID/OD:** | -- | **Water Level*:** | 9.91 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | 1/1/2/2 | 3 | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, medium grained sand layers -MARINE DEPOSIT-(CL) | |
| 10 | | | | | | | 54.74 | | 10.06 — Note: Drill action indicates a strata change at 10.0 m | |
| 11 | D8 | 61.0/61.0 | 10.67 - 11.28 | WOR/WOR/3/6 | 3 | | 53.52 | | Light brown, wet, very loose, silty SAND, well-graded -MARINE DEPOSIT-(SM) — 11.28 — Bottom of Exploration at 11.28 m below ground surface. | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 2" X 7" Field Vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-28-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mike Porter | Elevation (m): | 67.49 | Auger ID/OD: | 5.35 cm / 13.97 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/15/01 / 8/15/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 11 + 599, 16.2 R | Casing ID/OD: | -- | Water Level*: | 0.0 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 5/18/26/18 | 44 | | 67.40 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Brown-gray, dry, hard SILT with trace fine sand, non-plastic, mottled slightly from 0.54-0.61 m -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | Brown-gray, moist, very stiff, clayey SILT with trace sand, slightly plastic, mottled -MARINE DEPOSIT- Note: Auger spoils pile indicates a strata change at 2.44 m | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 5/11/16/25 | 27 | | | | | |
| 2 | | | | | | | 65.05 | | 2.44 | |
| | | | | | | | | | Brown-gray, moist, very stiff, silty CLAY with trace sand, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 10/13/20/18 | 33 | | | | | |
| 4 | | | | | | | 63.53 | | 3.96 | |
| | | | | | | | | | Brown-gray, moist, stiff, CLAY with little silt, moderately plastic, some mottling -MARINE DEPOSIT-(CL) | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 4/4/4/8 | 8 | | | | | |
| 5 | | | | | | | 62.40 | | 5.09 | |
| | | | | | | | | | Gray, moist, medium stiff, CLAY with little silt, slightly plastic -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 2/2/3/5 | 5 | | | | | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/WOH/4 | WOH | | | | Gray, moist, medium stiff, CLAY with little silt, slightly plastic -MARINE DEPOSIT-(CL) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-28-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 67.49 | **Auger ID/OD:** | 5.35 cm / 13.97 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/15/01 / 8/15/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 599, 16.2 R | **Casing ID/OD:** | -- | **Water Level*:** | 0.0 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 59.26 | | 8.23 Bottom of Exploration at 8.23 m below ground surface. | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-29-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 53.86 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/16/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 620, 18 L | **Casing ID/OD:** | – | **Water Level*:** | 0.76 |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | WOR/1/1/2 | 2 | | 53.76 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Brown-gray, wet, very soft, sandy SILT, slightly plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 53.00 | | 0.85 | |
| 1 | | | | | | | | | Note: Drill action indicates a strata change at 0.85 m | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 3/26/14/20 | 40 | | | | Light brown, wet, dense, SAND, little silt, trace gravel, well-graded -MARINE DEPOSIT-(SW) | |
| 2 | | | | | | | | | | |
| | | | | | | | 51.45 | | 2.41 | |
| | | | | | | | | | **Bottom of Exploration at 2.41 m below ground surface.** Auger refusal at 2.41 m | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-29-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-30-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 53.41 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/16/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 648, 20 R | **Casing ID/OD:** | – | **Water Level*:** | 1.37 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 2/3/5/6 | 8 | | 53.38 | -TOPSOIL- (0.03) | |
| | | | | | | | | Gray-brown, damp, stiff, sandy SILT, non-plastic -MARINE DEPOSIT-(ML) Note: Drill action indicates a strata change at 3.35 m | |
| 1 | | | | | | | 52.19 | (1.22) | |
| | | | | | | | | Gray, moist, very soft, CLAY with trace silt & sand, highly plastic -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/48.3 | 1.52 - 2.13 | 1/1/1/4 | 2 | | | | |
| 2 | | | | | | | 51.40 | (2.01) | |
| | | | | | | | 51.31 | Gray-brown, moist, loose, clayey SAND with little silt, poorly-graded -MARINE DEPOSIT-(SC) (2.10) | |
| | | | | | | | | Light brown, wet, medium dense, SAND with some silt, well graded -MARINE DEPOSIT-(SM) | |
| 3 | D3 | 61.0/50.8 | 3.05 - 3.66 | 2/3/15/13 | 18 | | | | |
| | | | | | | | 49.87 | (3.54) | |
| | | | | | | | | Gray, wet, dense, gravelly SAND with trace silt, poorly-graded loose to moderately bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 4 | | | | | | | | | |
| | D4 | 61.0/22.9 | 4.57 - 5.18 | 11/12/26/14 | 38 | | | | |
| 5 | | | | | | | 48.23 | (5.18) | |
| | | | | | | | | Bottom of Exploration at 5.18 m below ground surface. | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-30-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-31-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 55.81 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/31/01 / 8/31/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 500 + 240, 5.1 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 58.4/33.0 | 0.00 - 0.58 | 6/24/22/79(12.7) | 57 | | | | Brown dry, very dense, gravelly SAND with little silt, well-graded -FILL-(SW) | |
| | | | | | | | | | Note: Frequent gravel & cobbles from 0 to 1.22 m | |
| | | | | | | | | | Note: Drill action indicates a compositional change at 2.56 m | |
| 1 | | | | | | | | | | |
| | | | | | | | 54.59 | | 1.22 | |
| | D2 | 61.0/43.2 | 1.52 - 2.13 | 13/20/39/48 | 59 | | | | Olive brown, dry to damp, very dense, sandy GRAVEL with some asphalt & little silt, poorly-graded -FILL-(GM) | |
| | | | | | | | | | Note: Auger spoils indicates a compositional change at 2.56 m | |
| 2 | | | | | | | | | | |
| | | | | | | | 53.25 | | 2.56 | |
| | | | | | | | | | Gray brown, damp hard, clayey SILT, some gravel, non-plastic -FILL-(ML) | |
| | | | | | | | | | Note: Frequent cobbles from 3.66 to 4.21 m | |
| 3 | D3 | 17.8/5.1 | 3.05 - 3.23 | 3/50(2.54) | 53 | | | | | |
| 4 | | | | | | | 51.60 | | 4.21 | |
| | | | | | | | | | Gray damp, medium dense, silty SAND, trace fine gravel, poorly-graded, some minor stratification -MARINE DEPOSIT-(SW) | |
| | D4 | 61.0/43.2 | 4.57 - 5.18 | 10/12/14/13 | 26 | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | 49.71 | | 6.10 | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 1/WOH/2/2 | 2 | | | | Gray moist, very loose, clayey fine SAND, little silt, poorly-graded, slightly to moderately plastic in 2.54 cm, occasional layers in sample -MARINE DEPOSIT-(SW) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/1/9/29 | 10 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-31-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-31-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 55.81 | **Auger ID/OD:** | 5.72 cm / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/31/01 / 8/31/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 500 + 240, 5.1 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 47.82 | | 7.99 | |
| | | | | | | | 47.58 | | Gray, saturated, medium dense, silty SAND, trace clay & gravel, poorly-graded -MARINE DEPOSIT-(SW) | |
| | | | | | | | | | 8.23 | |
| | | | | | | | 47.12 | | Note: Drill action indicates a strata change at 8.23 m possible GLACIAL TILL | |
| 9 | | | | | | | | | 8.69 | |
| | | | | | | | | | **Bottom of Exploration at 8.69 m below ground surface.** Auger refusal on probable bedrock | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-32-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mike Porter | Elevation (m): | 57.43 | Auger ID/OD: | -- / 11.43 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/31/01 / 8/31/01 | Drilling Method: | SSA Spin | Core Barrel: | -- |
| Boring Location: | Station 500 + 302, 5.9 L | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 11/15/19/27 | 34 | | | | Brown, dry, dense, gravelly SAND with little silt, well-graded, no structure -FILL-(SW) | |
| 1 | | | | | | | 56.30 | | 1.13 Bottom of Exploration at 1.13 m below ground surface. Auger refusal on top of probable bedrock | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-32-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-33-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 66.41 | **Auger ID/OD:** | -- / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/31/01 / 8/31/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 500 + 423, 3.7 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 15/23/30/38 | 53 | | | | Brown, dry, very dense, gravelly SAND, with little silt, poorly-graded, no structure -FILL-(SP) | |
| 1 | | | | | | | | | | |
| | | | | | | | 64.89 | | 1.52 | |
| | D2 | 12.7/12.7 | 1.52 - 1.65 | 50(12.7) | 50 | | 64.73 | | Brown, dry, very dense, silty SAND with some gravel, poorly-graded, no structure -GLACIAL TILL DEPOSIT-(SM) | |
| 2 | | | | | | | | | 1.68 | |
| | | | | | | | | | **Bottom of Exploration at 1.68 m below ground surface.** Auger refusal on probable bedrock | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-33-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-34-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 70.18 | **Auger ID/OD:** | -- / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/31/01 / 8/31/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 500 + 513, 5.7 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 34/30/33/38 | 63 | | | | Brown, dry, very dense, SAND with some gravel & little silt, poorly-graded, no structure -FILL-(SP) | |
| 1 | | | | | | | 69.26 | | 0.91 Note: Drill action indicates a strata change at 0.91 m possibly to silty sand | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 8/11/14/18 | 25 | | 68.65 | | 1.52 Olive brown, damp, very stiff, SILT with some sand & trace clay, clay is slightly mottled, SILT & sand are stratified, non-plastic -MARINE SILT-(SP) | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/33.0 | 3.05 - 3.66 | 20/31/55/77 | 86 | | 67.13 | | 3.05 Brown, damp, very dense, gravelly SAND with little silt, well-graded, loose to moderately bonded -GLACIAL TILL DEPOSIT-(SW) Note: Weathered bedrock in tip of spoon | |
| 4 | | | | | | | 66.52 | | 3.66 **Bottom of Exploration at 3.66 m below ground surface.** | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Note:
Boring location moved from 12.8' LT to 18' LT due to newly paved surface

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-35-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 64.00 | **Auger ID/OD:** | -- / 11.43 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/16/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 760, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | 3.35 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 2/8/11/13 | 19 | SSA | 63.97 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Light brown, dry, medium dense, SILT with some sand, poorly-graded, non-plastic, no structure -MARINE SILT-(ML) | |
| 1 | | | | | | | 62.93 | | 1.07 | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change at 10.7 m | |
| | D2 | 61.0/50.8 | 1.52 - 2.13 | 2/13/29/30 | 42 | | | | Gray-brown, damp, medium dense, clayey SILT with trace sand, poorly-graded, very slightly plastic, foliated -MARINE SILT- | |
| 2 | | | | | | | 62.20 | | 1.80 | |
| 3 | D3 | | 3.05 - 3.48 | 20/18/50(4) | 68 | | | | Brown, dry, dense, SAND with some gravel & little silt & trace clay, poorly-graded, non-plastic, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| | | | | | | | 60.65 | | | |
| | | | | | | | 60.52 | | Note: Sample D3 in jar is entirely GLACIAL TILL 3.35 | |
| 4 | | | | | | | | | Yellow-brown, moist to wet, SAND with trace silt & gravel, well-graded, non-plastic, no structure -GLACIAL TILL-(SW) 3.47 | |
| 5 | | | | | | | | | **Bottom of Exploration at 3.47 m below ground surface.** Auger refusal due to probable bedrock | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-36-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 63.28 | Auger ID/OD: | -- / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/16/01 / 8/16/01 | Drilling Method: | SSA Spin | Core Barrel: | -- |
| Boring Location: | Station 11 + 760, CL | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 2/6/8/7 | 14 | | 63.22 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Light brown, dry, stiff, SILT with some sand -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 62.30 | | 0.98 | |
| | | | | | | | | | Note: Auger spoils pile indicates a composition change at 0.98 m | |
| | | | | | | | | | Gray brown, damp, very stiff, clayey SILT with little sand, mottled -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/10/12/12 | 22 | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| | D3 | 40.6/33.0 | 3.05 - 3.45 | 2/20/50(7.6) | 70 | | 60.17 | | 3.11 | |
| | | | | | | | 59.93 | | Gray, moist, stiff, CLAY with some sand and trace silt, moderately plastic, sand lenses present | |
| | | | | | | | 59.77 | | -MARINE DEPOSIT-(CL) 3.35 | |
| 4 | | | | | | | | | Yellow-brown, moist, very dense, SAND, with little silt, well-graded -MARINE DEPOSIT- (SW) 3.51 | |
| | | | | | | | | | Bottom of Exploration at 3.51 m below ground surface. Probable top of bedrock | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-37-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 61.91 | **Auger ID/OD:** | -- / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/16/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 760, 10 RT | **Casing ID/OD:** | -- | **Water Level*:** | -- |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 1/2/5/7 | 7 | | 61.88 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Brown, dry, loose, fine sandy SILT, -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 60.54 | | 1.37 | |
| | MD | 0.0/0.0 | 1.52 - 1.52 | 50(0) | 50 | | 60.39 | | No recovery | |
| | | | | | | | | | Note: Probable top of bedrock at 1.52 m | |
| 2 | | | | | | | | | 1.52 | |
| | | | | | | | | | Bottom of Exploration at 1.52 m below ground surface. | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-38-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 63.44 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/21/01 / 8/21/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 1 + 180, 15 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 1/6/12/14 | 18 | HSA | 63.38 | -TOPSOIL- (0.06) | |
| | | | | | | | | Light brown, dry, very stiff, SILT with trace sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 62.37 | (1.07) | |
| | | | | | | | | Gray brown, damp, very stiff, sandy SILT with some clay, clay layers are slightly plastic, clay is mottled, sand layers throughout are 1mm thick -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 7/10/13/14 | 23 | | | | |
| 2 | | | | | | | 61.30 | (2.13) | |
| | | | | | | | | Gray brown, damp, very stiff, silty CLAY with some sand, moderately plastic, sand lenses present, mottled -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 8/12/11/20 | 23 | | | | |
| | | | | | | | 60.05 | (3.38) | |
| | | | | | | | | Brown damp, dense, silty SAND with trace clay, poorly-graded, slightly stratified -MARINE DEPOSIT-(SM) | |
| 4 | | | | | | | 59.29 | (4.15) | |
| | | | | | | | | Light brown dry, very dense, gravelly SAND with trace silt, well-graded, non plastic, loosely-bonded -GLACIAL TILL DEPOSIT-(SW) | |
| | D4 | 61.0/50.8 | 4.57 - 5.18 | 28/26/42/46 | 68 | | | | |
| 5 | | | | | | | 58.26 | (5.18) | |
| | | | | | | | | Bottom of Exploration at 5.18 m below ground surface. | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-38-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-39-01 (OW)
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 64.40 | **Auger ID/OD:** | – |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/21/01 / 8/21/01 | **Drilling Method:** | Spin NW Casing | **Core Barrel:** | NQ |
| **Boring Location:** | Station 11 + 841, 16 L | **Casing ID/OD:** | 7.6 cm(NW) | **Water Level*:** | 5.57 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/33.0 | 0.00 - 0.61 | 3/10/19/20 | 29 | | 64.37 | -TOPSOIL- 0.03 | |
| | | | | | | | | Light brown, dry, very stiff, SILT with little fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 63.18 | 1.22 | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/11/10/21 | 21 | 24 | | Gray brown, damp, very stiff, sandy SILT with some clay, non-plastic, clay sections (2.5-10 cm thick) are mottled -MARINE DEPOSIT-(ML) Note: Drill action indicates a strata change at 2.80 m | |
| 2 | | | | | | 42 | | | |
| | | | | | | 47 | | | |
| | | | | | | 51 | | | |
| | | | | | | 188 | 61.60 | 2.80 | |
| 3 | D3 | 40.6/20.3 | 3.05 - 3.45 | 69/72/50(7.6) | 122 | | | Brown, damp, very dense, gravelly SAND with some silt, poorly-graded, loose to moderately bonded -GLACIAL TILL DEPOSIT-(SP) Note: Roller bit used from 3.05-3.90 m | |
| 4 | R1 | 152.4/137.2 | 3.90 - 5.43 | RQD = 75% | | | 60.50 | 3.90 | |
| | | | | | | | | Light gray and dark gray, aphanitic to medium grained, metamorphic & igneous, moderately hard to hard, fresh to slightly weathered, joints dipping horizontal to steep, very close to close, tight to open, some minor white quartz infilling -SLATE & GRANITE-, RMD good, Recovery 90% | |
| 5 | R2 | 149.9/149.9 | 5.43 - 6.92 | RQD = 80% | | | 58.98 | 5.43 | |
| | | | | | | | | Light gray & dark gray, aphanitic to medium grained, metamorphic & igneous, moderately hard to hard, fresh to moderate, severe joints dipping horizontal to steep, very close to close, tight to open, no infilling -SLATE & GRANITE-, RMD good Recovery 100% | |
| 6 | | | | | | | 57.48 | 6.92 | |
| 7 | | | | | | | | Bottom of Exploration at 6.92 m below ground surface. | |
| | | | | | | | | Note: For well details see well installation report C1-39-01 (OW) | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-39-01 (OW)

# OBSERVATION WELL INSTALLATION REPORT

| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing Project | Observation Well | C1-39-01 OW |
| City/State | Augusta, Maine | Test Boring | C1-39-01 |
| Client | Maine Department of Transportation | Installation Date | 21-Aug-01 |
| Contractor | Maine Test Borings, Inc. | Location | Station 11 + 841 |
| Foreman | Mark Gunning | | 16 L |
| | | H&A File No. | 80765-001 |
| | | H&A Rep. | Tim Erickson |

Ground El. 64.40 m

El. Datum unknown

| SOIL/ROCK CONDITIONS | BOREHOLE BACKFILL | |
|---|---|---|
| (Numbers refer to elevation/depth from ground surface in meters) (not to scale) | | |
| TOPSOIL | | 0.03 |
| MARINE SILT | FILTER SAND | 1.52 |
| GLACIAL TILL DEPOSIT | BENTONITE | 2.80 |
| | FILTER SAND | 3.29 |
| SLATE & GRANITE | | 3.90 |
| | | 6.83 |
| Bottom of Exploration | 6.83 | |

Type of protective cover/lock: Piece of wood(no cap avail)

Depth of top of roadway box below ground surface _____ m

Height of top of riser pipe above ground surface 0.59 m

Type of protective casing: None

Length _____ m

Inside diameter _____ mm

Depth of bottom of roadway box _____ m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite | 1.52 | 1.77 |

Type of riser pipe: Schedule 40 PVC

Inside diameter of riser pipe 25.4 mm

Type of backfill around riser: Filter sand/Bentonite

Diameter of borehole 127 mm

Depth of top of wellpoint 3.77 m

Type of Screen: Machine Slotted PVC

Screen gauge or size of openings 0.254 mm

Diameter of screen. 25.4 mm

Type of backfill around Screen: Filter Sand

Depth of bottom of wellpoint 6.83 m

Silt trap

Depth of bottom of borehole 6.83 m

(Depths refer to ground surface)

Remarks:

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
C1-39-01(OW)



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-001 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | T. Erickson |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 21-Aug-01 |
| ELEVATION SUBTRAHEND | 64.40 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 8/31/2001 | 1245 | 10 | 6.52 m | 57.88 m | | BKL |

Form #3170

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-40-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 64.38 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/21/01 / 8/21/01 | **Drilling Method:** | HSA Spin / SSA Spin | **Core Barrel:** | |
| **Boring Location:** | Station 11 + 840, CL | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 4/10/20/30 | 30 | SSA | 64.35 | -TOPSOIL- (0.03) | |
| | | | | | | | | Light brown, dry, hard, SILT with trace fine sand & gravel, non-plastic, -MARINE DEPOSIT-(ML) | |
| | | | | | | | 63.61 | Note: A trace of clay seen in tip of spoon for sample S1 (0.76) | |
| 1 | | | | | | | | Gray brown, damp hard clayey SILT with some sand, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/48.3 | 1.52 - 2.13 | 15/19/23/36 | 42 | | | | |
| 2 | | | | | | | 62.09 | (2.29) | |
| | | | | | | | | Brown gray, damp, very stiff, CLAY with little sand & trace silt, moderately plastic, mottled sand lenses (1mm thick) present every 2.5-10.2 cm) -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/73.7 | 3.05 - 3.66 | 11/13/16/33 | 29 | | | | |
| | | | | | | | 60.81 | (3.57) | |
| | | | | | | | | Light brown, damp, dense, SAND with some clay, trace silt, poorly-graded, -MARINE DEPOSIT-(SM) | |
| 4 | | | | | | | 59.96 | (4.42) | |
| | | | | | | | 59.80 | Probable-GLACIAL TILL- | |
| | MD | 0.0/0.0 | 4.57 - 4.57 | 50(0) | 50 | | | Probable top of bedrock at 4.57 m (4.57) | |
| 5 | | | | | | | | Bottom of Exploration at 4.57 m below ground surface. | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-40-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-41-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 65.56 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/21/01 / 8/21/01 | Drilling Method: | HSA Spin / SSA Spin | Core Barrel: | – |
| Boring Location: | Station 1 + 840, 15 RT | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/61.0 | 0.00 - 0.61 | 3/12/15/20 | 27 | | 65.50 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Light brown, dry, very stiff, SILT with little fine sand, non-plastic, -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | Note: Auger spoils indicates a strata change at 1.07 m | |
| 1 | | | | | | | 64.49 | | 1.07 | |
| | | | | | | | | | Brown gray, damp, hard, silty CLAY with trace fine sand, very slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/12/25/14 | 37 | | | | | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 13/12/12/14 | 24 | | | | Brown gray, damp, very stiff CLAY with some sand, very slightly plastic, mottled, sand lenses every 10.2-20.3 cm -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | 61.44 | | 4.11 | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 17/17/20/26 | 37 | | | | Brown-gray, damp, hard, CLAY with little silt, little sand, moderately to highly plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | 60.47 | | 5.09 | |
| | | | | | | | | | Light brown, damp, very dense, silty SAND with trace clay, poorly-graded, -MARINE DEPOSIT-(SM) | |
| | | | | | | | | | Brown-gray, damp, hard, CLAY with little silt & sand, moderately to highly plastic, mottled -MARINE DEPOSIT-(SM) | |
| 6 | D5 | 61.0/48.3 | 6.10 - 6.71 | 5/9/17/14 | 26 | | | | Light brown, damp, very dense, SAND with some silt, poorly-graded, some stratification -MARINE DEPOSIT-(SM) | |
| | D6 | 61.0/61.0 | 6.71 - 7.32 | 22/26/29/24 | 55 | | | | | |
| 7 | | | | | | | 58.24 | | 7.32 | |
| | | | | | | | | | Bottom of Exploration at 7.32 m below ground surface. | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-41-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80785-001

**Boring No.:** C1-42-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 64.28 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/20/01 / 8/20/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 11 + 860, 15 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 3/5/14/32 | 19 | | 64.19 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Light brown, dry, very stiff, SILT with trace fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change at 1.16 m | |
| 1 | | | | | | | 63.12 | | 1.16 | |
| | | | | | | | | | Brown dry, hard, sandy SILT with some gravel, loosely bonded -GLACIAL TILL DEPOSIT-(SM) | |
| | D2 | 33.0/20.3 | 1.52 - 1.85 | 44/73/50(2.5) | 123 | | | | Note: cobble layer from 1.52-2.89 m | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | 61.38 | | 2.90 | |
| | | | | | | | | | **Bottom of Exploration at 2.90 m below ground surface.** Auger refusal on top of probable bedrock | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-42-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-43-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 63.33 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/21/01 / 8/21/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 899, 16.9 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 2/3/8/17 | 11 | | 63.24 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Light brown, dry, stiff, SILT with some fine sand -MARINE SILT-(ML) | |
| 1 | | | | | | | 62.02 | | 1.31 | |
| | D2 | 20.3/17.8 | 1.52 - 1.73 | 19/ 75(5.1) | 91 | | | | Brown, dry, hard, SILT with little fine sand, trace clay, non-plastic -MARINE SILT-(ML) | |
| 2 | | | | | | | | | Note: Several cobbles encountered from 1.74-2.44 m | |
| | | | | | | | 60.89 | | 2.44 | |
| 3 | | | | | | | | | **Bottom of Exploration at 2.44 m below ground surface.** Auger refusal | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-43-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-44-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 62.50 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/20/01 / 8/20/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 900, 0.8 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/35.6 | 0.00 - 0.61 | 3/14/16/21 | 30 | | 62.44 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Light gray, dry, hard SILT with some fine sand, non-plastic -MARINE DEPOSIT-(ML) Note: Auger spoils pile indicates a strata change at 1.22 m | |
| 1 | | | | | | | | | Brown gray, damp, very stiff, silty, CLAY with trace sand, mottled -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 4/9/15/14 | 24 | | | | | |
| 2 | | | | | | | 60.21 | | 2.29 | |
| | | | | | | | | | Brown gray, damp, medium stiff, CLAY with some silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 3/3/6/6 | 9 | | 59.09 | | 3.41 | |
| | | | | | | | | | Gray brown, damp, medium dense, silty fine SAND, trace clay, poorly-graded -MARINE DEPOSIT-(SW) | |
| 4 | | | | | | | 58.38 | | 4.11 | |
| | | | | | | | | | Brown, damp, very dense, gravelly SAND with some silt, poorly-graded, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| | D4 | | 4.57 - 4.85 | 65/100(12.7) | 165 | | | | | |
| 5 | | | | | | | 57.32 | | 5.18 | |
| | | | | | | | | | Bottom of Exploration at 5.18 m below ground surface. | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-44-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-45-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 59.74 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/20/01 / 8/20/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 11 + 940, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/33.0 | 0.00 - 0.61 | 3/4/9/16 | 13 | | 59.68 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Brown, dry, medium dense, sandy, SILT, little gravel -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 58.52 | | 1.22 | |
| | D2 | 25.4/22.9 | 1.52 - 1.78 | 25/76 (10.2) | 101 | | | | Brown, dry, sandy SILT, little gravel, moderately bonded -MARINE DEPOSIT-(ML) Note: Auger used from 1.52-2.07 m | |
| 2 | | | | | | | 57.67 | | 2.07 | |
| | | | | | | | | | **Bottom of Exploration at 2.07 m below ground surface.** Spoon refusal on probable boulder | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-45-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: | Kennebec River Crossing | Boring No.: | C1-45A-01 |
| Location: | Augusta, Maine | PIN: | 556.21 |
| File No. | 80765-001 | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mark Gunning | Elevation (m): | 59.74 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/20/01 / 8/20/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 11 + 940, 15 L | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: no samples taken from 0-2.41 m For approximate soil information see log C1-45-011 | |
| | | | | | | | | | Note: Augers used from 0-3.05 m | |
| 1 | | | | | | | | | Note: Drill action indicates a dense cobble layer beginning at 2.13 m | |
| | | | | | | | | | Note: Tried to auger through boulder unsuccessfully at 2.41 m | |
| 2 | | | | | | | | | | |
| | | | | | | | 57.33 | | 2.41 Bottom of Exploration at 2.41 m below ground surface. Auger Refusal due to probable boulder | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-45A-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-46-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80785-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mark Gunning | Elevation (m): | 56.00 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/20/01 / 8/20/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 11 + 940, 15 R | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/22.9 | 0.00 - 0.61 | 5/6/12/21 | 18 | HSA | 55.94 | | -TOPSOIL- (0.06) | |
| | | | | | | | | | Light brown, dry, very stiff, SILT with little fine sand non-plastic -MARINE SILT-(ML) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/27.9 | 1.52 - 2.13 | 14/23/36/34 | 59 | | 54.29 | | (1.71) Gray brown, moist, very dense, gravelly SAND, some silt, poorly-graded, loose to moderately bonded -GLACIAL TILL DEPOSIT-(SP) Note: Auger used from 1.52-2.38 m | |
| 2 | | | | | | | 53.62 | | (2.38) Bottom of Exploration at 2.38 m below ground surface. Auger refusal on top of possible bedrock | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-47-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 60.56 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/17/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 020, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 8/13/16/22 | 29 | | 60.47 | -TOPSOIL- 0.09 | |
| | | | | | | | | Light brown, dry, very stiff, SILT with trace fine sand -MARINE DEPOSIT-(ML) | |
| | | | | | | | 60.04 | 0.52 | |
| 1 | | | | | | | | | |
| | D2 | | 1.52 - 2.13 | 8/11/14/18 | 25 | | | Brown-gray, damp, very stiff, silty CLAY with trace fine sand, non-plastic, mottled -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/8/9/13 | 17 | | | Brown-gray, damp, very stiff, silty CLAY with trace fine sand, non-plastic, mottled -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/6/7/9 | 13 | | | Brown-gray, moist, stiff, CLAY with some silt & little sand, slightly plastic, mottled fine sand lenses (1mm thick) -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | |
| | | | | | | | 54.92 | 5.64 | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 9/12/11/18 | 23 | | | Gray-brown, moist, medium dense, silty SAND with little clay, poorly-graded -MARINE DEPOSIT-(SM) | |
| 7 | | | | | | | | | |
| | D6 | 61.0/45.7 | 7.62 - 8.23 | 7/9/18/12 | 27 | | | Light brown, damp, medium dense, SAND with some silt, poorly-graded | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-47-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-47-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 60.56 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/16/01 / 8/17/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 020, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 52.33 | | -MARINE DEPOSIT-(SM) | |
| | | | | | | | | | 8.23 | |
| | | | | | | | | | Bottom of Exploration at 8.23 m below ground surface. | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-48-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 47.13 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/20/01 / 8/20/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 061, 15.7 R | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/12.7 | 0.00 - 0.61 | 1/2/2/4 | 4 | SSA | 47.07 | | -TOPSOIL- 0.06 | |
| | | | | | | | 46.67 | | Yellow-brown, dry, medium stiff, SILT, some sand, trace gravel, poorly-graded -MARINE DEPOSIT-(ML) 0.46 | |
| 1 | | | | | | | | | Note: At depth 0.46 m changes to a brown color | |
| | D2 | 50.8/40.6 | 1.52 - 2.03 | 12/18/18/50(9.1) | 36 | | 45.60 | | 1.52 | |
| 2 | | | | | | | 44.99 | | Gray brown, dry, dense, silty SAND, some grave, poorly-graded, moderately bonded -GLACIAL TILL DEPOSIT-(SP) Note: Advanced auger from 2.04-2.13 m 2.13 | |
| | | | | | | | | | Bottom of Exploration at 2.13 m below ground surface. Auger refusal | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-48-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-49-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 41.20 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 121, 30 R | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 1/3/5/8 | 8 | | 41.14 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Gray brown, damp, stiff, SILT with some sand & little roots, non-plastic, no structure | |
| | | | | | | | 40.53 | | -MARINE DEPOSIT-(ML) 0.67 | |
| 1 | | | | | | | | | Bottom of Exploration at 0.67 m below ground surface. Auger refusal on top of probable bedrock | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-49-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-50-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 45.10 | **Auger ID/OD:** | -- / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 120, 8.5 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 17.8/15.2 | 0.00 - 0.18 | 2/50(2.5 cm) | 52 | | 45.07 | | -TOPSOIL- 0.03 | |
| | | | | | | | 44.95 | | Tan, dry, loose, SILT with little roots & little fine sand, non-plastic, non structure | |
| | | | | | | | 44.92 | | -MARINE DEPOSIT-(ML) 0.15 | |
| 1 | | | | | | | | | Note: Possible glacial till layer of gravelly SAND with little silt from 0.15-0.18 m but layer is too thin to be certain 0.18 | |
| | | | | | | | | | **Bottom of Exploration at 0.18 m below ground surface.** Auger refusal on bedrock on probable bedrock | |
| | | | | | | | | | Note: C1-50-01 as staked is 0.15 m from bedrock outcrop | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-50-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-51-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 47.45 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 120, 10 LT | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 1/3/4/8 | 7 | | 47.39 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Tan, dry, medium stiff, SILT with some fine sand(sand from 0.46-0.61 m) non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| | | | | | | | 46.69 | | 0.76 | |
| 1 | | | | | | | | | Note: Strata change to probably glacial till (based on drill action) at 0.76 m | |
| | | | | | | | 46.17 | | 1.28 | |
| | | | | | | | | | Bottom of Exploration at 1.28 m below ground surface. Auger refusal on probable bedrock | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-51-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-52-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 48.73 | **Auger ID/OD:** | -- / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 180, 10 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 2/4/6/11 | 10 | | 48.70 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Tan, dry, stiff SILT with some fine sand & trace roots, non-plastic, no structure | |
| | | | | | | | 48.06 | | -MARINE DEPOSIT-(ML) 0.67 | |
| 1 | | | | | | | | | **Bottom of Exploration at 0.67 m below ground surface.** Auger refusal on top of probable bedrock | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-52-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-53-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 46.90 | Auger ID/OD: | – / 10.79 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/30/01 / 8/30/01 | Drilling Method: | SSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 240, 15 R | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/61.0 | 0.00 - 0.61 | 2/5/30/42 | 35 | | 46.81 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Tan, dry, hard, SILT with trace fine sand & roots, non-plastic, no structure -MARINE SILT-(ML) | |
| | | | | | | | 46.13 | | 0.76 | |
| 1 | | | | | | | | | Note: Drill action indicates a strata change at 0.76 m | |
| | | | | | | | | | Brown, dry, very dense, SILT with some gravel & trace fine sand, non-plastic, moderately bonded -GLACIAL TILL DEPOSIT- | |
| | D2 | 7.6/7.6 | 1.52 - 1.60 | 50(7.6) | 50 | | 45.28 | | 1.62 | |
| 2 | | | | | | | | | Bottom of Exploration at 1.62 m below ground surface. Auger refusal on top of probable bedrock | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-54-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 52.76 | **Auger ID/OD:** | -- / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | SSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 240, 10 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

*Definitions:*
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

*Definitions:*
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

*Definitions:*
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/15.2 | 0.00 - 0.61 | 2/8/12/35 | 20 | | 52.73 | | -TOPSOIL- 0.03 | |
| | | | | | | | 52.27 | | Tan, dry, very stiff, SILT with some sand & trace roots, non-plastic, no structure | |
| | | | | | | | 52.12 | | -MARINE DEPOSIT-(ML) 0.49 | |
| 1 | | | | | | | | | Yellow brown, very dense, sandy SILT with trace, fine gravel, poorly-graded, well-bonded -GLACIAL TILL DEPOSIT-(ML) 0.64 | |
| | | | | | | | | | **Bottom of Exploration at 0.64 m below ground surface.** Auger refusal on top of probable bedrock | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-54-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-55-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 58.40 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/30/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 281, 0.9 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 5.1/5.1 | 0.00 - 0.05 | 6/24/30/31 | 54 | | 58.37 | | -TOPSOIL- 0.03 | |
| | | | | | | | 57.94 | | Tan & gray-brown, dry, hard, SILT with little clay, non-plastic, clay is mottled & foliated -MARINE DEPOSIT-(ML) 0.46 | |
| 1 | | | | | | | | | Note: Soil changes from a SILT with little clay to a clayey SILT at 0.46 m | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/14/15/16 | 29 | | 56.63 | | 1.77 | |
| 2 | | | | | | | | | Olive brown, damp, very stiff, silty CLAY with trace sand, slightly plastic, mottled w/ occasional sand lenses -MARINE DEPOSIT-(CL) | |
| 3 | D3 | | 3.05 - 3.66 | 7/10/13/9 | 23 | | 55.26 | | 3.14 | |
| | | | | | | | | | Brown, wet, medium dense, silty SAND with trace clay, poorly-graded, no structure -MARINE DEPOSIT-(SM) | |
| 4 | | | | | | | 54.59 | | 3.81 | |
| | | | | | | | | | Note: Drill action indicates a strata change at 3.81 m possibly to glacial till | |
| | | | | | | | 53.89 | | 4.51 | |
| 5 | | | | | | | | | **Bottom of Exploration at 4.51 m below ground surface.** Auger refusal on top of probable bedrock | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-55-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-56-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 65.86 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/29/01 / 8/29/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 282, 25 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Inelitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Inelitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 2/4/1/5 | 5 | | 65.76 | | -TOPSOIL- 0.09 | |
| | | | | | | | 65.34 | | Tan, dry, medium stiff, SILT, with trace sand & roots, non-plastic, non structure -MARINE DEPOSIT-(ML) 0.52 | |
| 1 | | | | | | | | | Tan, dry, medium stiff, SILT, with trace sand, non-plastic, non structure -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 10/14/17/23 | 31 | | 64.24 | | 1.62 Brown gray, damp, hard, clayey SILT with little fine sand, non-plastic, mottled -MARINE DEPOSIT- Sand lenses present | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 7/10/13/14 | 23 | | 62.81 | | 3.05 Olive gray, damp, very stiff, CLAY with some silt & trace fine sand, slightly plastic, occasional sand lenses, mottled & foliated -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/6/7/9/ | 13 | | | | Olive gray, damp, stiff, CLAY with little silt, slightly to moderately plasticity -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| | | | | | | | 60.06 | | 5.79 Gray, moist, soft, CLAY with some silt & little sand, moderate to high plasticity -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 1/2/3/5 | 5 | | 59.45 | | 6.40 Gray-brown, loose, wet, silty fine SAND with little clay, poorly-graded, non-plastic, no structure -MARINE DEPOSIT-(SW) | |
| 7 | | | | | | | 58.60 | | 7.25 Note: Drill action indicates probable glacial till | |
| | | | | | | | 58.24 | | 7.62 Bottom of Exploration at 7.62 m below ground surface. Auger refusal on top of probable bedrock | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-57-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 63.71 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/29/01 / 8/29/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 340, CL | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 5/14/28/26 | 42 | | 63.62 | | -TOPSOIL- 0.09 | |
| | | | | | | | | | Tan, dry, hard, SILT with trace sand & roots, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/45.7 | 1.52 - 2.13 | 5/15/28/13 | 43 | | 62.13 | | 1.58 | |
| | | | | | | | | | Brown gray & tan, dry to damp, hard, SILT with little sand & trace clay, non- plastic, slightly mottled -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | | | | |
| | | | | | | | 60.97 | | 2.74 | |
| 3 | | | | | | | | | Brown gray, damp, very stiff, silty CLAY with trace sand, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/8/12/17 | 20 | | | | | |
| | | | | | | | | | Brown gray, damp, stiff, silty CLAY with trace fine sand, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/5/9/9 | 14 | | | | | |
| 5 | | | | | | | 58.56 | | 5.15 | |
| | | | | | | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, sand lenses present -MARINE DEPOSIT-(CL) | |
| 6 | | | | | | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, sand lenses present -MARINE DEPOSIT-(CL) | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/2/5/6 | 7 | | | | | |
| 7 | | | | | | | | | | |
| | | | | | | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, sand lenses present -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/3/5 | 3 | | | | | |

**Remarks:**

Shear vane: 2" x 7" field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-57-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 63.71 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/29/01 / 8/29/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 340, CL | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | V1 | | 8.53 - 8.71 | 70.8 kPa | | | | | Note: Shear vane taken at 8.53 m and 8.78 m | |
| | V2 | | 8.75 - 8.93 | 74.6/33.5 kPa | | | | | | |
| 9 | | | | | | | | | | |
| | D7 | 61.0/61.0 | 9.14 - 9.75 | 1/2/3/5 | 5 | | | | Gray, moist, medium stiff, CLAY with trace silt & sand, moderately plastic, sand lenses present -MARINE DEPOSIT-(CL) | |
| 10 | | | | | | | | | | |
| | D8 | 61.0/61.0 | 10.67 - 11.28 | 2/3/7/8 | 10 | | | | | |
| 11 | | | | | | | 52.71 | | 11.00 Brown, moist, stiff, clayey, SILT with some fine sand, very slightly plastic, stratified -MARINE DEPOSIT-(ML) | |
| 12 | | | | | | | 51.83 | | 11.89 Brown, wet, medium dense, fine SAND with little silt, poorly-graded, no structure -MARINE DEPOSIT-(SW) | |
| | D9 | 61.0/61.0 | 12.19 - 12.80 | 1/6/8/8 | 14 | | | | | |
| 13 | | | | | | | | | Bottom of Exploration at 12.80 m below ground surface. | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear vane: 2" x 7" field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-58-01 (OW)
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 68.41 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/29/01 / 8/29/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 341, 20 L | **Casing ID/OD:** | – | **Water Level*:** | 13.62 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 4/7/12/16 | 19 | | 68.35 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Tan, dry, medium dense, silty SAND with trace gravel, poorly-graded, no structure GLACIO FLUVIAL DEPOSIT-(SM) | |
| 1 | | | | | | | 67.19 | | 1.22 | |
| | | | | | | | | | Gray-brown, damp, very stiff, clayey SILT with trace fine sand, non-plastic, some mottling -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/53.3 | 1.52 - 2.13 | 9/11/16/17 | 27 | | | | | |
| 2 | | | | | | | | | | |
| | | | | | | | 65.67 | | 2.74 | |
| 3 | | | | | | | | | Brown, damp, very stiff, silty CLAY with some fine sand, very slightly plastic -MARINE DEPOSIT-(CL) | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 3/9/8/10 | 17 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 3/5/4/4 | 9 | | | | | |
| 5 | | | | | | | 63.47 | | 4.94 | |
| | | | | | | | | | Gray, moist, stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | V1 | | 5.49 - 5.61 | 42.6/11.0 kPa | | | | | Note: Shear vane test taken at 5.49 m and 5.79 m | |
| | V2 | | 5.79 - 5.92 | 53.6/9.5 kPa | | | | | | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/WOH/4/5 | 4 | | | | Gray, moist, medium stiff to stiff CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/3/4/5 | 7 | | | | Gray, moist, medium stiff CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

| Haley & Aldrich, Inc.<br>Soil/Rock Exploration Log<br>METRIC UNITS | Project: Kennebec River Crossing<br>Location: Augusta, Maine<br>File No. 80765-001 | Boring No.: C1-58-01 (OW)<br>PIN: 556.21 |
|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 68.41 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/29/01 / 8/29/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 12 + 341, 20 L | Casing ID/OD: | -- | Water Level*: | 13.62 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | V3 | | 8.53 - 8.66 | 55.2/11.0 kPa | | | | | Note: Shear vane test taken at 8.53 m and 8.84 m | |
| | V4 | | 8.84 - 8.97 | 61.5/15.8 kPa | | | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | WOH/WOH/5/6 | 5 | | | | Gray, moist, stiff, CLAY with trace silt, moderately plastic<br>-MARINE DEPOSIT-(CL) | |
| 10 | | | | | | | | | | |
| | D8 | 61.0/61.0 | 10.67 - 11.28 | 2/6/6/12 | 12 | | 57.74 | | 10.67<br>Brown, wet, medium dense, SAND with little silt & trace clay, poorly-graded non-plastic, no structure<br>-MARINE DEPOSIT-(SW) | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | 56.53 | | 11.89<br>Red-gray, wet, very dense, gravelly SILT, with some sand, poorly-graded, moderately bonded<br>-GLACIAL TILL DEPOSIT-(ML) | |
| | D9 | 61.0/12.7 | 12.19 - 12.80 | 6/29/29/36 | 58 | | | | | |
| 13 | | | | | | | | | | |
| 14 | D10 | 0.0/0.0 | 13.93 - 13.93 | 50(0) | 50 | | 54.48 | | 13.93<br>Bottom of Exploration at 13.93 m below ground surface.<br>Top of possible bedrock<br>Note: For observation well details see log C1-58-01 (OW) | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# OBSERVATION WELL INSTALLATION REPORT

| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing Project | Observation Well | C1-58-01 OW |
| City/State | Augusta, Maine | Test Boring | C1-58-01 |
| Client | Maine Department of Transportation | Installation Date | 29-Aug-01 |
| Contractor | Maine Test Borings, Inc. | Location | Station 12 + 341 |
| Foreman | Darrel McKeen | | 20 L |
| | | H&A File No. | 80765-001 |
| | | H&A Rep. | Tim Erickson |

Ground El. 68.41 m

El. Datum unknown

| SOIL/ROCK CONDITIONS (Numbers refer to elevation/depth from ground surface in meters) (not to scale) | BOREHOLE BACKFILL |
|---|---|
| TOPSOIL 0.06 | NATURAL SOIL 0.06 |
| | BENTONITE 0.61 |
| MARINE SILT 2.74 | |
| | FILTER SAND |
| MARINE CLAY | |
| | 9.75 |
| | BENTONITE 10.27 |
| 10.57 | |
| MARINE SAND 11.84 | FILTER SAND |
| GLACIAL TILL DEPOSIT 13.92 | 13.92 |

Bottom of Exploration

Type of protective cover/lock: PVC Cap

Depth of top of roadway box below ground surface ____ m

Height of top of riser pipe above ground surface 0.61 m

Type of protective casing: None

Length ____ m

Inside diameter ____ mm

Depth of bottom of roadway box ____ m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Bentonite | 9.75 | 0.51 |
| | | |
| | | |
| | | |

Type of riser pipe: Scheduled 40 PVC

Inside diameter of riser pipe 25.4 m

Type of backfill around riser: Filter sand/Bentonite Natural

Diameter of borehole 228.6 mm

Depth of top of wellpoint 10.78 m

Type of Screen: Machine Slotted PVC

Screen gauge or size of openings 0.254 mm

Diameter of screen. 25.4 mm

Type of backfill around Screen: Filter Sand

Depth of bottom of wellpoint 13.92 m

Silt trap

Depth of bottom of borehole 13.92 m

(Depths refer to ground surface)

Remarks:

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
C1-58-01(OW)



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-001 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | T. Erickson |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 29-Aug-01 |
| ELEVATION SUBTRAHEND | 68.41 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 8/30/2001 | 1439 | 1 | 10.42 m | 57.99 m | | TJE |

Form #3170

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-59-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |
| Driller: | Darrel McKeen | Elevation (m): 72.39 | Auger ID/OD: 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: NGVD | Sampler: 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: Mobile B53 Bombardier | Hammer Wt./Fall: 140 lb / 76.2 cm |
| Date Start/Finish: | 8/28/01 / 8/29/01 | Drilling Method: HSA Spin | Core Barrel: – |
| Boring Location: | Station 12 + 340, 41.8 L | Casing ID/OD: – | Water Level*: Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/30.5 | 0.00 - 0.61 | 12/20/16/14 | 36 | | 72.33 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Tan, dry, hard, SILT with some sand & gravel, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 71.48 | | 0.91 | |
| | | | | | | | | | Tan, dry, very stiff, sandy SILT with trace gravel, non-plastic, stratified -MARINE DEPOSIT-(ML) | |
| 2 | D2 | 61.0/43.2 | 1.52 - 2.13 | 8/13/15/19 | 28 | | 70.26 | | 2.13 | |
| | | | | | | | | | Light brown, dense, damp, SAND with some silt & trace clay, poorly-graded, non-plastic, stratified -MARINE DEPOSIT-(SM) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 13/16/16/15 | 32 | | | | | |
| 4 | | | | | | | | | | |
| 5 | D4 | 61.0/61.0 | 4.57 - 5.18 | 2/6/8/9 | 14 | | 67.82 | | 4.57 | |
| | | | | | | | | | Olive brown, moist, stiff, sandy CLAY, with trace silt, slightly plastic, sand layers are frequent -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 1/3/4/5 | 7 | | | | | |
| 7 | | | | | | | 65.84 | | 6.55 | |
| | | | | | | | | | Gray, moist, medium stiff, moderately plastic -MARINE DEPOSIT-(CL) | |
| | V1 | | 7.01 - 7.14 | 42.6/7.9 kPa | | | | | Note: Shear vane test taken at 7.01 m and 7.32 m | |
| | V2 | | 7.32 - 7.44 | 36.6/6.3 kPa | | | | | Gray, moist, medium stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/WOH/5 | WOH | | | | Gray, moist, medium stiff, CLAY with trace fine sand, highly plastic, -MARINE DEPOSIT-(CL) | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-59-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 72.39 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/29/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 340, 41.8 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | WOH/WOH/WOH/6 | WOH | | | | Gray, moist, medium stiff, CLAY with trace fine sand, highly plastic, -MARINE DEPOSIT-(CL) | |
| | V3 | | 9.45 - 9.58 | 48.9/9.5 kPa | | | | | | |
| | V4 | | 9.75 - 9.88 | 47.3/9.5 kPa | | | | | Note: Shear vane test taken at 9.45 m and at 9.75 m | |
| 10 | | | | | | | | | | |
| | D8 | 61.0/61.0 | 10.67 - 11.28 | WOH/WOH/4/5 | 4 | | | | Gray, moist, stiff, CLAY with trace fine sand, moderately plastic -MARINE DEPOSIT-(CL) | |
| 11 | | | | | | | | | Shear vane test attempted at 12.19 m and vane would not turn due to strata change | |
| 12 | | | | | | | 60.20 | | 12.19 | |
| | D9 | 61.0/61.0 | 12.19 - 12.80 | 3/6/6/11 | 12 | | | | Brown, moist, medium dense, fine SAND with some clay, poorly-graded, non-plastic, stratified with 1 mm thick clay layers every 10.2 cm -MARINE DEPOSIT-(SW) | |
| | | | | | | | 59.59 | | 12.80 | |
| 13 | | | | | | | | | Bottom of Exploration at 12.80 m below ground surface. | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-60-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 62.20 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/27/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 420, 0.9 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 1/4/4/8 | 8 | | 62.17 | | -TOPSOIL- (0.03) | |
| | | | | | | | | | Yellow brown, dry, stiff, SILT with trace fine sand, uniform, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | Note: Auger spoils pile indicates a strata change at 0.91 m | |
| | | | | | | | 61.13 | | (1.07) | |
| | | | | | | | | | Light brown, dry, hard, clayey SILT with trace fine sand, poorly-graded, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 23/24/35/34 | 49 | | | | | |
| 2 | | | | | | | 60.07 | | (2.13) | |
| 3 | D3 | 30.5/30.5 | 3.05 - 3.35 | 70/93 | 163 | | | | Gray brown, damp, hard CLAY with trace silt, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D4 | 61.0/61.0 | 3.35 - 3.96 | 10/11/15/26 | 26 | | | | Gray brown, damp, stiff CLAY with trace silt, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | | | | | | | 58.54 | | (3.66) | |
| 4 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 4.57 - 5.18 | 11/6/7/8 | 13 | | | | Gray brown, damp, stiff, CLAY with trace silt lenses, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| 6 | D6 | 61.0/61.0 | 6.10 - 6.71 | WOH/2/3/4 | 5 | | | | Gray, damp, medium stiff, CLAY with trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D7 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/3/5 | 3 | | | | Gray, damp, medium stiff CLAY with trace silt & fine sand, moderately plastic, occasional sand lenses from 8. 17-8.23 m | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-60-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 62.20 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/27/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 420, 0.9 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | -MARINE DEPOSIT-(CL) | |
| 9 | D8 | 61.0/61.0 | 9.14 - 9.75 | WOH/WOH/5/7 | 5 | | | | Gray, damp, medium stiff CLAY with trace silt & fine sand, moderately plastic, occasional sand lenses -MARINE DEPOSIT-(CL) | |
| 10 | | | | | | | | | | |
| | D9 | 61.0/61.0 | 10.67 - 11.28 | 5/8/9/13 | 17 | | 51.53 | | 10.67 Gray & brown, damp, medium dense, clayey SAND with trace silt, poorly-graded, clay is highly plastic, clay is found in layers from 1.3-10.2 cm thick -MARINE DEPOSIT-(SW) | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | 50.47 | | 11.73 Note: Drill action indicates a strata change @ 11.73 m Brown, damp, very dense, gravelly SILT with some fine sand, pooly-graded, non plastic, moderately bonded -GLACIAL TILL DEPOSIT-(GM-SM) | |
| | D10 | 48.3/35.6 | 12.19 - 12.67 | 12/24/33/50(2.5) | 57 | | | | | |
| 13 | | | | | | | 49.52 | | 12.68 **Bottom of Exploration at 12.68 m below ground surface.** Auger refusal on top of probable bedrock | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-61-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |
| Driller: Darrel McKeen | Elevation (m): 70.37 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: Maine Test Borings | Datum: NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: Tim Erickson | Rig Type: Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: 8/27/01 / 8/27/01 | Drilling Method: HSA Spin | Core Barrel: | – |
| Boring Location: Station 12 + 420, 30 L | Casing ID/OD: – | Water Level*: | 9.63 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 2/3/4/4 | 7 | | 70.31 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Yellow brown, dry, medium stiff, sandy SILT, poorly-graded, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 3/4/8/15 | 12 | | 68.84 | | 1.52 | |
| 2 | | | | | | | | | Brown, damp, medium dense, fine SAND with trace silt, uniform, non-plastic, stratified -MARINE DEPOSIT-(SP) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 9/8/10/13 | 18 | | 67.20 | | 3.17 | |
| | | | | | | | | | Brown gray, moist, very stiff, clayey SILT with some fine sand, poorly-graded, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| 4 | | | | | | | 66.40 | | 3.96 | |
| | | | | | | | | | Brown gray, moist, very stiff, CLAY with some silt & little sand, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 6/7/10/11 | 17 | | | | | |
| 5 | | | | | | | | | | |
| 6 | D5 | | 6.10 - 6.71 | 3/4/5/6 RQD = 24% | 9 | | 64.27 | | 6.10 | |
| | | | | | | | | | Brown gray, moist, stiff, CLAY with trace silt, plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | WOH/WOH/WOH/5 | WOH | | | | | |

**Remarks:**

Shear Vane: 55 x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-61-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 70.37 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/27/01 / 8/27/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 420, 30 L | **Casing ID/OD:** | -- | **Water Level*:** | 9.63 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | V1 | | 8.53 - 8.64 | 45.7 kPa | | | | | Note: Shear vane test done at 8.53 m | |
| 9 | | | | | | | | | | |
| | D7 | 61.0/61.0 | 9.14 - 9.75 | WOR/1/3/5 | 4 | | 61.22 | | 9.14 Gray brown, wet, silty sand with some clay, poorly-graded, non-plastic, no structure -MARINE DEPOSIT-(SM) | |
| 10 | | | | | | | 60.46 | | 9.91 -GLACIAL TILL- | |
| | | | | | | | 60.25 | | 10.12 **Bottom of Exploration at 10.12 m below ground surface.** Spoon refusal on probable bedrock. Note: For well details see well installation report # C1-61-01 OW | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

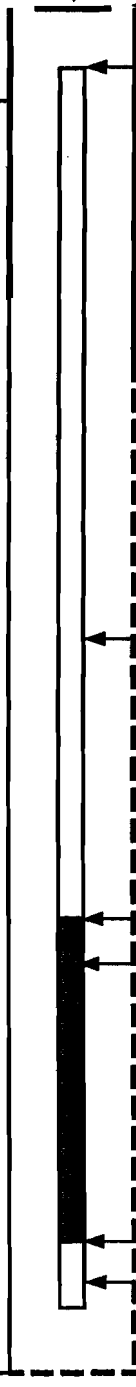
# OBSERVATION WELL INSTALLATION REPORT

| | | | |
|---|---|---|---|
| Project | Kennebec River Crossing Project | Observation Well | C1-61-01 OW |
| City/State | Augusta, Maine | Test Boring | C1-61-01 |
| Client | Maine Department of Transportation | Installation Date | 27-Aug-01 |
| Contractor | Maine Test Borings, Inc. | Location | Station 12 + 420 |
| Foreman | Darrel McKeen | | 30 L |
| | | H&A File No. | 80765-001 |
| | | H&A Rep. | Tim Erickson |

Ground El. 70.37 m

El. Datum unknown

| SOIL/ROCK CONDITIONS (Numbers refer to elevation/depth from ground surface in meters) (not to scale) | BOREHOLE BACKFILL |
|---|---|
| TOPSOIL 0.06 | NATURAL SOIL 0.06 |
| MARINE SILT 1.52 | BENTONITE 0.61 |
| FLUVIAL DEPOSIT 3.16 | NATURAL SOIL 6.09 |
| MARINE SILT 3.95 | BENTONITE 6.55 |
| MARINE CLAY 9.14 | FILTER SAND 10.11 |
| GLACIOFLUVIAL DEPOSIT 9.31 | |
| GLACIAL TILL DEPOSIT 10.11 | |
| Bottom of Exploration | |



Type of protective cover/lock: PVC Cap

Depth of top of roadway box below ground surface ____ m

Height of top of riser pipe above ground surface 2.90 m

Type of protective casing: None

Length ____ m

Inside diameter ____ mm

Depth of bottom of roadway box ____ m

Seals:

| Type | Depth to top (m) | Thickness (m) |
|---|---|---|
| Natural | 0.61 | 5.44 |
| Bentonite | 6.09 | 0.46 |

Type of riser pipe: Scheduled 40 PVC

Inside diameter of riser pipe 25.4 mm

Type of backfill around riser: Natural/Bentonite

Diameter of borehole 130.5 mm

Depth of top of wellpoint 6.91 m

Type of Screen: Machine Slotted PVC

Screen gauge or size of openings 0.254 mm

Diameter of screen. 25.4 mm

Type of backfill around Screen: Filter Sand

Depth of bottom of wellpoint 10.11 m

Silt trap

Depth of bottom of borehole 10.11 m

(Depths refer to ground surface)

Remarks:

HALEY & ALDRICH

# GROUNDWATER MONITORING REPORT

OW/PZ NUMBER
C1-61-01(OW)



| | | | |
|---|---|---|---|
| PROJECT | Kennebec River Crossing Project | H&A FILE NO. | 80765-001 |
| LOCATION | Augusta, Maine | PROJECT MGR. | J. Weaver |
| CLIENT | Maine Department of Transportation | FIELD REP. | T. Erickson |
| CONTRACTOR | Maine Test Borings, Inc. | DATE | 27-Aug-01 |
| ELEVATION SUBTRAHEND | 70.37 m | | |

| Date | Time | Elapsed Time (days) | Depth of Water from Ground Surface | Elevation of Water | Remarks | Read By |
|---|---|---|---|---|---|---|
| 8/30/2001 | 1422 | 3 | 4.21 m | 66.16 m | | TJE |

Form #3170

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-62-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 63.00 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 460, 18.4 L | **Casing ID/OD:** | -- | **Water Level*:** | 6.61 m |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 4/12/18/22 | 30 | | 62.94 | -TOPSOIL- (0.06) | |
| | | | | | | | | Light brown, dry, hard, SILT with trace fine sand, poorly-graded, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 62.08 | (0.91) | |
| | | | | | | | | Gray brown, damp very stiff, clayey SILT, poorly-graded, very slightly plastic, mottled -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 6/12/16/18 | 28 | | | | |
| 2 | | | | | | | 60.87 | (2.13) | |
| | | | | | | | | Gray brown, damp, stiff, CLAY with trace sand & silt, poorly-graded, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 4/4/5/6 | 9 | | | | |
| | | | | | | | 59.34 | (3.66) | |
| 4 | | | | | | | | Brown, moist, medium dense, clayey SAND with trace silt, poorly-graded, slightly plastic, stratified -MARINE DEPOSIT-(SL) | |
| | D4 | 61.0/48.3 | 4.57 - 5.18 | 1/4/6/7 | 10 | | | | |
| 5 | | | | | | | 57.60 | (5.39) | |
| | | | | | | | | Note: Drill action indicates a strata change possibly to glacial till at 5.39 m<br>Note: Augered through a cobble from 5.94-6.25 m | |
| 6 | | | | | | | | Brown, moist very dense, gravelly SILT with some sand, poorly-graded, non-plastic, loose to moderately bonding -GLACIAL TILL DEPOSITS-(GM-SM) | |
| | D5 | | 6.25 - 6.68 | 12/25/50(10.2) | 75 | | | | |
| 7 | | | | | | | 56.32 | (6.68) | |
| | | | | | | | | Bottom of Exploration at 6.68 m below ground surface. Auger refusal on probable bedrock | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-63-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 71.04 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/24/01 / 8/24/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 12 + 459, 35.8 L | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 2/3/4/18 | 7 | | 70.98 | | -TOPSOIL- 0.06 | |
| | | | | | | | 70.58 | | Yellow-brown, dry, medium stiff, fine sandy SILT, poorly-graded, non-plastic, no structure -MARINE DEPOSIT-(ML) 0.46 | |
| 1 | | | | | | | | | Brown, dry, medium stiff, silty SAND with trace gravel, poorly-graded -MARINE DEPOSIT-(SM) | |
| | | | | | | | 69.82 | | 1.22 | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 8/9/12/15 | 21 | | | | Gray-brown, damp, very stiff, fine sand SILT, little clay, non-plastic, mottled, -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | 67.99 | | 3.05 | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 15/18/20/25 | 38 | | | | Gray brown, damp, hard, sandy CLAY, poorly-graded, slightly plastic, mottled & foliated -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | 67.07 | | 3.96 | |
| | | | | | | | | | Brown gray, damp, hard, CLAY, little sand, slightly to moderately, plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 12/14/21/32 | 35 | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 4/8/8/11 | 16 | | | | | |
| | | | | | | | 64.64 | | 6.40 | |
| | | | | | | | | | Brown damp, medium dense silty SAND, trace clay, poorly-graded -MARINE DEPOSIT-(SM) | |
| 7 | | | | | | | | | | |
| | | | | | | | 63.72 | | 7.32 | |
| | | | | | | | | | Note: Drill action indicates a strata change at 7.32 m, probable glacial till. | |
| | D6 | 12.7/5.1 | 7.62 - 7.75 | 100 (12.7) | 100 | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-63-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 71.04 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/24/01 / 8/24/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 459, 35.8 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_V$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | MD | 0.0/0.0 | 8.38 - 8.38 | 50(0) | 50 | | 62.65 | | 8.38 **Bottom of Exploration at 8.38 m below ground surface.** Auger refusal on probable bedrock | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-63-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-64-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 64.70 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 498, 1.7 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | 64.67 | | -TOPSOIL- 0.03 | |
| | D1 | 61.0/40.6 | 0.30 - 0.91 | 2/4/10/14 | 14 | | | | Light brown, dry, stiff SILT with trace roots & fine sand, uniform, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/48.3 | 1.52 - 2.13 | 20/16/24/28 | 40 | | 63.18 | | 1.52 Gray brown, dry, hard, sandy SILT with trace clay, poorly-graded, non-plastic, -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | | | | |
| | | | | | | | 62.11 | | 2.59 Olive brown, damp, very stiff, clayey SILT, poorly-graded, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 7/9/11/16 | 20 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 7/10/13/15 | 23 | | | | | |
| 5 | | | | | | | 59.64 | | 5.06 Olive brown, damp, very stiff, silty CLAY with trace sand, slightly plastic, poorly graded, mottled, occasional sand lenses -MARINE DEPOSIT-(CL) | |
| 6 | | | | | | | | | Olive brown, damp, damp, stiff, CLAY with little fine sand & trace silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 5/6/6/11 | 12 | | | | | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/50.8 | 7.62 - 8.23 | 5/10/11/16 | 21 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-64-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 64.70 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bomberdier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 498, 1.7 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 56.68 | | 8.02 | |
| | | | | | | | | | Light-brown, damp, medium dense, silty SAND with trace clay, poorly-graded, non-plastic, stratified -MARINE DEPOSIT-(SM) | |
| | | | | | | | 56.29 | | 8.41 | |
| 9 | | | | | | | | | Brown, damp, medium dense, SAND with little silt & trace clay, poorly-graded, non-plastic, 1 clay layer is 7.6 cm thick and mottled, sand is stratified -MARINE DEPOSIT-(SP) | |
| | D7 | 61.0/61.0 | 9.14 - 9.75 | 3/10/18/20 | 28 | | | | | |
| 10 | | | | | | | 54.49 | | 10.21 | |
| | | | | | | | 54.25 | | Note: Drill action indicates a strata change at 10.24 m probably to glacial till | |
| | | | | | | | | | 10.45 | |
| 11 | | | | | | | | | Bottom of Exploration at 10.45 m below ground surface. Auger refusal on top of probable bedrock | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-65-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 68.81 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 500, 25 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/61.0 | 0.00 - 0.61 | 8/12/13/17 | 25 | | 68.69 | -TOPSOIL- 0.12 | |
| | | | | | | | | Gray brown, dry, very stiff, SILT with little fine sand, poorly-graded, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 67.89 | 0.91 | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 7/8/12/14 | 20 | | | Gray-brown, damp, very stiff, sandy SILT with trace clay, poorly-graded, non-plastic, mottled -MARINE DEPOSIT-(ML) | |
| 2 | | | | | | | 66.37 | 2.44 | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 5/8/11/15 | 19 | | | Gray-brown, damp, very stiff, clayey SILT with little sand, poorly-graded, slightly plastic, sand lenses present, -MARINE DEPOSIT-(ML) | |
| | | | | | | | 65.15 | 3.66 | |
| 4 | | | | | | | | | |
| 5 | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/6/7/13 | 13 | | | Gray-brown, damp, stiff, CLAY with little silt, poorly-graded, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 0.0/0.0 | 6.10 - 6.10 | 6/8/14/14 | 22 | | 62.71 | 6.10 | |
| | | | | | | | | Brown, damp, medium dense, SAND with little silt, poorly-graded, non-plastic, no structure -GLACIAL STREAM DEPOSIT-(SP) | |
| 7 | | | | | | | 61.89 | 6.92 | |
| | | | | | | | | Brown, damp, very dense, gravelly fine SAND with some silt, poorly-graded, non- plastic, moderately bonded, -GLACIAL TILL DEPOSIT-(SP) | |
| | D6 | 38.1/33.0 | 7.62 - 8.00 | 23/36/100(7.6) | 136 | | | Note: Probable fresh bedrock in tip of spoon sample D6 | |

**Remarks:**

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# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-65-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 68.81 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/28/01 / 8/28/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 500, 25 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 60.79 | | **Bottom of Exploration at 8.02 m below ground surface.** Spoon refusal on probable bedrock (8.02) | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-65A-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 68.81 | Auger ID/OD: | – / 10.79 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 9/4/01 / 9/4/01 | Drilling Method: | SSA Spin / Casing Spin | Core Barrel: | NQ |
| Boring Location: | Station 12 + 500, 25 L | Casing ID/OD: | – | Water Level*: | – |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 1 | | | | | | | | | Note: For soil information from 0-7.65 m, refer to log C1-65-01 | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | Note: 10.79 cm S5 augers used from 0-3.05 m, NW casing then placed in hole and used for the remainder of the drilling<br>Note: No overburden samples taken<br>Note: Cored through boulder from 7.65-7. 99 m | |
| 4 | | | | | | | | | Note: From 7.92-7.99 m encountered brown gravelly SAND, some silt, poorly graded<br>-GLACIAL TILL DEPOSIT-(SP) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-65A-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 68.81 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/4/01 / 9/4/01 | **Drilling Method:** | SSA Spin / Casing Spin | **Core Barrel:** | NQ |
| **Boring Location:** | Station 12 + 500, 25 L | **Casing ID/OD:** | – | **Water Level*:** | – |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 60.82 | | 7.99 | |
| | | | | | | | | | Begin NX rockcore at 8.23 m | |
| | R1 | 152.4/152.4 | 8.23 - 9.75 | RQD = 100% | | | 60.58 | | 8.23 | |
| | | | | | | | | | Gray, aphanitic to medium grained, SLATE with igneous intrusions moderate to hard, fresh to very slight, quartz stringers and granite intrusions, RMD excellent, Recovery 100% | |
| 9 | | | | | | | | | | |
| | | | | | | | 59.06 | | 9.75 | |
| | | | | | | | | | Bottom of Exploration at 9.75 m below ground surface. | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-66-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 70.36 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 501, 40 L | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/61.0 | 0.00 - 0.61 | 7/4/8/23 | 12 | | 70.30 | | -TOPSOIL- 0.06 | |
| | | | | | | | | | Light brown, dry, stiff, SILT, little sand, trace gravel, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 69.75 | | 0.61 | |
| 1 | | | | | | | | | Note: Drill action indicates a strata change at 0.61 m<br>Light brown, dry, hard, sandy SILT, trace clay, non-plastic, clay is mottled, silt is stratified with sand -MARINE DEPOSIT-(ML) | |
| 2 | D2 | 61.0/61.0 | 1.52 - 2.13 | 22/23/32/40 | 55 | | | | | |
| | | | | | | | 67.77 | | 2.59 | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 30/25/33/39 | 58 | | | | Gray brown, damp, very dense, silty SAND, poorly-graded, well stratified -MARINE DEPOSIT-(SM) | |
| 4 | | | | | | | 65.94 | | 4.42 | |
| | | | | | | | | | Bottom of Exploration at 4.42 m below ground surface.<br>Auger refused on probable boulders | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-66-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-66A-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 70.36 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/24/01 / 8/24/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 502 40 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: No samples taken from 0-3.05 m | |
| | | | | | | | | | Note: For soil information from 0-3.05 m refer to log C1-66-01 | |
| | | | | | | | | | Note: Auger used from 0-3.05 m | |
| 1 | | | | | | | | | Note: Auger grinding on rock from 4. 27-5.57 m | |
| 2 | | | | | | | | | | |
| 3 | D1 | 61.0/53.3 | 3.05 - 3.66 | 9/13/13/19 | 26 | | | | Brown, damp, medium dense, silty SAND, poorly-graded -MARINE DEPOSIT-(SP) | |
| 4 | | | | | | | | | | |
| | MD | 0.0/0.0 | 4.57 - 4.57 | 50(0) | 50 | | 65.79 | | 4.57 | |
| 5 | | | | | | | | | Bottom of Exploration at 4.57 m below ground surface. Auger refusal on possible bedrock | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-66A-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-67-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 55.56 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/27/01 / 8/27/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 541, 8.7 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/45.7 | 0.00 - 0.61 | 3/6/14/17 | 20 | | 55.53 | -TOPSOIL- (0.03) | |
| | | | | | | | | Light-brown, dry, very stiff, SILT with trace fine sand, uniform, non-plastic, no structure -MARINE DEPOSIT-(ML) | |
| | | | | | | | 54.79 | (0.76) | |
| 1 | | | | | | | | | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 7/9/10/11 | 19 | | | Gray-brown, damp, very stiff, CLAY with same silt & trace sand, poorly-graded, slight to moderately plastic, mottled, occasional sand lenses -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 6/7/10/17 | 17 | | 52.51 | (3.05) Gray-brown, damp, very stiff, SILT with little sand & trace clay, poorly-graded, non-plastic, stratified -MARINE DEPOSIT-(ML) | |
| 4 | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 7/11/15/17 | 26 | | 50.98 | (4.57) Brown, damp, medium dense, fine SAND with little silt, poorly-graded, non-plastic, stratified -GLACIAL STREAM DEPOSIT-(SP) | |
| 5 | | | | | | | | | |
| | | | | | | | 49.98 | (5.58) Brown, dry to damp, very dense, gravelly SAND with some silt, poorly-graded, non-plastic, loosely bonded -GLACIAL TILL DEPOSIT- | |
| 6 | D5 | 61.0/45.7 | 6.10 - 6.71 | 62/81/72/77 | 153 | | | | |
| 7 | | | | | | | 48.24 | (7.32) Brown, dry, very dense, silty GRAVEL with some sand, poorly-graded, non-plastic, loosely bonded -GLACIAL TILL DEPOSIT-(GM) | |
| | D6 | 38.1/35.6 | 7.62 - 8.00 | 55/80/100(7.6) | 180 | | | | |

**Remarks:**

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*Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-67-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mike Porter | **Elevation (m):** | 55.56 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/27/01 / 8/27/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 541, 8.7 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 84 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 47.51 | | 8.05 **Bottom of Exploration at 8.05 m below ground surface.** Auger refusal on probable top of bedrock | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-68-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mark Gunning | Elevation (m): | 67.25 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 12 + 540, 15 L | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 6/10/16/8 | 26 | | 67.12 | | -TOPSOIL- 0.12 | |
| | | | | | | | | | Light brown, dry, very, stiff, sandy SILT, little gravel, non-plastic -FILL-(ML) | |
| 1 | | | | | | | | | Light brown, dry, very stiff, SILT, some fine sand, trace gravel, trace plastic & glass fragments, non-plastic -FILL-(ML) | |
| | D2 | 61.0/45.7 | 1.52 - 2.13 | 6/11/13/15 | 24 | | | | | |
| 2 | | | | | | | 65.11 | | 2.13 | |
| | | | | | | | | | Light brown, dry, very stiff, SILT, some fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 64.50 | | 2.74 | |
| 3 | | | | | | | | | Brown gray, damp, hard, silty CLAY, slightly plastic, mottled in sections -MARINE DEPOSIT-(CL) | |
| | D3 | 61.0/61.0 | 3.05 - 3.66 | 11/18/30/21 | 48 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/6/10/15 | 16 | | | | Brown gray, damp, very stiff, CLAY, trace silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 4/6/9/11 | 15 | | | | Brown gray, damp, very stiff, CLAY, trace silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 3/6/11/13 | 17 | | | | Gray brown, damp, very stiff, sandy CLAY, trace silt, slightly plastic, clay is mottled, sand layers are 1.3 to 10.2 cm | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-68-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 67.25 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 540, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | -MARINE DEPOSIT-(CL) | |
| | | | | | | | 58.71 | | 8.53 | |
| | | | | | | | | | Light brown, moist, medium dense, SAND, trace silt, poorly-graded -MARINE DEPOSIT-(SP) | |
| 9 | D7 | | 9.14 - 9.93 | 16/16/23/50(5.1) | 39 | | | | | |
| | | | | | | | 57.80 | | 9.45 | |
| | | | | | | | | | Brown, moist, very dense, gravelly SAND, little silt, poorly-graded, slightly to moderately bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 10 | | | | | | | 57.31 | | 9.94 | |
| | | | | | | | | | **Bottom of Exploration at 9.94 m below ground surface.** Auger refusal on probable top of bedrock | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-69-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 66.99 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 540, 35 L | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/20.3 | 0.00 - 0.61 | 28/16/18/19 | 34 | | 66.83 | | Gravelly SAND -FILL- | |
| | | | | | | | | | 0.15 | |
| | | | | | | | | | Gray-brown, dry to damp, hard, clayey SILT, trace coarse sand, slightly plastic -FILL-(ML) | |
| 1 | | | | | | | 65.92 | | 1.07 | |
| | | | | | | | | | Brown, dry, very dense, gravelly SAND, trace silt, poorly-graded -FILL-(SP) | |
| | D2 | 61.0/43.2 | 1.52 - 2.13 | 10/70/52/63 | 127 | | | | | |
| 2 | | | | | | | 64.85 | | 2.13 | |
| 3 | D3 | 1.3/1.3 | 3.05 - 3.06 | 50(1.3) | 50 | | 63.94 | | 3.05 | |
| | | | | | | | | | **Bottom of Exploration at 3.05 m below ground surface.** Auger refusal on probable bedrock | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

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* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-69-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-69A-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 66.90 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 540, 37.4 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: For overburden soil descriptions & information from 0-3.05 m See log C1-69-01 | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | 64.16 | | 2.74 | |
| | D1 | 33.0/20.3 | 3.05 - 3.38 | 26/45/50(2.5) | 95 | | 63.79 | | Light-brown, dry, very dense, SAND, trace silt, poorly-graded, slightly stratified -MARINE DEPOSIT-(SP) | |
| 4 | | | | | | | 62.79 | | 3.11 Gray-brown, damp, very dense, gravelly SAND, little silt, poorly-graded, moderately bonded -GLACIAL TILL DEPOSIT-(SP) 4.11 | |
| 5 | | | | | | | | | Bottom of Exploration at 4.11 m below ground surface. Auger refusal on probable bedrock | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-69A-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-69B-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 66.90 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 9/5/01 / 9/5/01 | **Drilling Method:** | SSA Spin / Hammer | **Core Barrel:** | NQ |
| **Boring Location:** | Station 12 + 540, 35.6 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: No overburden samples taken | |
| | | | | | | | | | Note: Casing used from 0-4.39 m | |
| | | | | | | | | | Note: Frequent cobbles from 1.22-4.39 m | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| | R1 | 152.4/121.9 | 4.39 - 5.91 | RQD = 77% | | | 62.51 | | 4.39 | |
| | | | | | | | | | Gray, aphanitic to fine grained, SLATE, moderately hard, fresh to very slight, joints dipping to horizontal to low angle, moderate to close, tight, no infilling, occasional quartz stringers RMD good, Recovery 80% | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | 60.99 | | 5.91 | |
| | | | | | | | | | Bottom of Exploration at 5.91 m below ground surface. | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-69B-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80785-001

**Boring No.:** C1-70-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mark Gunning | Elevation (m): | 62.33 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 12 + 850, 5 L | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | | 0.00 - 0.61 | 4/7/13/42 | 20 | | 62.30 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Light-brown, dry, very stiff, SILT with trace fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 61.11 | | 1.22 | |
| | | | | | | | | | Gray-brown, dry to damp, hard, clayey SILT, non-plastic -MARINE DEPOSIT-(ML) | |
| | D2 | 61.0/45.7 | 1.52 - 2.13 | 17/16/18/29 | 34 | | | | | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 12/16/15/16 | 31 | | 59.04 | | 3.29 | |
| | | | | | | | | | Brown-gray, damp, hard, CLAY with little silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/7/9/11 | 16 | | | | Brown-gray, damp, very stiff, CLAY, trace fine sand & silt, slightly to moderately plastic, mottled -MARINE CLAY-(CL) | |
| 5 | | | | | | | | | | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 4/5/6/9 | 11 | | | | Brown-gray, damp stiff, CLAY trace fine sand & silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | 55.02 | | 7.32 | |
| | | | | | | | | | Brown-gray, damp, stiff, sandy CLAY with trace silt, slightly plastic, Sand is stratified, clay & sand alternating layers throughout -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 5/5/8/11 | 13 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-70-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 62.33 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 850, 5 L | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 54.10 | | 8.23 Light-brown, damp, medium dense, SAND, trace silt, poorly-graded -MARINE DEPOSIT-(SP) | |
| 9 | D7 | 61.0/61.0 | 9.14 - 9.75 | 9/12/15/41 | 27 | | | | | |
| | | | | | | | 52.64 | | 9.69 Brown, damp, very dense, gravelly SAND, trace silt, poorly-graded, loose to moderately bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 10 | | | | | | | 52.27 | | 10.06 **Bottom of Exploration at 10.06 m below ground surface.** Auger refused on probable bedrock | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80785-001

**Boring No.:** C1-70A-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 62.20 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/31/01 | **Drilling Method:** | NW Casing Spin / SSA Spin | **Core Barrel:** | NQ |
| **Boring Location:** | Station 12 + 580, 5 L | **Casing ID/OD:** | – | **Water Level*:** | – |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | Note: 10.79 cm solid stem augers used from 0-4.57 m NW casing used below depth 4.57 m | |
| | | | | | | | | | Note: No overburden samples taken | |
| | | | | | | | | | Note: Drill action indicates a cobble from 10.61-10.67 m | |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-70A-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-70A-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 62.20 | **Auger ID/OD:** | – / 10.79 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/30/01 / 8/31/01 | **Drilling Method:** | NW Casing Spin / SSA Spin | **Core Barrel:** | NQ |
| **Boring Location:** | Station 12 + 580, 5 L | **Casing ID/OD:** | – | **Water Level*:** | – |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | R1 | 137.2/111.8 | 10.67 - 12.04 | RQD = 14% | | | 51.53 | | 10.67<br>Gray, aphanitic SLATE, moderately hard to hard, fresh to moderately weathered, joints are dipping horizontal to steep, very close to close, tight to open, no visible infilling, RMD very poor, Recovery 81%<br><br>Granite intrusion from 10.97-11.43 m | |
| 12 | | | | | | | 50.13 | | 12.07<br>**Bottom of Exploration at 12.07 m below ground surface.** | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-71-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 61.29 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 580, 25 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 6/11/14/23 | 25 | | 61.23 | | -TOPSOIL- (0.06) | |
| | | | | | | | | | Light-brown, dry, very stiff, SILT with trace fine sand, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 60.53 | | (0.76) | |
| 1 | | | | | | | | | Brown, damp, medium dense, fine SAND, trace silt, poorly-graded -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | Note: Drill action indicates a strata change at 2.65 m | |
| | D2 | 61.0/43.2 | 1.52 - 2.13 | 14/12/10/9 | 22 | | | | | |
| 2 | | | | | | | | | | |
| | | | | | | | 58.70 | | (2.59) | |
| 3 | | | | | | | | | No recovery | |
| | | | | | | | | | Note: Frequent cobbles & gravel from 3.35-4.57 m | |
| | MD | 7.6/0.0 | 3.05 - 3.12 | 100(7.6) | 100 | | | | Note: Broke through a cobble from 3.35 3.51 m -PROBABLE GLACIAL TILL- | |
| 4 | | | | | | | | | | |
| | MD | 7.6/0.0 | 4.57 - 4.65 | 100(7.6) | 100 | | | | No recovery | |
| 5 | | | | | | | 56.35 | | (4.94) Bottom of Exploration at 4.94 m below ground surface. Auger refusal on probable bedrock | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-71-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-72-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Mark Gunning | Elevation (m): | 57.06 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | -- |
| Boring Location: | Station 12 + 620, 10 R | Casing ID/OD: | -- | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/35.6 | 0.00 - 0.61 | 12/21/15/13 | 36 | | | | Gray brown, dry, dense, gravelly SAND, some silt, trace brick, asphalt & furnace brick, poorly-graded -FILL-(SP) | |
| 1 | | | | | | | | | | |
| | D2 | 61.0/2.5 | 1.52 - 2.13 | 6/8/15/21 | 23 | | | | Poor-recovery -FILL-(SP) | |
| 2 | | | | | | | | | Note: Auger from 3.05-4.57 m indicates a gravelly-cobble filled layer | |
| 3 | D3 | 61.0/2.5 | 3.05 - 3.66 | 6/24/20/14 | 44 | | | | Poor Recovery -FILL-(SP) | |
| 4 | | | | | | | 52.79 | | 4.27 Gray-brown, moist, stiff silty SAND with clay, gravel, poorly-graded -FILL-(SM) | |
| | D4 | 61.0/5.1 | 4.57 - 5.18 | 2/4/6/3 | 10 | | | | | |
| 5 | | | | | | | 51.88 | | 5.18 Brown-gray, moist, very stiff, clayey SILT, trace fine sand, very slightly plastic -MARINE DEPOSIT-(ML) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | 3/9/12/12 | 21 | | | | | |
| 7 | | | | | | | 49.74 | | 7.32 Light-brown, moist, medium dense, SAND little silt, poorly-graded -MARINE DEPOSIT-(SP) | |
| | D6 | 61.0/61.0 | 7.62 - 8.23 | 6/8/9/10 | 17 | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-72-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 57.06 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 620, 10 R | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | | | | | | | 48.52 | | 8.53 Gray-brown, dry, very dense, gravelly SAND, little silt, poorly-graded, loosely bonded -GLACIAL TILL DEPOSIT-(SP) | |
| 9 | D7 | 25.4/17.8 | 9.14 - 9.40 | 53/75(10.2) | 128 | | | | | |
| | | | | | | | 47.15 | | 9.91 Probable Bedrock | |
| 10 | | | | | | | 46.91 | | 10.15 Bottom of Exploration at 10.15 m below ground surface. Auger refusal on probable bedrock | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-73-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 57.10 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/23/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 620, 15 L | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/25.4 | 0.00 - 0.61 | 12/24/21/14 | 45 | | | | Yellow-brown, dry, dense, gravelly SAND, some silt, poorly-graded -FILL-(SP) | |
| 1 | | | | | | | 55.89 | | 1.22 Gray-brown, dry, very dense, silty SAND with some gravel, poorly-graded -FILL-(SM) | |
| 2 | D2 | 5.1/5.1 | 1.52 - 1.57 | 100(2) | 100 | | 54.67 | | 2.44 Brown, damp, dry, dense, silty SAND with some gravel, poorly-graded-FILL-(SM) | |
| 3 | D3 | 61.0/40.6 | 3.05 - 3.66 | 13/15/14/13 | 29 | | | | | |
| 4 | | | | | | | 52.84 | | 4.27 Brown, damp, dry, dense, silty SAND with some gravel, poorly-graded loosely bonded -GLACIAL TILL DEPOSIT-(SM) | |
| 5 | D4 | 61.0/43.2 | 4.57 - 5.18 | 15/18/24/27 | 42 | | | | | |
| 6 | | | | | | | 51.47 | | 5.64 **Bottom of Exploration at 5.64 m below ground surface.** Auger refusal on probable bedrock | |
| 7 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-74-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 53.65 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Brickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 658, 10 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 4/10/11/13 | 21 | | | | Brown, damp, medium dense, SAND, some silt & gravel, poorly-graded -FILL-(SP) | |
| 1 | | | | | | | | | | |
| | | | | | | | 52.13 | | 1.52 | |
| | D2 | 61.0/43.2 | 1.52 - 2.13 | 10/9/7/11 | 16 | | | | Brown, damp, medium dense, silty SAND, little gravel, trace wood fragments, poorly-graded -FILL-(SM) | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/38.1 | 3.05 - 3.66 | 5/23/20/12 | 43 | | | | Gray-brown, damp, dense, silty SAND, little gravel, trace wood chips, brick, plastic, poorly-graded -FILL-(SM) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/35.6 | 4.57 - 5.18 | 5/10/13/7 | 23 | | | | Gray-brown, damp, medium dense, silty SAND, trace gravel, wire, wood fragments, poorly-graded -FILL-(SM) | |
| 5 | | | | | | | | | | |
| 6 | D5 | 61.0/20.3 | 6.10 - 6.71 | 4/21/40/15 | 61 | | | | Gray-brown, damp, very dense, silty SAND, some clay, brick fragments, trace gravel & cinders, poorly-graded -FILL-(SM) | |
| 7 | | | | | | | 46.64 | | 7.01 | |
| | | | | | | | | | Yellow brown, wet, medium dense, poorly- graded, stratified -MARINE DEPOSIT-(ML) | |
| | D6 | 61.0/45.7 | 7.62 - 8.23 | 3/8/9/14 | 17 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



**Boring No.:** C1-74-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-74-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 53.65 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/23/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 658, 10 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| 9 | | | | | | | 44.81 | | 8.84<br>Gray-brown, moist, medium dense, SAND, trace silt, well graded<br>-MARINE DEPOSIT-(SW) | |
| | D7 | 61.0/33.0 | 9.45 - 10.06 | 5/10/13/14 | 23 | | | | | |
| 10 | | | | | | | 43.59 | | 10.06<br>Bottom of Exploration at 10.06 m below ground surface. | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-75-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 53.39 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Brickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/22/01 / 8/23/01 | Drilling Method: | HSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 660, 15 L | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/48.3 | 0.00 - 0.61 | 13/37/22/20 | 59 | | | | Gray-brown, dry, very dense, silty SAND, some gravel, poorly-graded -FILL-(SM) | |
| | | | | | | | 52.78 | | 0.61 | |
| 1 | | | | | | | | | Yellow-brown, dry, medium dense, silty SAND, little gravel, poorly-graded -FILL-(SM) | |
| | D2 | 61.0/50.8 | 1.52 - 2.13 | 10/8/12/13 | 20 | | 51.83 | | 1.55 | |
| 2 | | | | | | | | | Gray-brown, dry, medium dense, SAND,little silt, trace clay, poorly-graded, clay layer (7.6 cm thick) is slightly plastic, mottled -MARINE DEPOSIT-(SP) | |
| 3 | D3 | 61.0/40.6 | 3.05 - 3.66 | 6/11/15/18 | 26 | | | | Gray-brown, damp, medium dense, SAND, little silt, poorly-graded, stratified -MARINE DEPOSIT-(SP) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/43.2 | 4.57 - 5.18 | 4/7/10/15 | 17 | | | | Gray-brown, damp, medium dense, SAND, little silt, poorly-graded, stratified -MARINE DEPOSIT-(SP) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | 47.29 | | 6.10 | |
| | D5 | 61.0/33.0 | 6.10 - 6.71 | 8/9/14/13 | 23 | | | | Gray-brown, damp, medium dense, SAND, trace fine gravel, well-graded -MARINE DEPOSIT-(SW) | |
| 7 | | | | | | | | | | |
| | | | | | | | 46.07 | | 7.32 | |
| | | | | | | | | | No recovery | |
| | MD | 7.6/0.0 | 7.62 - 7.70 | 100(7.6) | 100 | | | | Note: Auger spoils pile indicates a cobble & gravel layer from 7.32-8.84 m | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-75-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 53.39 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/23/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 660, 15 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | Note: Auger used to grind through rock from 8.84-8.99 m | |
| | | | | | | | | | -Probable Glacial TILL- | |
| 9 | MD | 0.0/0.0 | 8.99 - 8.99 | 100(0) | 100 | | 44.39 | | Split spoon refusal at 8.9 m. No recovery 8.99 | |
| | | | | | | | | | **Bottom of Exploration at 8.99 m below ground surface.** Auger refusal on probable bedrock | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-76-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 49.97 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer WL/Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 700 CL | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 5/10/23/24 | 33 | | 49.94 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Light-brown, dry, hard, SILT, with trace sand, non-plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change at 0.92 m | |
| 1 | | | | | | | 49.05 | | 0.91 Brown-gray, damp, very dense, SAND, some silt, clay, poorly-graded, stratified -MARINE DEPOSIT-(SP) | |
| | D2 | 61.0/55.9 | 1.52 - 2.13 | 12/21/30/29 | 51 | | | | | |
| 2 | | | | | | | 47.53 | | 2.44 Gray-brown, damp, medium dense, clayey SAND, little silt, poorly-graded, clay layers are slightly plastic, sand is stratified, clay layers are 2.5-7.6 cm thick -MARINE DEPOSIT-(SC) | |
| 3 | D3 | 61.0/43.2 | 3.05 - 3.66 | 8/12/8/13 | 20 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/40.6 | 4.57 - 5.18 | 4/4/7/16 | 11 | | | | Gray-brown, damp, medium dense, clayey SAND, trace silt, poorly-graded, clay layers are slightly plastic, sand layers are stratified -MARINE DEPOSIT-(SC) | |
| 5 | | | | | | | | | | |
| 6 | D5 | 61.0/40.6 | 6.10 - 6.71 | 5/10/12/15 | 22 | | | | Gray-brown, damp, very stiff, sandy CLAY, trace silt, slightly to moderately plastic, sand lenses throughout -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | 42.65 | | 7.32 Brown-gray, damp, medium dense, SAND, trace silt, poorly-graded, slightly stratified -MARINE DEPOSIT-(SP) | |
| | D6 | 61.0/50.8 | 7.62 - 8.23 | 7/8/10/22 | 18 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-76-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 49.97 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 700 CL | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 41.74 | | 8.23 Bottom of Exploration at 8.23 m below ground surface. | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-77-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 49.00 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 740, 13.5 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_V$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/27.9 | 0.00 - 0.61 | 3/19/26/30 | 45 | | 48.94 | -TOPSOIL- 0.06 | |
| | | | | | | | | Light-brown, dry, hard, SILT, little sand, poorly-graded -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 48.09 | 0.91 | |
| | | | | | | | | Gray-brown, damp, very stiff, sandy CLAY, trace silt, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| 2 | D2 | 61.0/61.0 | 1.52 - 2.13 | 9/11/17/18 | 28 | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 5/9/11/13 | | | | | |
| | | | | | | | 45.43 | 3.57 | |
| 4 | | | | | | | | Brown, damp, medium dense, clayey SAND with trace silt, poorly-graded, non-plastic, clay layers are mottled & foliated -MARINE DEPOSIT-(SC) | |
| | | | | | | | 44.76 | 4.24 | |
| | D4 | 61.0/53.3 | 4.57 - 5.18 | 9/7/15/18 | 22 | | | Brown, damp, medium dense, SAND, trace silt, some stratification observed -MARINE DEPOSIT-(SP) | |
| 5 | | | | | | | | | |
| 6 | D5 | 61.0/55.9 | 6.10 - 6.71 | 11/12/14/51 | 26 | | | | |
| | | | | | | | 42.42 | 6.58 | |
| 7 | | | | | | | 42.14 | Brown, damp, very dense, SAND, some clay, poorly-graded -MARINE DEPOSIT-(SP) | |
| | | | | | | | | Note: Auger refusal at 6.86 m | |
| | | | | | | | | 6.86 | |
| | | | | | | | | **Bottom of Exploration at 6.86 m below ground surface.** Auger refusal on probable cobble | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-78-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Driller: | Darrel McKeen | Elevation (m): | 46.96 | Auger ID/OD: | 5.35 cm / 14.51 cm |
| Operator: | Maine Test Borings | Datum: | NGVD | Sampler: | 3.49 cm Split Spoon |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier | Hammer Wt./Fall: | 140 lb / 76.2 cm |
| Date Start/Finish: | 8/22/01 / 8/22/01 | Drilling Method: | HSA Spin | Core Barrel: | – |
| Boring Location: | Station 12 + 740 15 L | Casing ID/OD: | – | Water Level*: | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/40.6 | 0.00 - 0.61 | 6/23/31/34 | 54 | | 46.93 | | -TOPSOIL- 0.03 | |
| | | | | | | | 46.47 | | Light-brown, dry, dense, gravelly, SAND, poorly-graded -FILL-(SP) 0.49 | |
| | | | | | | | | | Light-brown, dry, hard, SILT, trace sand, non-plastic -MARINE DEPOSIT-(ML) | |
| 1 | | | | | | | 45.89 | | 1.07 | |
| | | | | | | | | | Note: Auger spoils pile indicates a strata change at 1.06 m | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 8/9/13/15 | 22 | | | | Gray-brown, moist, very stiff, CLAY, trace silt, slightly to moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 5/8/8/14 | 16 | | | | Gray-brown, moist, very stiff, CLAY, trace silt, slightly to moderately plastic, mottled, sand lenses are present from 3.54-3.66 m -MARINE DEPOSIT-(CL) | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 4/4/7/11 | 11 | | 42.39 | | 4.57 | |
| 5 | | | | | | | | | Brown-gray, moist, stiff, CLAY, trace silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 6 | | | | | | | 40.86 | | 6.10 | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 6/12/18/28 | 30 | | | | Gray-brown, moist, hard, sandy CLAY, slightly to moderately plastic -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/61.0 | 6.71 - 7.32 | 18/23/24/26 | 47 | | 40.10 | | 6.86 | |
| 7 | | | | | | | | | Light-brown, damp, dense, SAND, some clay, trace silt, poorly-graded, stratified -MARINE DEPOSIT-(SP) | |
| | | | | | | | 39.64 | | 7.32 | |
| | | | | | | | | | Bottom of Exploration at 7.32 m below ground surface. | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

| | | | |
|---|---|---|---|
| Project: Kennebec River Crossing | | Boring No.: | C1-79-01 |
| Location: Augusta, Maine | | PIN: | 556.21 |
| File No. 80765-001 | | | |
| Driller: | Mark Gunning | Elevation (m): | 44.20 |
| Operator: | Maine Test Borings | Datum: | NGVD |
| Logged By: | Tim Erickson | Rig Type: | Mobile B53 Bombardier |
| Date Start/Finish: | 8/22/01 / 8/22/01 | Drilling Method: | HSA Spin |
| Boring Location: | Station 12 + 781, 10 L | Casing ID/OD: | -- |
| Auger ID/OD: | 5.35 cm / 14.51 cm | | |
| Sampler: | 3.49 cm Split Spoon | | |
| Hammer Wt./Fall: | 140 lb / 76.2 cm | | |
| Core Barrel: | -- | | |
| Water Level*: | Dry | | |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/38.1 | 0.00 - 0.61 | 9/12/12/14 | 24 | | | | Light-brown, dry, medium dense, SAND, trace of silt, poorly-graded -FILL-(SP) | |
| | | | | | | | 43.68 | | 0.52 | |
| 1 | | | | | | | | | Gray-brown, damp, very stiff, CLAY, little fine sand, trace silt, slightly plastic, mottled -MARINE DEPOSIT-(CL) | |
| 2 | D2 | 12.7/17.8 | 1.52 - 1.65 | 5/7/14/11 | 21 | | | | | |
| | | | | | | | 41.61 | | 2.59 | |
| 3 | D3 | 61.0/48.3 | 3.05 - 3.66 | 6/7/11/11 | 18 | | | | Light-brown, dry to damp, medium dense, clayey SAND, little silt, poorly-graded, faintly stratified -MARINE DEPOSIT-(SC) | |
| 4 | | | | | | | 39.93 | | 4.27 | |
| 5 | D4 | 61.0/33.0 | 4.57 - 5.18 | 8/20/19/25 | 39 | | | | Brown, dry, dense, SAND, little gravel, trace silt, well-graded -GLACIAL STREAM DEPOSIT-(SW) | |
| | | | | | | | 39.02 | | 5.18 | |
| | | | | | | | | | Bottom of Exploration at 5.18 m below ground surface. | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



Boring No.: C1-79-01

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-80-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 37.02 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 820, CL | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 4/7/4/5 | 11 | | | | Light-brown, dry, medium dense, gravelly SAND, poorly-graded -FILL-(SP) | |
| | | | | | | | 36.71 | | 0.30 | |
| | | | | | | | | | Yellow-brown, moist, stiff, CLAY, trace silt, moderately plastic, foliated -MARINE DEPOSIT-(CL) | |
| 1 | | | | | | | 36.10 | | 0.91 | |
| | | | | | | | | | Gray, moist, medium stiff CLAY, plastic -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 1/1/2/1 | 3 | | | | | |
| 2 | | | | | | | | | | |
| 3 | V1 | | 3.05 - 3.66 | 41.0/6.3 kPa | | | | | Note: Shear vane test taken at 3.05 m | |
| 4 | | | | | | | | | | |
| | D3 | 61.0/61.0 | 4.57 - 5.18 | 1/3/2/1 | 5 | | | | Gray, moist, medium stiff CLAY, plastic -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 6.40 - 7.01 | 1/5/6/7 | 11 | | | | Brown-gray, moist, stiff, sandy CLAY, trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | | | | | | | 29.70 | | 7.32 | |
| | | | | | | | | | Gray-brown, moist, very stiff, sandy SILT, trace clay, stratified -MARINE DEPOSIT-(ML) | |
| | D5 | 61.0/55.9 | 7.62 - 8.23 | 6/13/12/14 | 25 | | | | | |

**Remarks:**

Shear vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-80-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Mark Gunning | **Elevation (m):** | 37.02 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 820, CL | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | | | | | | | 28.48 | | 8.53 Light-brown, damp, dense, SAND, little silt, poorly-graded, stratified -MARINE DEPOSIT-(ML) | |
| 9 | D6 | 61.0/50.8 | 9.14 - 9.75 | 8/17/22/29 | 39 | | | | | |
| 10 | | | | | | | 26.78 | | 10.24 Light-brown, moist very dense, gravelly SAND, trace silt, poorly-graded -GLACIAL STREAM-(ML) | |
| 11 | D7 | 61.0/33.0 | 10.67 - 11.28 | 59/45/46/52 | 91 | | 25.74 | | 11.28 Brown, dry to damp, very dense, gravelly SAND, trace silt, well-graded, -GLACIAL STREAM DEPOSIT-(SW) Spoon refusal | |
| 12 | D8 | 22.9/15.2 | 12.19 - 12.42 | 50/115(12.7) | 167 | | 24.67 | | 12.34 **Bottom of Exploration at 12.34 m below ground surface.** Spoon refusal | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear vane: 55 mm x 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80765-001

**Boring No.:** C1-81-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 37.20 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 838, 10.5 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 84 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 3/6/7/9 | 13 | | | | Light-brown, dry, medium dense, SAND, some gravel, trace silt, well-graded -FILL-(SP) | |
| 1 | | | | | | | 35.98 | | 1.22 Gray, moist, medium stiff, CLAY, trace silt, uniform, moderately plastic -MARINE DEPOSIT-(CL) | |
| | D2 | 61.0/61.0 | 1.52 - 2.13 | 2/2/2/3 | 4 | | | | | |
| 2 | | | | | | | | | | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 2/3/1/4 | 4 | | | | Note: Shear vane attempt at 3.05 m no penetration<br>Note: From 3.05-3.11 m is a fine sand layer | |
| 4 | | | | | | | | | Gray, moist, medium stiff, CLAY, trace silt, fine sand, moderately plastic -MARINE DEPOSIT-(CL) | |
| 5 | V1 | | 4.88 - 4.99 | 37.8/9.5 kPa | | | | | Note: Shear vane taken at 4.88 m | |
| | D4 | 15.2/15.2 | 5.03 - 5.18 | 4 | 4 | | | | Gray, moist, medium stiff, CLAY, trace silt, fine sand, high plasticity -MARINE DEPOSIT-(CL) | |
| 6 | D5 | 61.0/61.0 | 6.10 - 6.71 | WOH/WOH/3/5 | 3 | | | | Gray, moist, medium stiff CLAY, trace silt, fine sand, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | | |
| | D6 | 61.0/50.8 | 7.62 - 8.23 | WOH/4/8/11 | 12 | | 29.43 | | 7.77 | |

**Remarks:**

Shear Vane: 55 mm X 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-81-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 37.20 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 838, 10.5 L | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | 28.97 | | Gray-brown, damp, medium dense, clayey SAND, little silt -MARINE DEPOSIT-(SC) — 8.23 | |
| 9 | D7 | 61.0/55.9 | 9.14 - 9.75 | 9/14/12/20 | 26 | | | | Gray-brown, damp, medium dense, SAND, little clay, trace silt, poorly-graded, slightly stratified -MARINE DEPOSIT-(SP) | |
| 10 | | | | | | | | | | |
| 11 | D8 | 61.0/48.3 | 10.67 - 11.28 | 8/18/22/19 | 40 | | | | Gray-brown, damp, dense, SAND, little clay, trace silt, poorly-graded, stratified -MARINE DEPOSIT-(SP) | |
| 12 | D9 | 61.0/45.7 | 12.19 - 12.80 | 10/16/18/19 | 34 | | | | Gray-brown, damp, medium dense, SAND, little clay, trace silt, poorly-graded, slightly stratified -MARINE DEPOSIT-(SP) | |
| 13 | | | | | | | 24.19 | | 13.02 — Brown, damp, very dense, gravelly SAND, trace silt, well-graded -GLACIAL STREAM DEPOSIT-(SW) | |
| 14 | D10 | 61.0/43.2 | 13.72 - 14.33 | 40/56/48/64 | 104 | | 22.88 | | 14.33 — **Bottom of Exploration at 14.33 m below ground surface.** | |
| 15 | | | | | | | | | | |

**Remarks:**

Shear Vane: 55 mm X 110 mm field vane

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log
METRIC UNITS

Project: Kennebec River Crossing
Location: Augusta, Maine
File No. 80785-001

**Boring No.:** C1-82-01
**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 37.30 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | -- |
| **Boring Location:** | Station 12 + 854, 10 R | **Casing ID/OD:** | -- | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | D1 | 61.0/43.2 | 0.00 - 0.61 | 12/25/23/20 | 48 | | 37.27 | | -TOPSOIL- 0.03 | |
| | | | | | | | | | Light-brown, dry, hard, SILT, little fine sand, plastic -MARINE DEPOSIT-(ML) | |
| | | | | | | | 36.78 | | 0.52 | |
| | | | | | | | | | Light-brown, dry, dense, SAND,track gravel, silt, well graded -MARINE DEPOSIT-(SW) | |
| 1 | | | | | | | | | Brown, damp, medium dense, SAND, little silt, trace gravel, well graded -MARINE DEPOSIT-(SW) | |
| | D2 | 61.0/45.7 | 1.52 - 2.13 | 10/9/10/13 | 19 | | | | | |
| 2 | | | | | | | | | | |
| | | | | | | | 35.01 | | 2.29 | |
| | | | | | | | | | Note: Considerable amount of silt found in spoon tip may indicate a strata change | |
| | | | | | | | | | Brown-gray, damp, hard CLAY, little silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 3 | D3 | 61.0/61.0 | 3.05 - 3.66 | 12/14/17/22 | 31 | | | | | |
| 4 | | | | | | | | | | |
| | D4 | 61.0/61.0 | 4.57 - 5.18 | 5/6/7/9 | 13 | | | | Olive, damp, stiff, CLAY, trace silt, moderately plastic, mottled -MARINE DEPOSIT-(CL) | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| | D5 | 61.0/61.0 | 6.10 - 6.71 | 4/4/5/4 | 9 | | | | | |
| | | | | | | | 30.87 | | 6.43 | |
| | | | | | | | | | Gray, moist, stiff CLAY, trace silt, moderately plastic -MARINE DEPOSIT-(CL) | |
| 7 | | | | | | | | | Note: Attempted vane shear test at 7.92 m, unable to turn | |
| | | | | | | | | | Gray-brown, damp, very stiff, sandy CLAY, trace silt, moderately plastic, sand layers are 0.6-10.2 cm thick -MARINE DEPOSIT-(CL) | |
| | D6 | 61.0/58.4 | 7.62 - 8.23 | 9/11/11/17 | 22 | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

# Haley & Aldrich, Inc.

Soil/Rock Exploration Log

METRIC UNITS

Project: Kennebec River Crossing

Location: Augusta, Maine

File No. 80765-001

**Boring No.:** C1-82-01

**PIN:** 556.21

| | | | | | |
|---|---|---|---|---|---|
| **Driller:** | Darrel McKeen | **Elevation (m):** | 37.30 | **Auger ID/OD:** | 5.35 cm / 14.51 cm |
| **Operator:** | Maine Test Borings | **Datum:** | NGVD | **Sampler:** | 3.49 cm Split Spoon |
| **Logged By:** | Tim Erickson | **Rig Type:** | Mobile B53 Bombardier | **Hammer Wt./Fall:** | 140 lb / 76.2 cm |
| **Date Start/Finish:** | 8/22/01 / 8/22/01 | **Drilling Method:** | HSA Spin | **Core Barrel:** | – |
| **Boring Location:** | Station 12 + 854, 10 R | **Casing ID/OD:** | – | **Water Level*:** | Dry |

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
R = Rock Core Sample
V = Insitu Vane Shear Test
SSA = Solid Stem Auger

Definitions:
$S_u$ = Insitu Field Vane Shear Strength (kPa)
$T_v$ = Pocket Torvane Shear Strength (kPa)
$q_p$ = Unconfined Compressive Strength (Pa)
$S_{u(lab)}$ = Lab Vane Shear Strength (kPa)
WOH = weight of 64 kg hammer
WOR = weight of rods

Definitions:
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

| Depth (m) | Sample No. | Pen/Rec (cm) | Sample Depth (m) | Blows (150 mm) Shear Strength (kPa) or RQD (%) | N-value | Casing Blows | Elevation (m) | Graphic Log | Visual Description and Remarks | Laboratory Testing Results/ AASHTO and Unified Class. |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | | | | | | | | | |
| | | | | | | | 28.61 | | 8.69 Light-brown, moist dense, SAND, little clay, trace silt, poorly-graded -MARINE DEPOSIT-(SP) | |
| 9 | D7 | 61.0/48.3 | 9.14 - 9.75 | 7/14/22/31 | 36 | | | | | |
| 10 | | | | | | | | | | |
| 11 | D8 | 61.0/43.2 | 10.67 - 11.28 | 12/16/21/26 | 37 | | | | Light-brown, moist, dense, SAND, trace clay, silt, poorly-graded -MARINE DEPOSIT-(SP) | |
| 12 | D9 | 61.0/45.7 | 12.19 - 12.80 | 12/23/30/26 | 53 | | | | Light-brown, moist, very dense, SAND, trace silt, well-graded -MARINE DEPOSIT-(SW) | |
| 13 | | | | | | | 24.31 | | 12.98 Light-brown, damp, very dense, SAND, little gravel, trace silt, well-graded -GLACIAL STREAM DEPOSIT-(SP) | |
| 14 | D10 | 61.0/35.6 | 13.72 - 14.33 | 11/21/40/60 | 61 | | | | | |
| | | | | | | | 22.97 | | 14.33 Bottom of Exploration at 14.33 m below ground surface. | |
| 15 | | | | | | | | | | |

**Remarks:**

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Appendix C

# APPENDIX C

## Results of Laboratory Testing

HALEY & ALDRICH

# GEOTECHNICAL LABORATORY SOIL TEST RESULTS - TUBE SAMPLES

**Proposed Augusta Bypass Project**
**Augusta, ME**



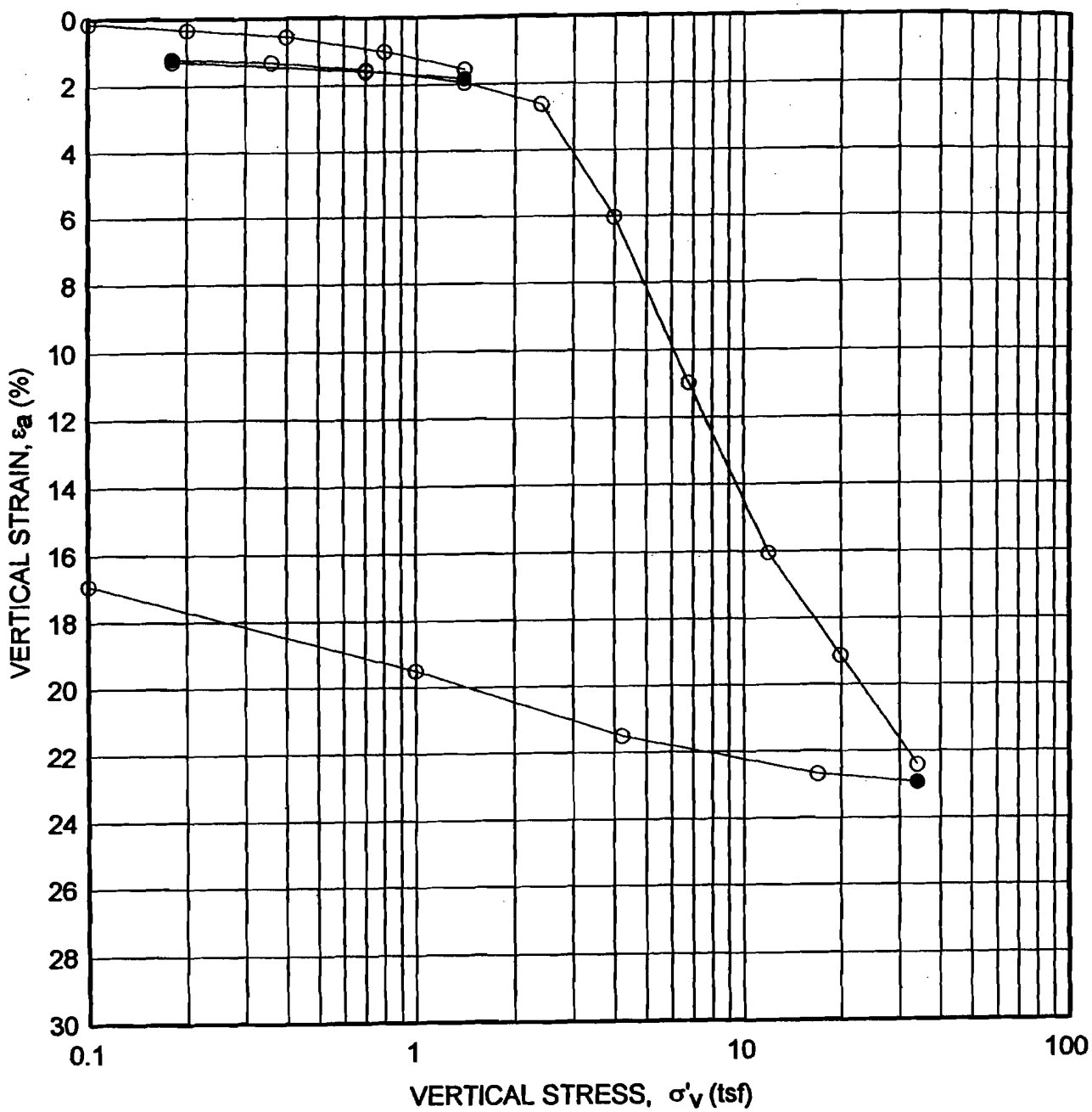
| Test | Description | USCS | Depth (ft) | Test No. | Nat. Water Cont. (%) | Atterberg Limits (%) Liq. Limit Wl | Plas. Limit Wp | Plas. Index Ip | Index Value (tsf) Tor-vane | Shear Vane | Rem. Shear Vane | Pkt Pen. PP/2 | Stress History Precons Press (tsf) / Test Qual | CR / RR | Total Unit Wt. (pcf) | Undr. Shear Str. cu (tsf) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Boring:** | **B05** | | | | | | | | | | | | | | | | |
| **Sample:** | **U01** | | | | | | | | | | | | | | | | |
| **Depth (ft):** | **15.0 to 17.0** | | | | | | | | | | | | | | | | |
| **Recovery (in.):** | **24.25** | | | | | | | | | | | | | | | | |
| Description | Stiff gray silty CLAY | CL | 16.5 | | | | | | | | | | | | | | |
| Tube Extrusion | | | 16.5 | | 34.9 | | | | 0.52 | | | 0.50 | | | 114.29 | | |
| Tube Extrusion | | | 16.6 | | 38.4 | | | | 0.51 | | | 0.43 | | | | | |
| Atterberg Limit | | | 16.8 | | 37.2 | 40.7 | 18.5 | 22.2 | | | | | | | | | |
| Consolidation | | | 16.8 | OED001 | 38.9 | | | | | | | | 2.6 | 0.140 | 114.60 | | |
| | | | | | | | | | | | | | Fair | 0.007 | | | |
| Tube Extrusion | | | 16.9 | | 33.8 | | | | 0.50 | 0.43 | 0.12 | 0.37 | | | | | |
| **Boring:** | **B08** | | | | | | | | | | | | | | | | |
| **Sample:** | **U01** | | | | | | | | | | | | | | | | |
| **Depth (ft):** | **10.0 to 12.0** | | | | | | | | | | | | | | | | |
| **Recovery (in.):** | **23.75** | | | | | | | | | | | | | | | | |
| Description | Medium stiff gray silty CLAY | CL | 11.5 | | | | | | | | | | | | | | |
| Tube Extrusion | | | 11.5 | | 30.2 | | | | 0.52 | | | 0.44 | | | 119.45 | | |
| Tube Extrusion | | | 11.6 | | 32.5 | | | | 0.45 | | | 0.36 | | | | | |
| Atterberg Limit | | | 11.8 | | 29.2 | 35.8 | 19.6 | 16.2 | | | | | | | | | |
| Consolidation | | | 11.8 | OED002 | 34.0 | | | | | | | | 2.1 | 0.129 | 119.00 | | |
| | | | | | | | | | | | | | Good | 0.005 | | | |
| Tube Extrusion | | | 11.9 | | 32.0 | | | | 0.50 | 0.42 | 0.11 | 0.31 | | | | | |

# GEOTECHNICAL LABORATORY SOIL TEST RESULTS - TUBE SAMPLES

Proposed Augusta Bypass Project
Augusta, ME



| Test | Description | USCS | Depth (ft) | Test No. | Nat. Water Cont. (%) | Atterberg Limits (%) Liq. Limit Wl | Plas. Limit Wp | Plas. Index Ip | Index Value (tsf) Tor-vane | Shear Vane | Rem. Shear Vane | Pkt Pen. PP/2 | Stress History Precons Press (tsf) / Test Qual | CR / RR | Total Unit Wt. (pcf) | Undr. Shear Str. cu (tsf) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Boring:** B12 | | | | | | | | | | | | | | | | | |
| **Sample:** U01 | | | | | | | | | | | | | | | | | |
| **Depth (ft):** 20.0 to 22.0 | | | | | | | | | | | | | | | | | |
| **Recovery (in.):** 24 | | | | | | | | | | | | | | | | | |
| Description | Medium stiff gray silty CLAY | CL | 21.5 | | | | | | | | | | | | | | |
| Tube Extrusion | | | 21.5 | | 32.3 | | | | 0.33 | | | 0.17 | | | 125.63 | | |
| Atterberg Limit | | | 21.8 | | 36.8 | 40.2 | 19.7 | 20.5 | | | | | | | | | |
| Tube Extrusion | | | 21.6 | | 39.2 | | | | 0.36 | | | 0.23 | | | | | |
| Consolidation | | | 21.8 | OED003 | 31.4 | | | | | | | | 1.4 | 0.109 | 120.00 | | |
| | | | | | | | | | | | | | Fair | 0.009 | | | |
| Tube Extrusion | | | 21.9 | | 35.5 | | | | 0.36 | 0.30 | 0.06 | 0.22 | | | | | |
| **Boring:** B13 | | | | | | | | | | | | | | | | | |
| **Sample:** U01 | | | | | | | | | | | | | | | | | |
| **Depth (ft):** 20.0 to 22.0 | | | | | | | | | | | | | | | | | |
| **Recovery (in.):** 24 | | | | | | | | | | | | | | | | | |
| Description | Medium stiff gray silty CLAY | CL | 21.5 | | | | | | | | | | | | | | |
| Atterberg Limit | | | 21.8 | | 32.6 | 33.0 | 19.3 | 13.7 | | | | | | | | | |
| Tube Extrusion | | | 21.5 | | 30.1 | | | | 0.34 | | | 0.20 | | | 118.49 | | |
| Tube Extrusion | | | 21.6 | | 31.8 | | | | 0.40 | | | 0.22 | | | | | |
| Consolidation | | | 21.8 | OED004 | 32.4 | | | | | | | | 2.2 | 0.109 | 119.80 | | |
| | | | | | | | | | | | | | Fair | 0.005 | | | |
| Tube Extrusion | | | 21.9 | | 34.8 | | | | 0.40 | 0.41 | 0.09 | 0.25 | | | | | |




Boring No.: B05
Sample No.: U01
Depth (ft): 16.75

Test No.: OED01

Atterberg Limits (%)

Wl: 40.7
Wp: 18.5
Ip: 22.2

Sample Description: Stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial: | 38.8 | 1.178 |
| Final: | 28.6 | 0.824 |

Preconsolidation Pressure (tsf): 2.6
Compression Ratio, CR: 0.140
Recompression Ratio, RR: 0.007

6 July 2000 ; J:\OED\80765000\OED01\0770OD.WB2

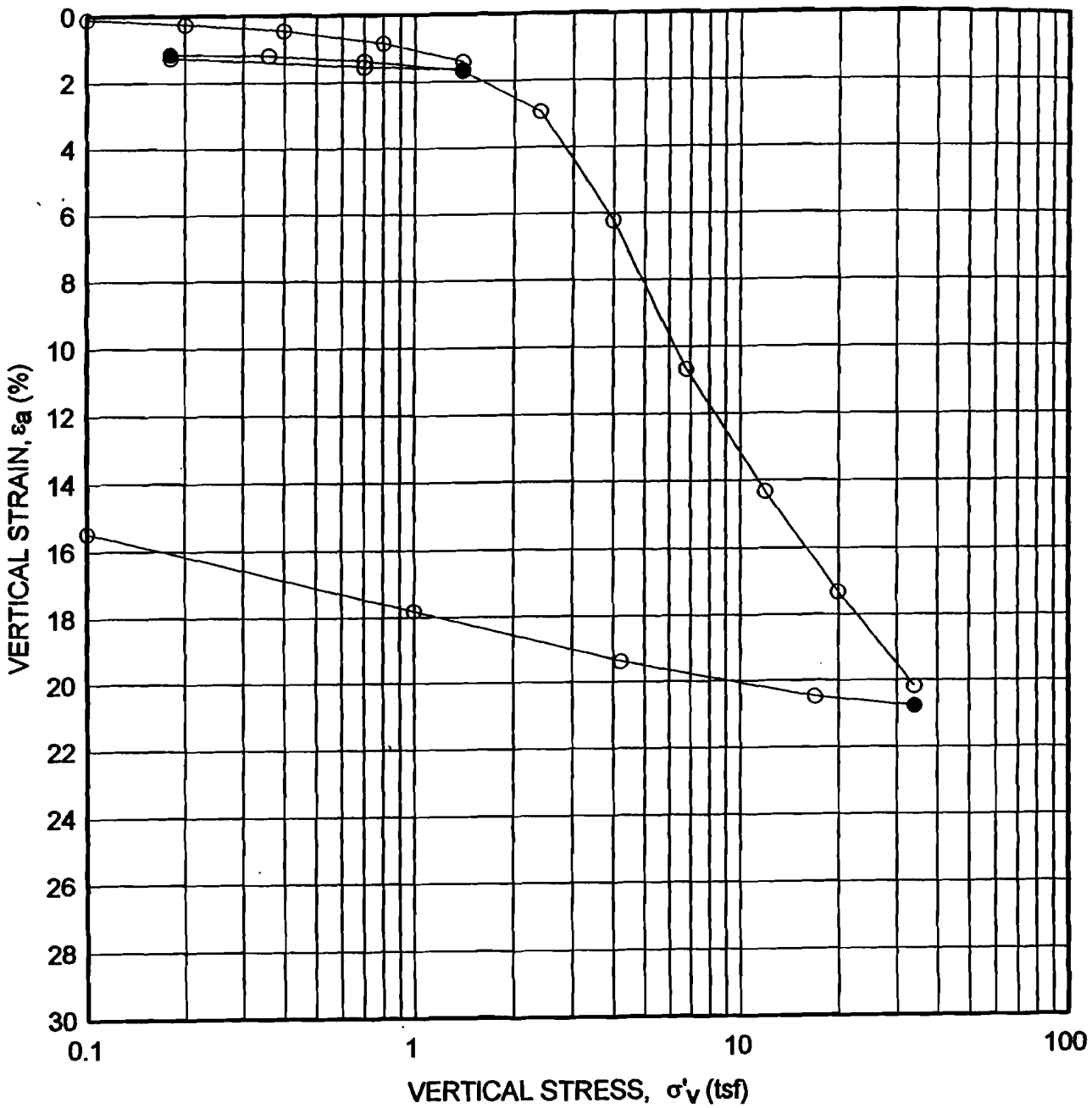
HALEY & ALDRICH, INC.

Augusta River Crossing Project
Augusta, Maine

**CONSOLIDATION TEST**

FILE NO. 80765-000

MAY, 2000




Boring No. : B08
Sample No. : U01
Depth (ft) : 11.75

Test No. : OED02

Atterberg Limits (%)

Wl : 35.8
Wp : 19.6
Ip : 16.2

Sample Description : Stiff to medium stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial : | 34.0 | 1.044 |
| Final : | 25.5 | 0.741 |

Preconsolidation Pressure (tsf) : 2.1
Compression Ratio, CR : 0.129
Recompression Ratio, RR : 0.005

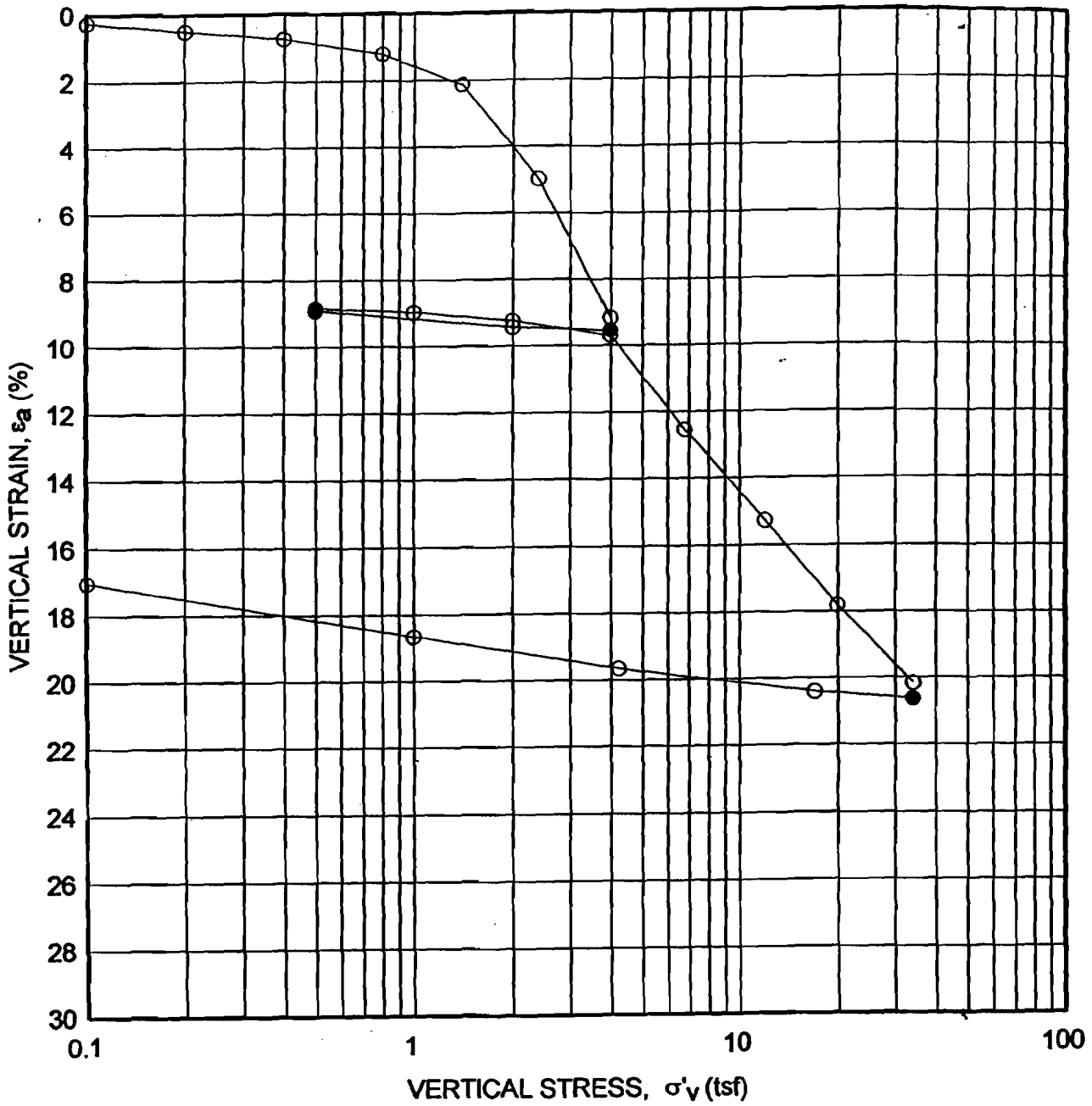
6 July 2000 ; J:\OED\80765000\OED02\0771OD.WB2

HALEY & ALDRICH, INC.

Augusta River Crossing Project
Augusta, Maine

**CONSOLIDATION TEST**

FILE NO. 80765-000 JUNE 2000




Boring No. : B12
Sample No. : U01
Depth (ft) : 21.75

Test No. : OED03

Atterberg Limits (%)

Wl : 40.2
Wp : 19.7
Ip : 20.5

Sample Description : Medium stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial : | 31.3 | 0.909 |
| Final : | 21.7 | 0.606 |

Preconsolidation Pressure (tsf) : 1.4
Compression Ratio, CR : 0.109
Recompression Ratio, RR : 0.009

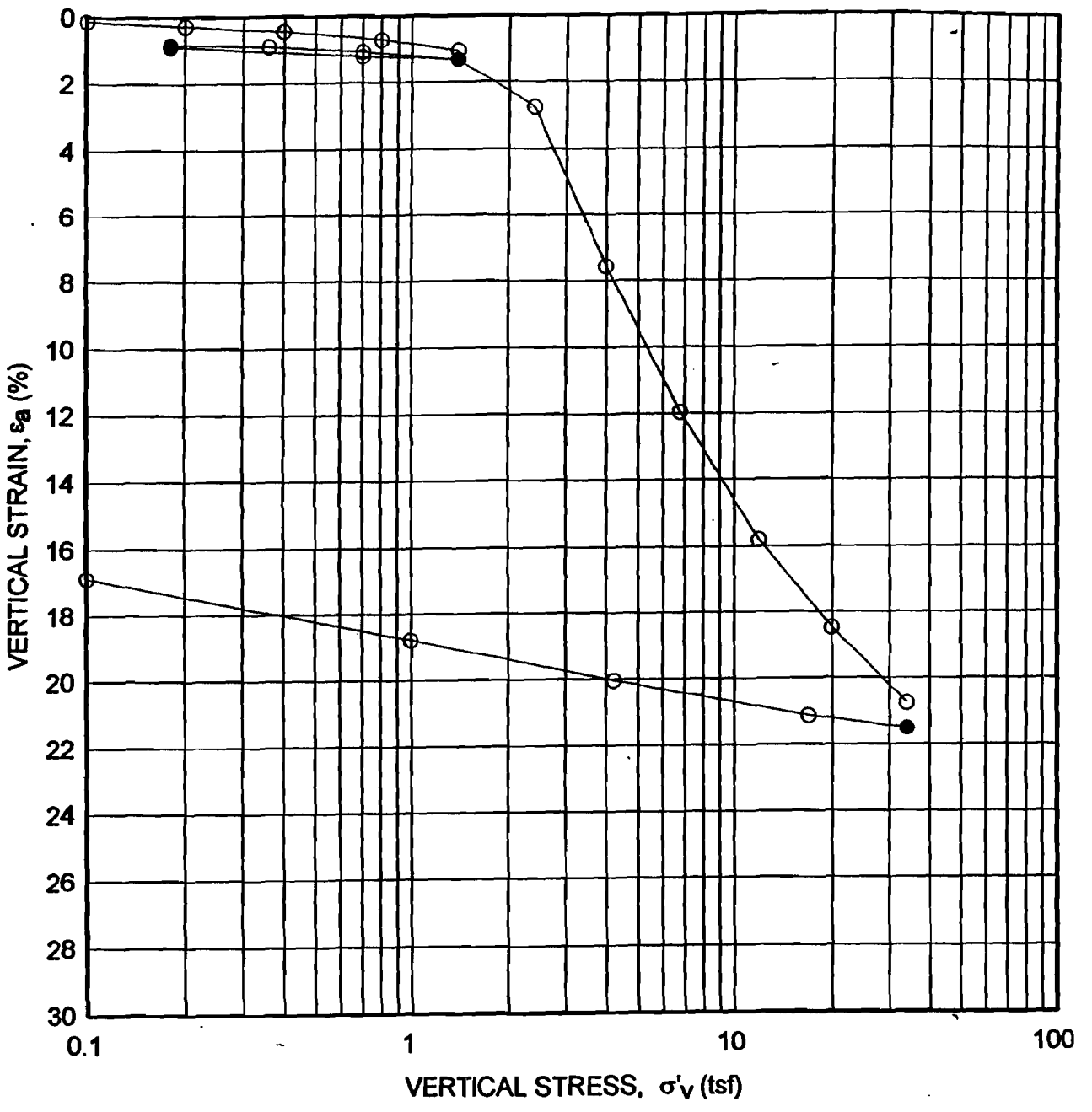
6 July 2000 ; J:\OED\80765000\OED03\0772OD.WB2

HALEY & ALDRICH, INC.

Augusta River Crossing Project
Augusta, Maine

**CONSOLIDATION TEST**

FILE NO. 80765-000 JUNE 2000




Boring No. : B13
Sample No. : U01
Depth (ft) : 21.75

Test No. : OED04

Atterberg Limits (%)

Wl : 33.0
Wp : 19.3
Ip : 13.7

Sample Description : Medium stiff gray silty CLAY

| | Water Content (%) | Void Ratio, e |
|---|---|---|
| Initial : | 32.4 | 0.968 |
| Final : | 22.9 | 0.652 |

Preconsolidation Pressure (tsf) : 2.2
Compression Ratio, CR : 0.109
Recompression Ratio, RR : 0.005

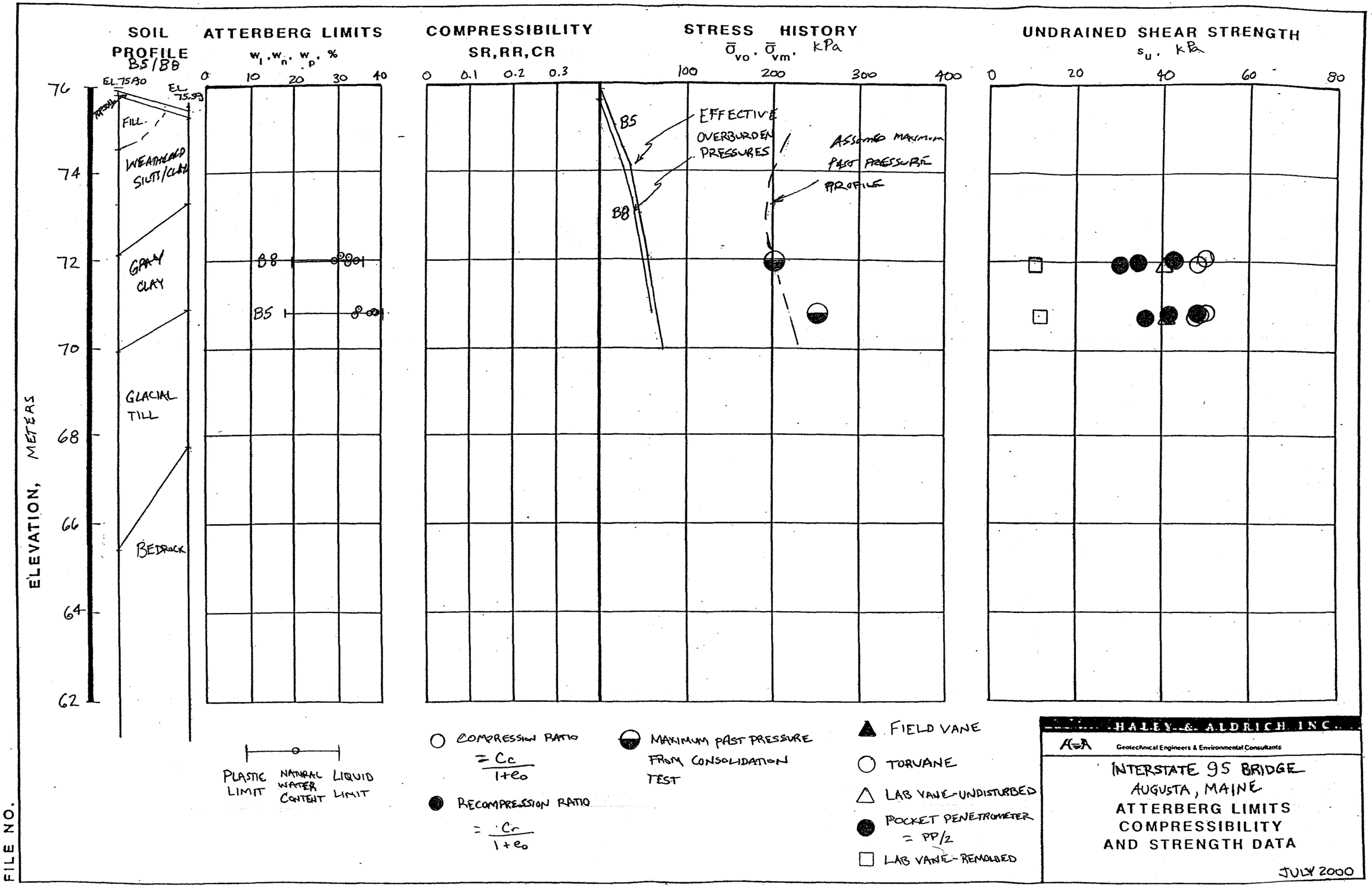
6 July 2000 : J:\OED\80765000\OED04\0773OD.WB2

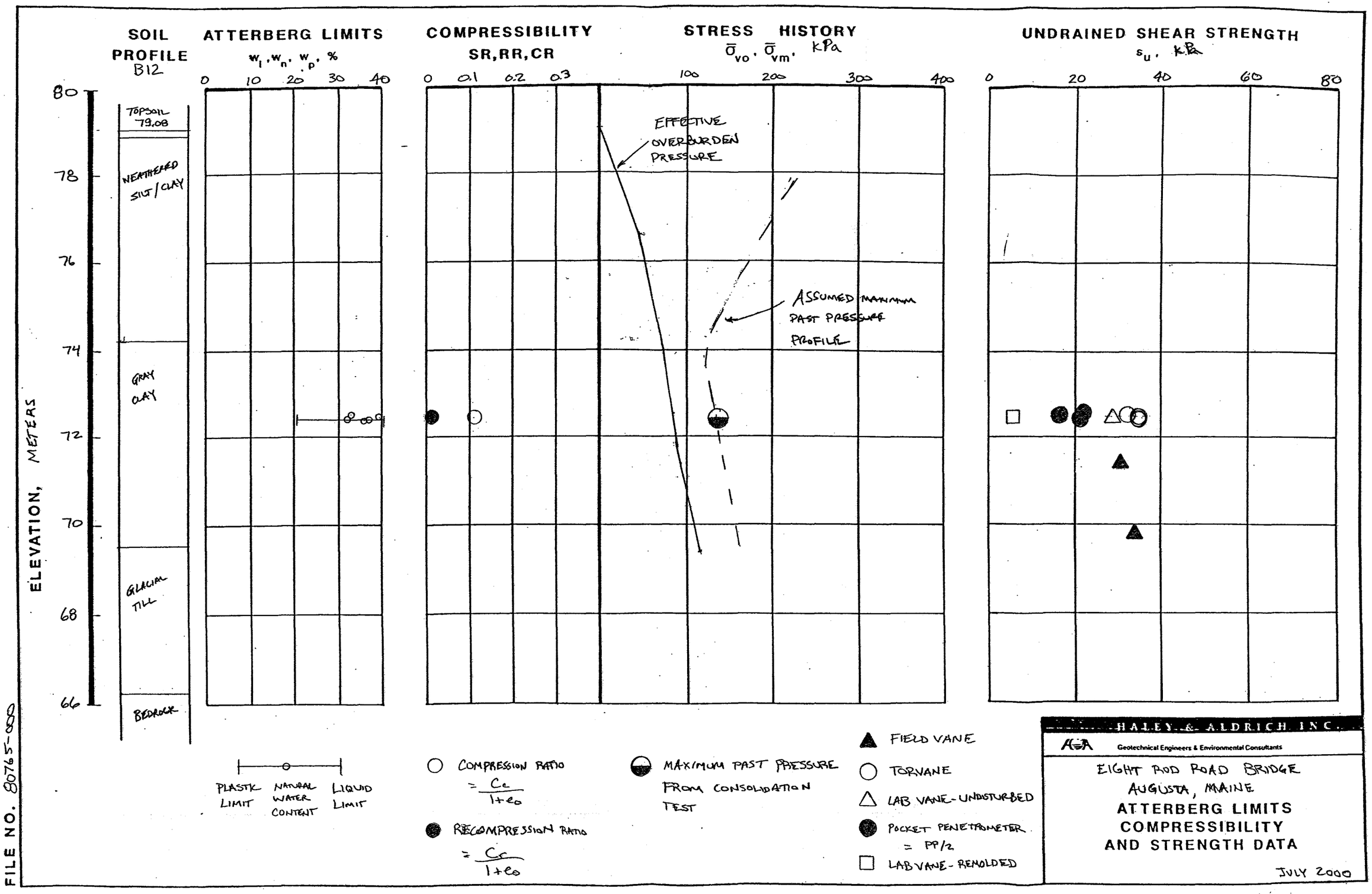
HALEY & ALDRICH, INC.

Augusta River Crossing
Augusta, Maine

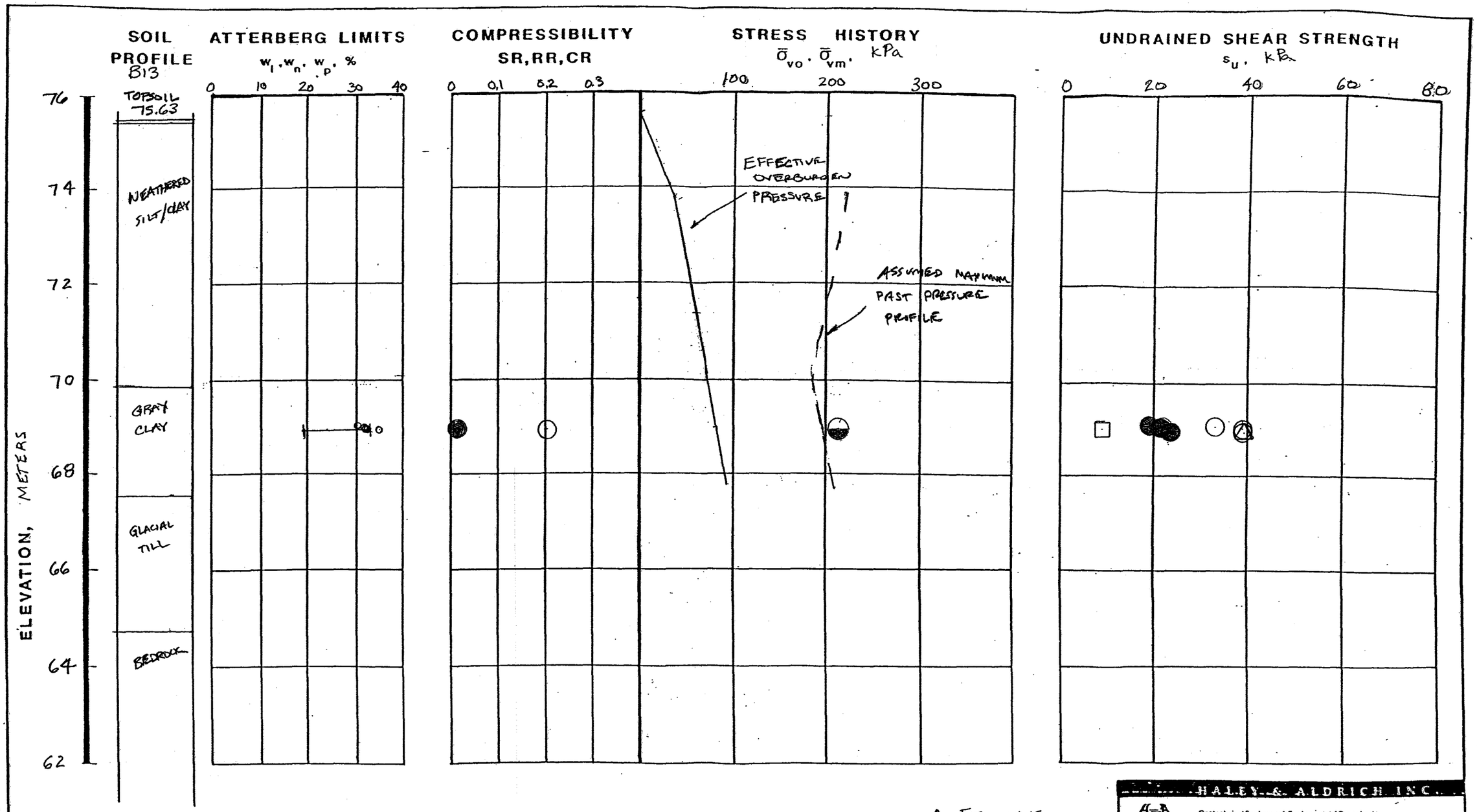
CONSOLIDATION TEST

FILE NO. 80765-000 JUNE 2000


SOIL PROFILE
B5/B8
ATTERBERG LIMITS
$w_l, w_n, w_p$, %
COMPRESSIBILITY
SR, RR, CR
STRESS HISTORY
$\bar{\sigma}_{vo}, \bar{\sigma}_{vm}$, kPa
UNDRAINED SHEAR STRENGTH
$s_u$, kPa
ELEVATION, METERS
EL. 75.80
EL. 75.93
FILL
WEATHERED SILTY CLAY
GRAY CLAY
GLACIAL TILL
BEDROCK
B8
B5
EFFECTIVE OVERBURDEN PRESSURES
ASSUMED MAXIMUM PAST PRESSURE PROFILE
PLASTIC LIMIT
NATURAL WATER CONTENT
LIQUID LIMIT
COMPRESSION RATIO $= \frac{C_c}{1+e_o}$
RECOMPRESSION RATIO $= \frac{C_r}{1+e_o}$
MAXIMUM PAST PRESSURE FROM CONSOLIDATION TEST
FIELD VANE
TORVANE
LAB VANE-UNDISTURBED
POCKET PENETROMETER $= PP/2$
LAB VANE-REMOLDED
HALEY & ALDRICH, INC.
Geotechnical Engineers & Environmental Consultants
INTERSTATE 95 BRIDGE
AUGUSTA, MAINE
ATTERBERG LIMITS
COMPRESSIBILITY
AND STRENGTH DATA
JULY 2000
FILE NO.




FILE NO. 80765-88



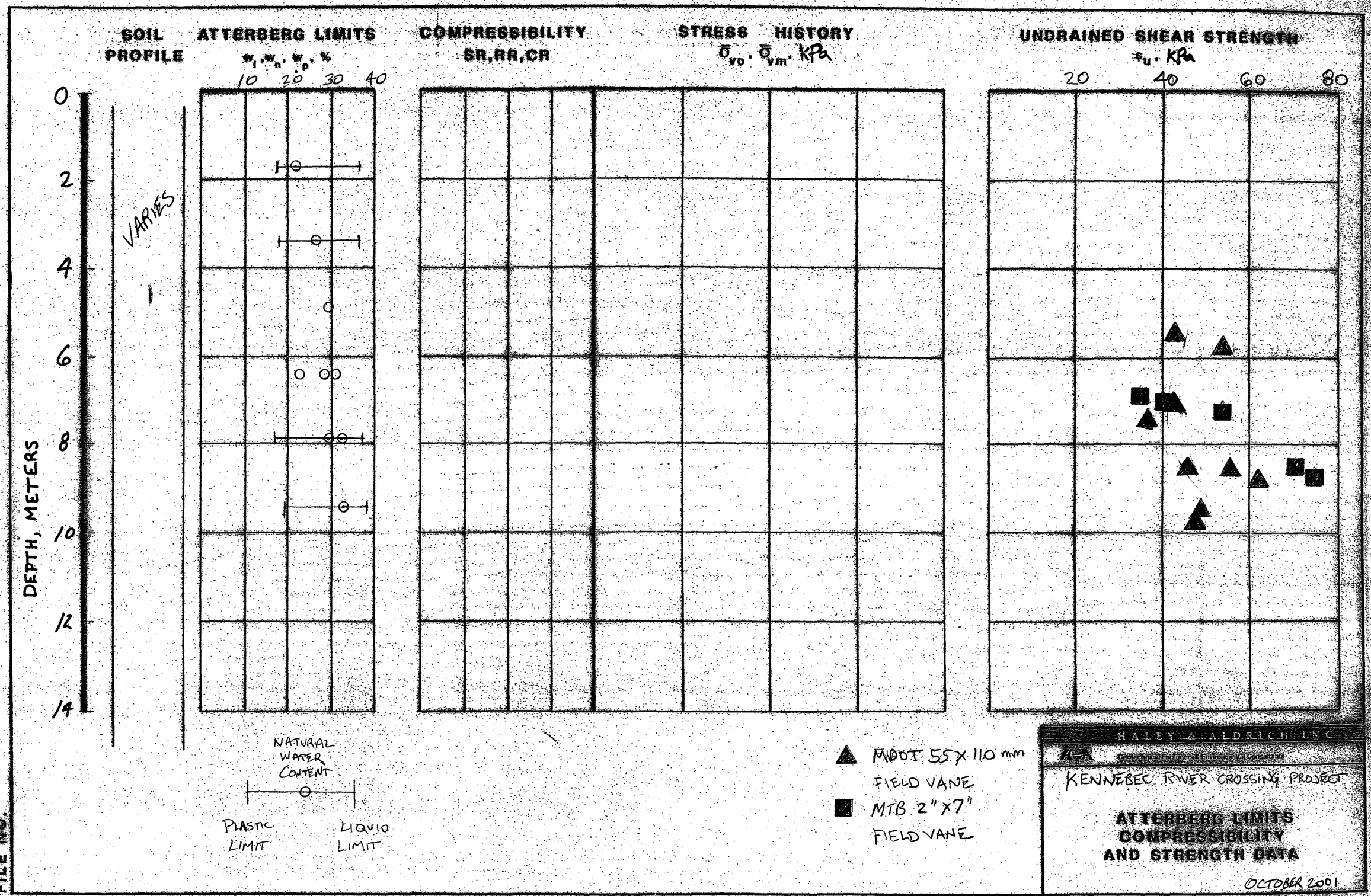

HALEY & ALDRICH, INC.
Geotechnical Engineers & Environmental Consultants

EIGHT ROD ROAD BRIDGE
AUGUSTA, MAINE

**ATTERBERG LIMITS COMPRESSIBILITY AND STRENGTH DATA**

JULY 2000

FILE NO. 80765-000


SOIL PROFILE
ATTERBERG LIMITS
$w_l, w_n, w_p$, %
10 20 30 40
COMPRESSIBILITY
SR, RR, CR
STRESS HISTORY
$\bar{\sigma}_{vo}, \bar{\sigma}_{vm}$, kPa
UNDRAINED SHEAR STRENGTH
$s_u$, kPa
20 40 60 80
0 2 4 6 8 10 12 14
DEPTH, METERS
VARIES
NATURAL WATER CONTENT
PLASTIC LIMIT
LIQUID LIMIT
MDOT 55 x 110 mm FIELD VANE
MTB 2" x 7" FIELD VANE
HALEY & ALDRICH, INC.
Geotechnical Engineers & Environmental Consultants
KENNEBEC RIVER CROSSING PROJECT
ATTERBERG LIMITS
COMPRESSIBILITY
AND STRENGTH DATA
OCTOBER 2001
FILE NO.

HALEY & ALDRICH, INC.
GEOTECHNICAL LABORATORY

# WATER CONTENT DATA SHEET

F lo: 1-001
DATE: 9/20/2001

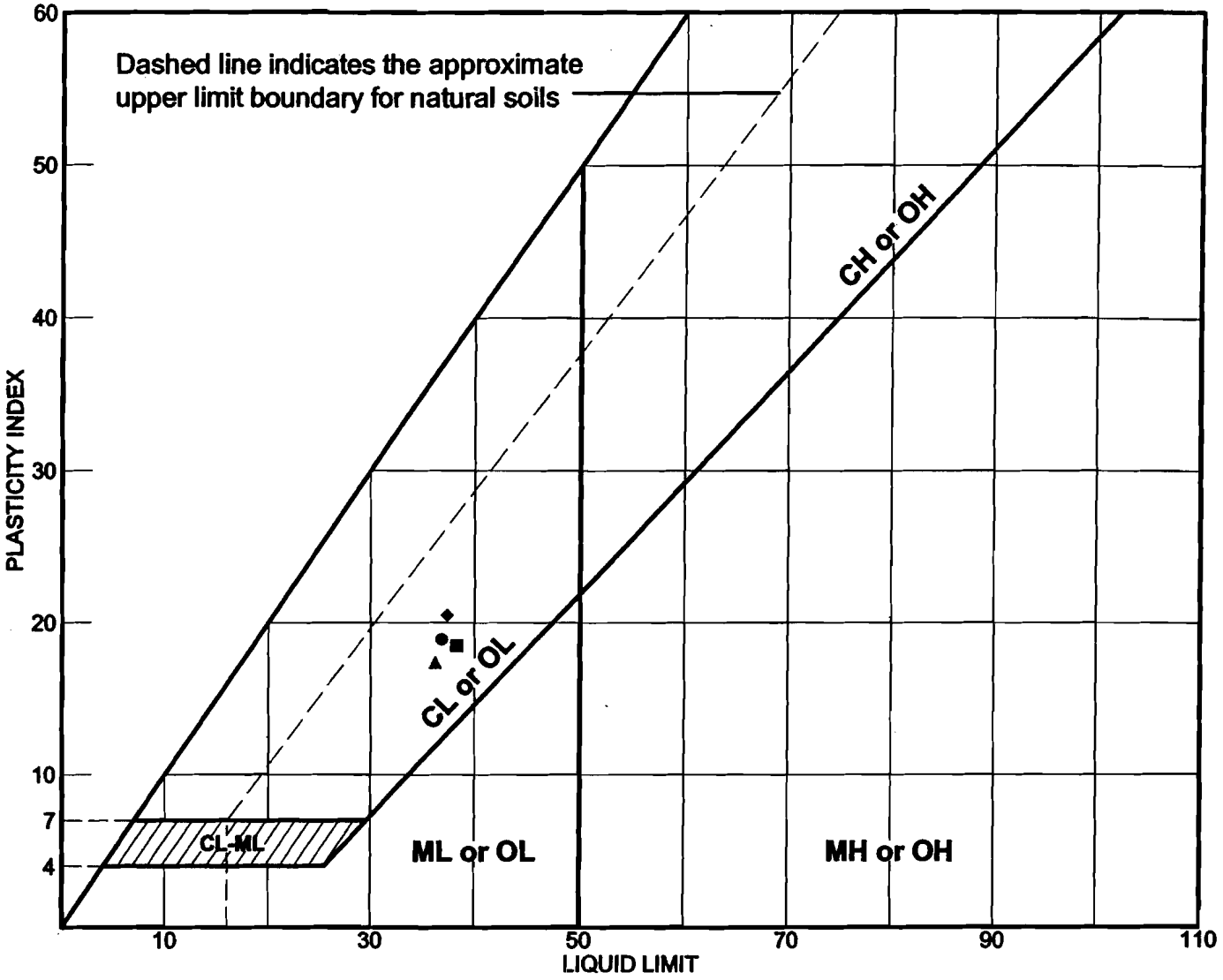
PROJECT: Kennebec River Crossing Project - Contract 1
Augusta, Maine

| | WATER CONTENT No. 1 | WATER CONTENT No. 2 | WATER CONTENT No. 3 | WATER CONTENT No. 4 | WATER CONTENT No. 5 |
|---|---|---|---|---|---|
| EXPL. No: | C1-21-01 | C1-41-01 | C1-57-01 | C1-60-01 | C-76-01 |
| SAMPLE No: | S06 | S04 | S05 | S06 | S05 |
| DEPTH (m) | 7.6-8.2 | 4.6-5.2 | 6.1-6.7 | 6.1-6.7 | 6.1-6.7 |
| DESCRIPTION: | | | | | |
| OVEN TEMPERATURE (110 OR 65 degrees C) | 110 | 110 | 110 | 110 | 110 |
| CONTAINER No: | J-8 | J-10 | J-48 | J-68 | J-69 |
| WT. CONT. + WET SOIL (g) | 143.9400 | 177.8400 | 153.2600 | 135.0400 | 196.6800 |
| WT. CONT. + DRY SOIL (g) | 121.1200 | 149.2200 | 130.6300 | 114.9300 | 169.6700 |
| WT. CONTAINER (g) | 50.8400 | 51.4600 | 50.1900 | 49.4700 | 49.6000 |
| WATER CONTENT (%) | **32.47%** | **29.28%** | **28.13%** | **30.72%** | **22.50%** |

| | WATER CONTENT No. 6 | WATER CONTENT No. 7 | WATER CONTENT No. 8 | WATER CONTENT No. 9 | WATER CONTENT No.10 |
|---|---|---|---|---|---|
| EXPL. No: | | | | | |
| SAMPLE No: | | | | | |
| DEPTH (ft) | | | | | |
| DESCRIPTION: | | | | | |
| OVEN TEMPERATURE (110 OR 65 degrees C) | | | | | |
| CONTAINER No: | | | | | |
| WT. CONT. + WET SOIL (g) | | | | | |
| WT. CONT. + DRY SOIL (g) | | | | | |
| WT. CONTAINER (g) | | | | | |
| WATER CONTENT (%) | | | | | |

| | WATER CONTENT No.11 | WATER CONTENT No.12 | WATER CONTENT No.13 | WATER CONTENT No.14 | WATER CONTENT No.15 |
|---|---|---|---|---|---|
| EXPL. No: | | | | | |
| SAMPLE No: | | | | | |
| DEPTH (ft) | | | | | |
| DESCRIPTION: | | | | | |
| OVEN TEMPERATURE (110 OR 65 degrees C) | | | | | |
| CONTAINER No: | | | | | |
| WT. CONT. + WET SOIL (g) | | | | | |
| WT. CONT. + DRY SOIL (g) | | | | | |
| WT. CONTAINER (g) | | | | | |
| WATER CONTENT (%) | | | | | |

# LIQUID AND PLASTIC LIMITS TEST REPORT

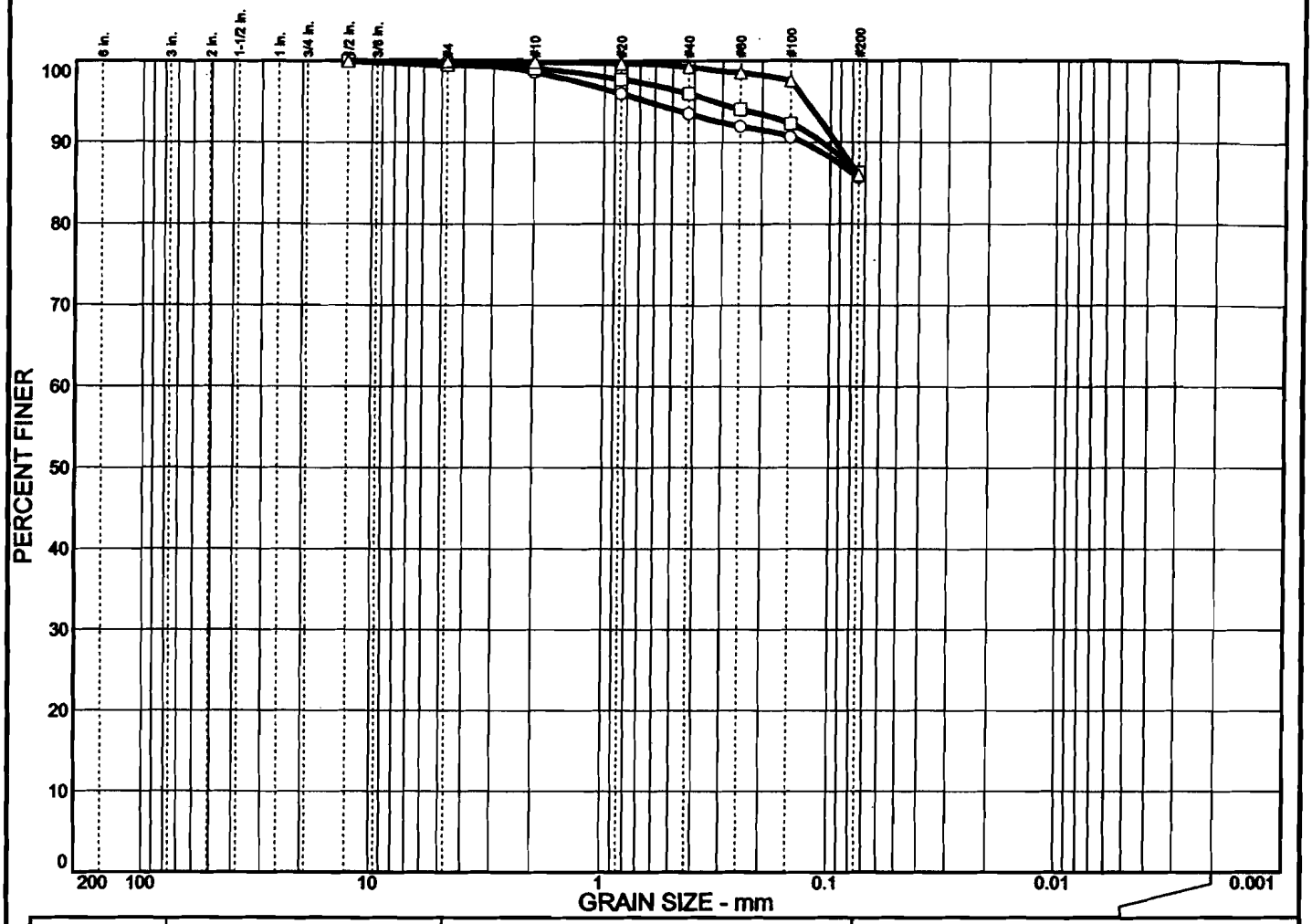



**SOIL DATA**

| SYMBOL | SOURCE | SAMPLE NO. | DEPTH (ft.) | NATURAL WATER CONTENT (%) | PLASTIC LIMIT (%) | LIQUID LIMIT (%) | PLASTICITY INDEX (%) | USCS |
|---|---|---|---|---|---|---|---|---|
| ● | C1-13-01 | S02 | 1.5-1.9m | 22.2 | 18.0 | 36.9 | 18.9 | CL |
| ■ | C1-25-01 | S07 | 9.2-9.8m | 32.3 | 19.8 | 38.3 | 18.5 | CL |
| ▲ | C1-27-01 | S03 | 3.1-3.7m | 26.4 | 18.9 | 36.3 | 17.4 | CL |
| ◆ | C1-27-01 | S06 | 7.6-8.2m | 29.4 | 16.9 | 37.4 | 20.5 | CL |

| | |
|---|---|
| LIQUID AND PLASTIC LIMITS TEST REPORT<br>**HALEY AND ALDRICH, INC.** | **Client:** Maine Department of Transporation<br>**Project:** Kennebec River Crossing Project - Contract 1<br>Augusta, Maine<br>**Project No.:** 80765-001 |

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 0.1 | 1.3 | 5.1 | 7.8 | 85.7 | |
| □ | 0.0 | 0.0 | 0.5 | 0.4 | 3.1 | 9.7 | 86.3 | |
| △ | 0.0 | 0.0 | 0.1 | 0.1 | 0.6 | 13.2 | 86.0 | |

| X | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | | | | | | | | |
| □ | | | | | | | | | | |
| △ | | | | | | | | | | |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silt | ML | |
| □ Light brown Silt | ML | |
| △ Olive brown Silt | ML | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-09-01 **Sample No.:** S01 **Elev./Depth:** 0.0-0.6

□ **Source:** C1-76-01 **Sample No.:** S01 **Elev./Depth:** 0.0-0.6

△ **Source:** C1-36-01 **Sample No.:** S02 **Elev./Depth:** 1.5-2.1

**Remarks:**

○ Marine Silt

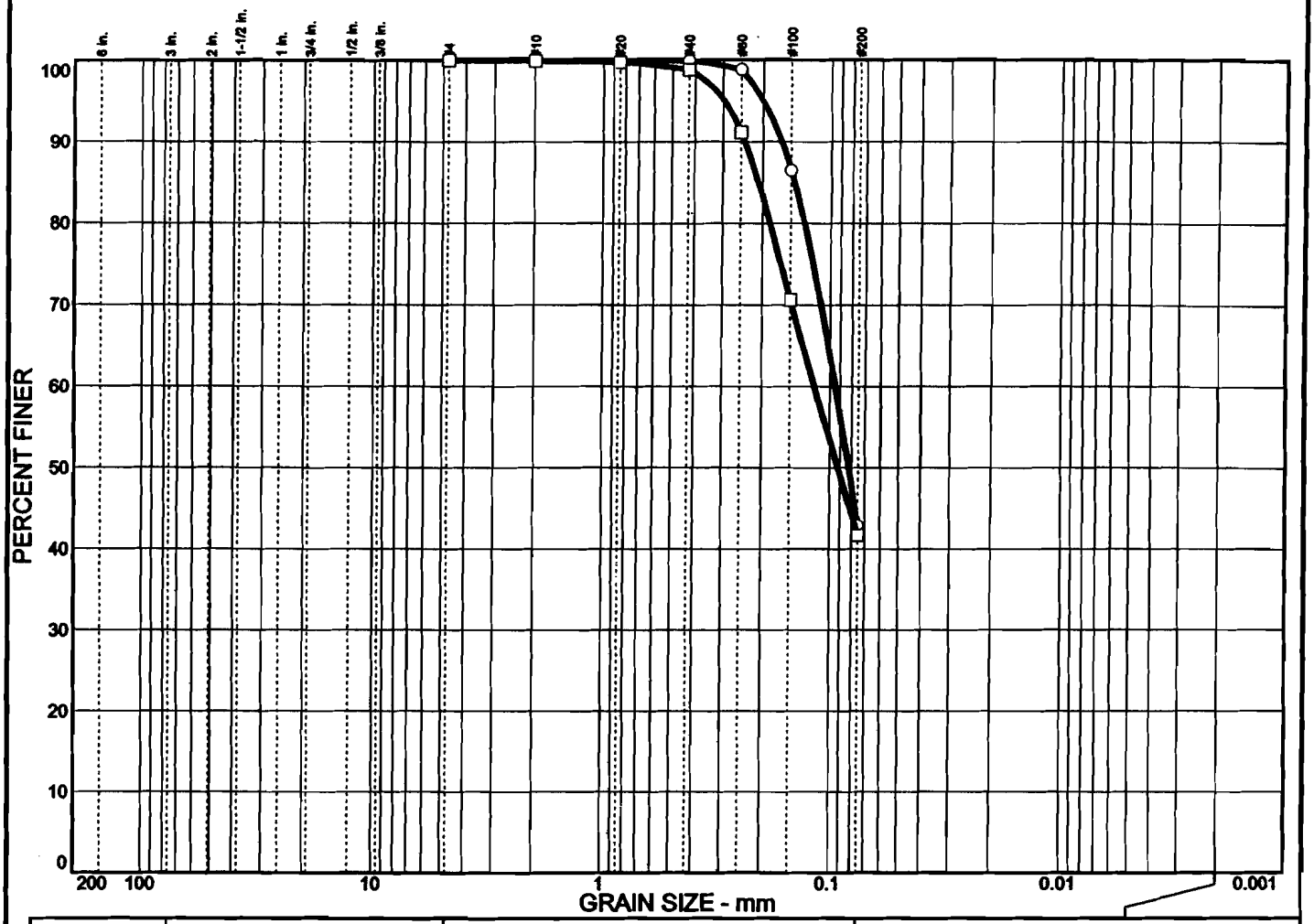
□ Marine Silt

△ Marine Silt

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 57.0 | 42.9 | |
| □ | 0.0 | 0.0 | 0.0 | 0.1 | 1.1 | 57.1 | 41.7 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 0.145 | 0.0949 | 0.0826 | | | | | |
| □ | | | 0.209 | 0.117 | 0.0921 | | | | | |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silty sand | SM | |
| □ Brown Silty sand | SM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-75-01 **Sample No.:** S03 **Elev./Depth:** 3.1-3.7

□ **Source:** C1-79-01 **Sample No.:** S03 **Elev./Depth:** 3.1-3.7

**Remarks:**

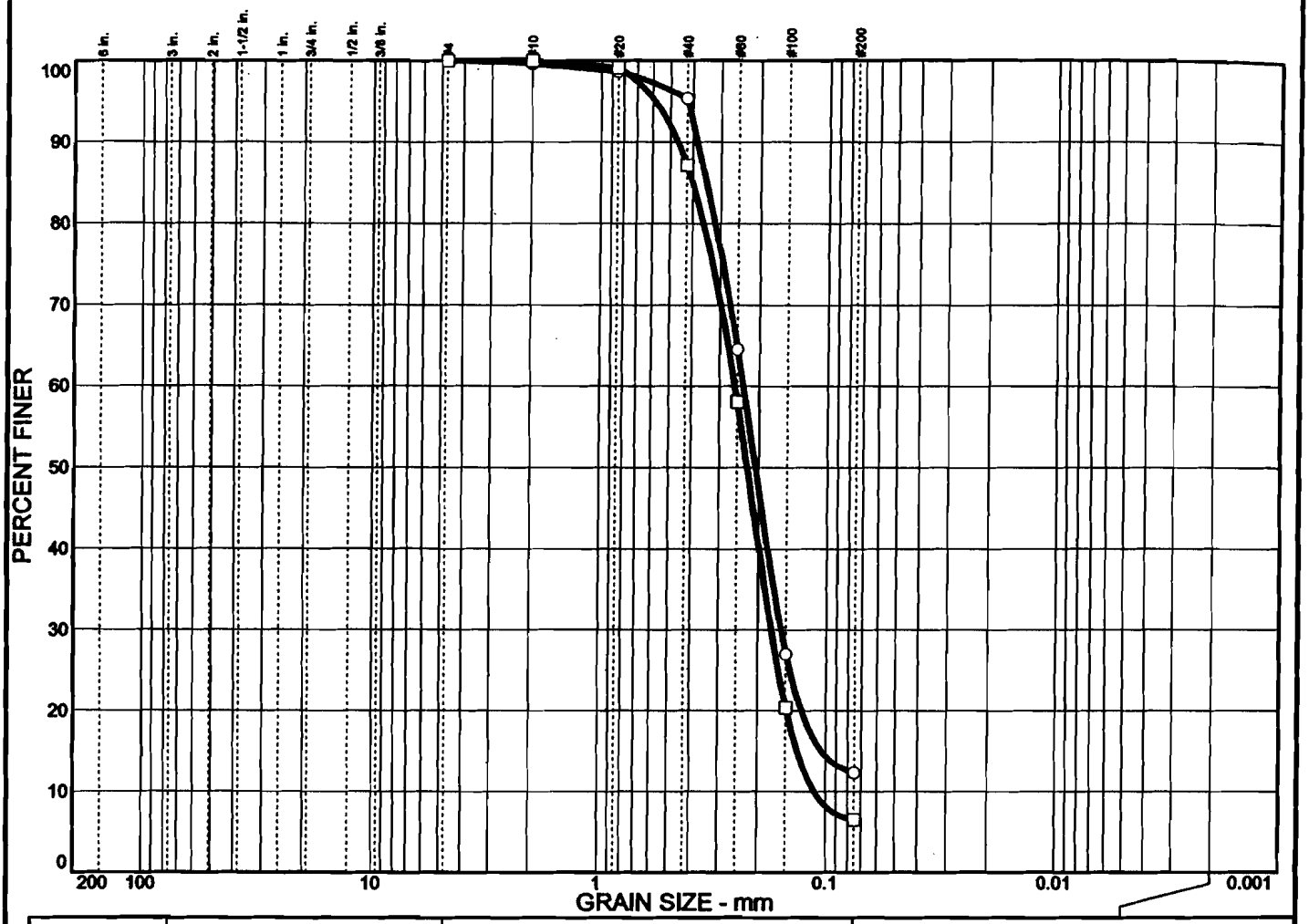
○ Marine Sand

□ Marine Sand

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 0.0 | 0.4 | 4.3 | 83.0 | 12.3 | |
| □ | 0.0 | 0.0 | 0.0 | 0.0 | 12.8 | 80.7 | 6.5 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 0.348 | 0.235 | 0.207 | 0.158 | 0.104 | | | |
| □ | | | 0.401 | 0.257 | 0.225 | 0.174 | 0.134 | 0.112 | 1.05 | 2.29 |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silty sand | SM | |
| □ Brown Poorly graded sand with silt | SP-SM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-61-01 **Sample No.:** S02 **Elev./Depth:** 1.5-2.1

□ **Source:** C1-22-01 **Sample No.:** S07 **Elev./Depth:** 9.2-9.8

**Remarks:**

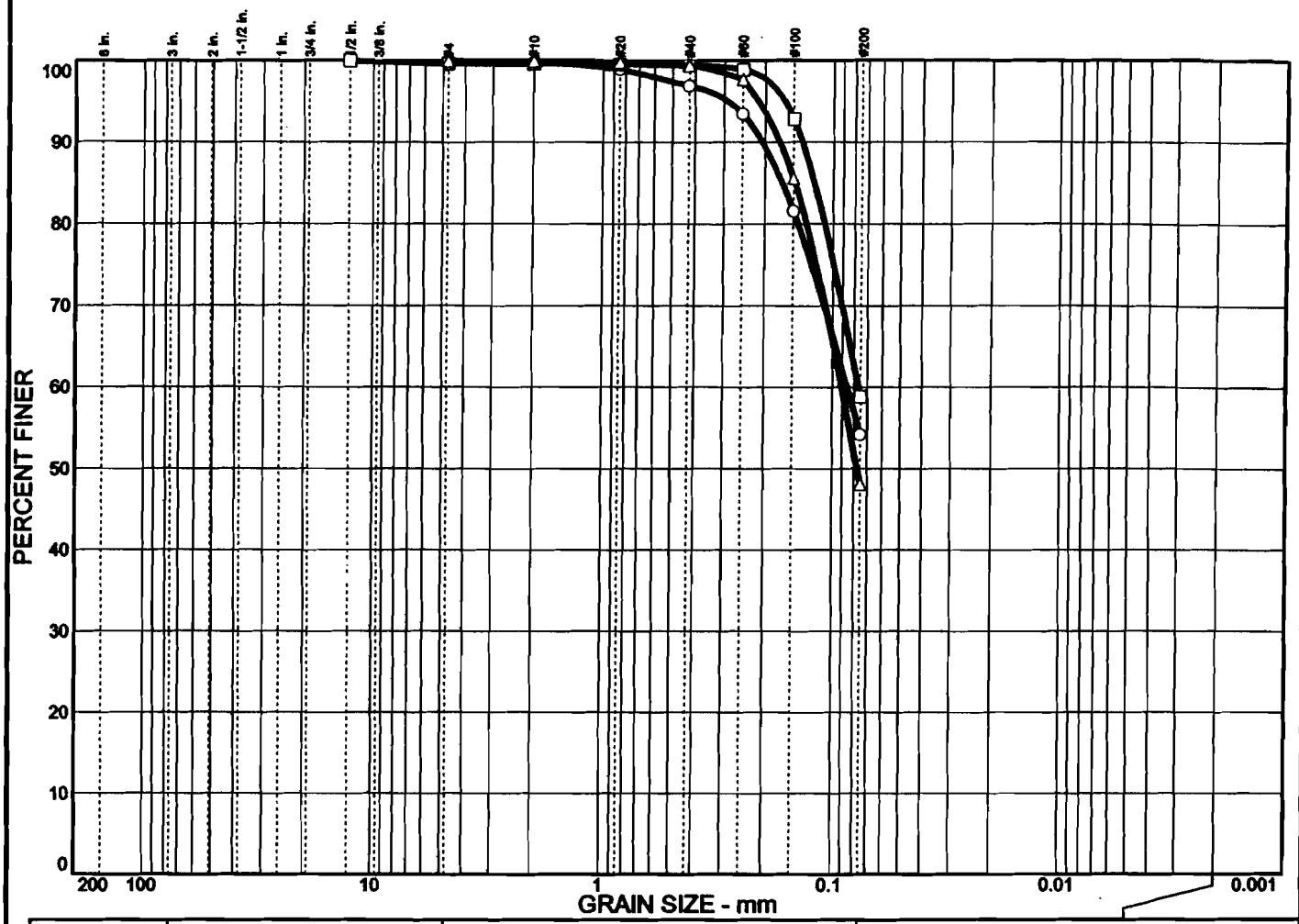
○ Marine Sand

□ Marine Sand

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 0.0 | 0.2 | 2.9 | 42.7 | 54.2 | |
| □ | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | 40.6 | 58.9 | |
| △ | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 51.4 | 48.1 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 0.168 | 0.0858 | | | | | | |
| □ | | | 0.121 | 0.0765 | | | | | | |
| △ | | | 0.148 | 0.0909 | 0.0773 | | | | | |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Sandy silt | ML | |
| □ Brown Sandy silt | ML | |
| △ Brown Silty sand | SM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-13-01 **Sample No.:** S02A **Elev./Depth:** 1.9-2.1

□ **Source:** C1-66-01 **Sample No.:** S03 **Elev./Depth:** 3.1-3.7

△ **Source:** C1-59-01 **Sample No.:** S03 **Elev./Depth:** 3.1-3.7

**Remarks:**

○ Marine Sand

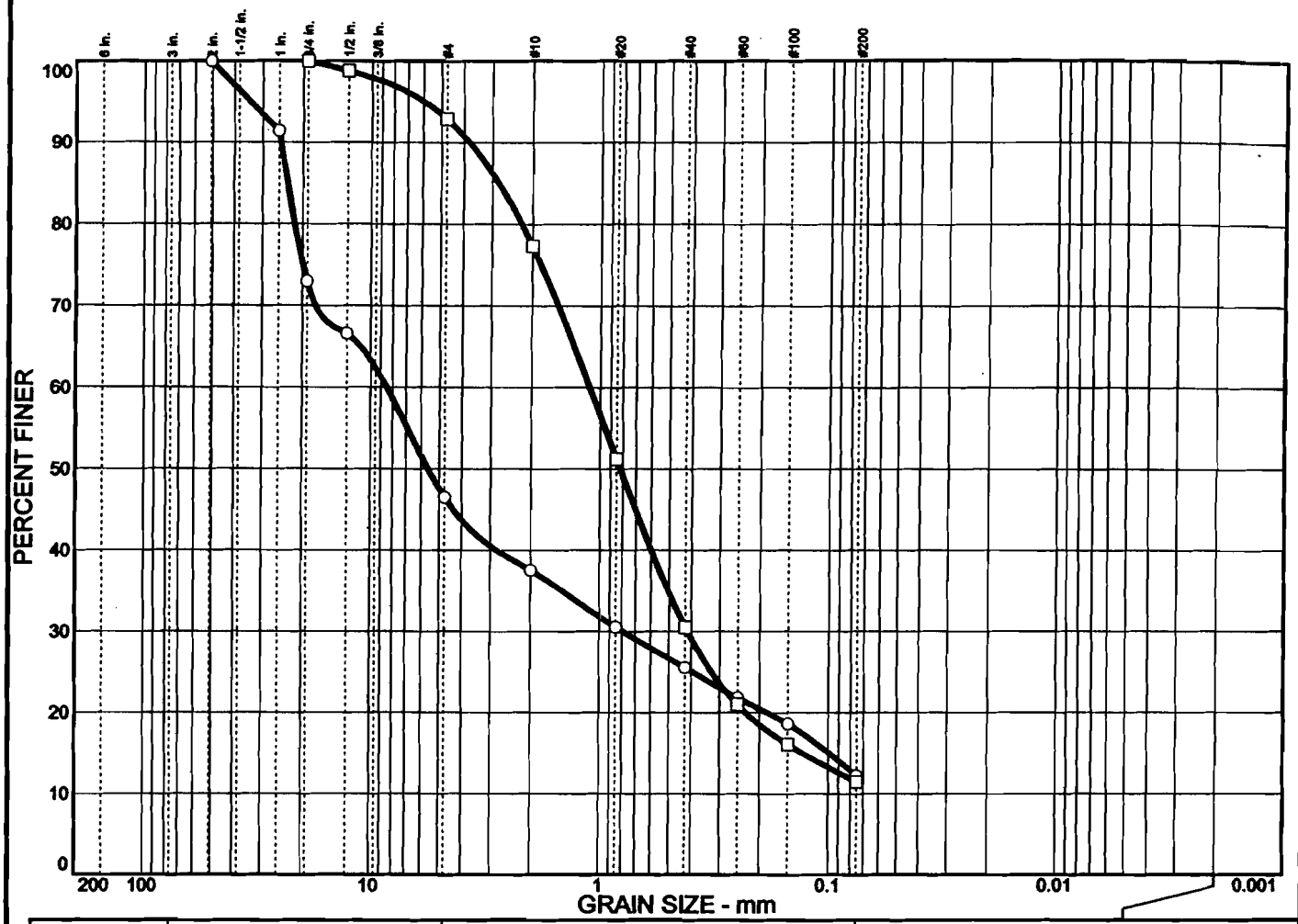
□ Marine Sand

△ Marine Sand

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 27.0 | 26.5 | 9.0 | 12.0 | 13.3 | 12.2 | |
| □ | 0.0 | 0.0 | 7.1 | 15.6 | 46.8 | 19.1 | 11.4 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 23.3 | 8.50 | 5.60 | 0.793 | 0.0989 | | | |
| □ | | | 2.83 | 1.11 | 0.819 | 0.416 | 0.129 | | | |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silty gravel with sand | GM | |
| □ Brown Poorly graded sand with silt | SP-SM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-12-01 **Sample No.:** S01/02 **Elev./Depth:** 0.0-2.1

□ **Source:** C1-10-01 **Sample No.:** S03 **Elev./Depth:** 3.1-3.7

**Remarks:**

○ Glaciofluvial Deposit

□ Glaciofluvial Deposit

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION

| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 0.0 | 11.1 | 5.6 | 12.8 | 32.0 | 38.5 | |
| □ | 0.0 | 0.0 | 17.6 | 8.6 | 13.9 | 22.4 | 37.5 | |
| △ | 0.0 | 4.8 | 16.9 | 10.5 | 14.3 | 21.4 | 32.1 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 2.51 | 0.215 | 0.137 | | | | | |
| □ | | | 9.18 | 0.434 | 0.150 | | | | | |
| △ | | | 8.32 | 0.872 | 0.300 | | | | | |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silty sand | SM | |
| □ Brown Silty sand with gravel | SM | |
| △ Olive brown Silty sand with gravel | SM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-08-01 **Sample No.:** S02 **Elev./Depth:** 1.7-2.3

□ **Source:** C1-42-01 **Sample No.:** S02 **Elev./Depth:** 1.5-1.9

△ **Source:** C1-73-01 **Sample No.:** S04 **Elev./Depth:** 4.6-5.2

**Remarks:**

○ Glacial Till

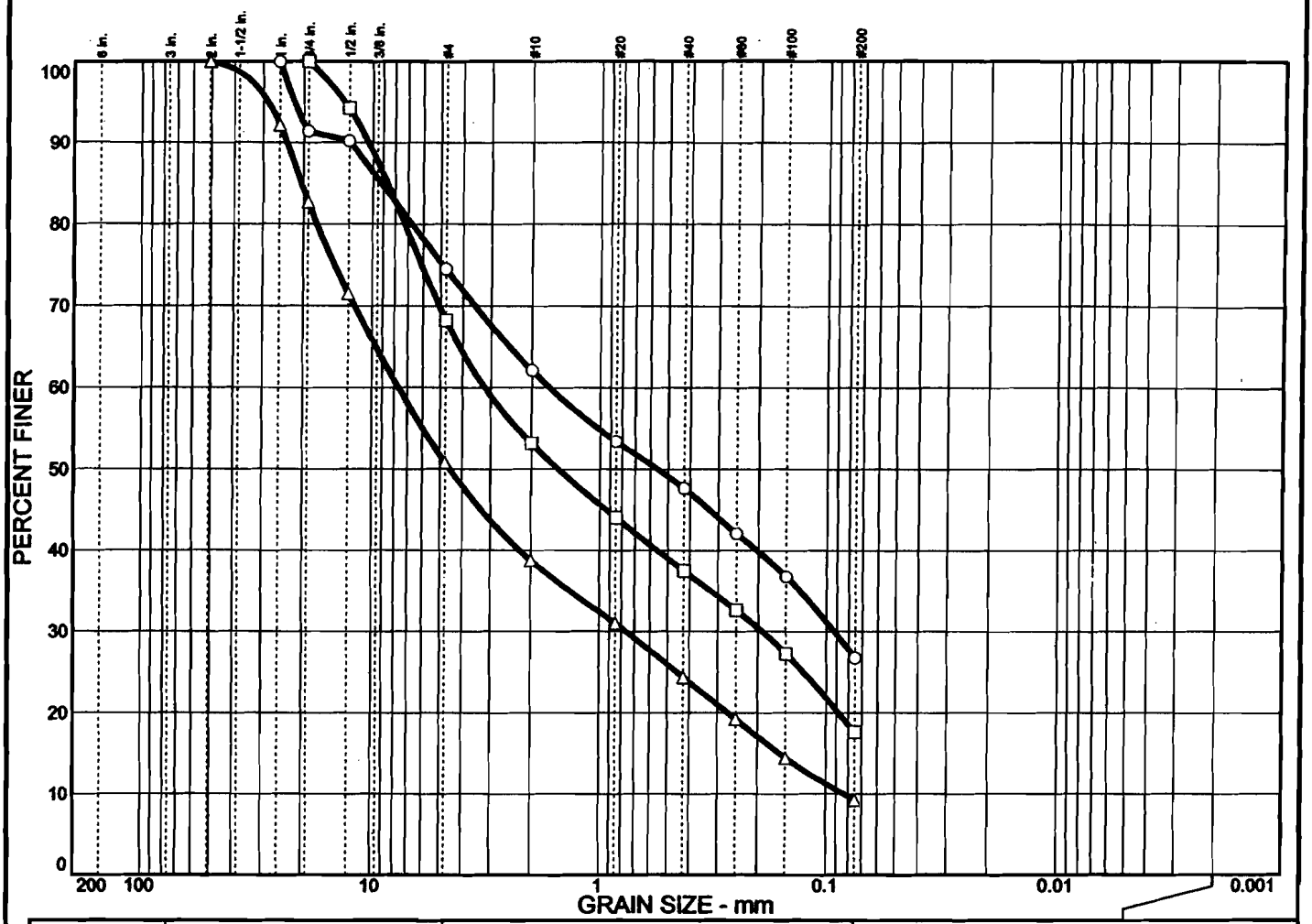
□ Glacial Till

△ Glacial Till

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**

# GRAIN SIZE DISTRIBUTION




| | % + 3" | % GRAVEL | | % SAND | | | % FINES | |
|---|---|---|---|---|---|---|---|---|
| | | CRS. | FINE | CRS. | MEDIUM | FINE | SILT | CLAY |
| ○ | 0.0 | 8.6 | 16.9 | 12.4 | 14.5 | 20.9 | 26.7 | |
| □ | 0.0 | 0.0 | 31.7 | 15.1 | 15.7 | 19.9 | 17.6 | |
| △ | 0.0 | 17.3 | 31.9 | 12.0 | 14.4 | 15.1 | 9.3 | |

| | LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| ○ | | | 9.20 | 1.67 | 0.557 | 0.0925 | | | | |
| □ | | | 8.64 | 3.19 | 1.52 | 0.192 | | | | |
| △ | | | 20.4 | 7.65 | 4.53 | 0.762 | 0.160 | 0.0834 | 0.91 | 91.68 |

| MATERIAL DESCRIPTION | USCS | AASHTO |
|---|---|---|
| ○ Brown Silty sand with gravel | SM | |
| □ Brown Silty sand with gravel | SM | |
| △ Brown Poorly graded gravel with silt and sand | GP-GM | |

**Project No.** 80765-001 **Client:** Maine Department of Transporation

**Project:** Kennebec River Crossing Project - Contract 1

Augusta, Maine

○ **Source:** C1-72-01 **Sample No.:** S07 **Elev./Depth:** 9.2-9.4

□ **Source:** C1-17-01 **Sample No.:** S04/05 **Elev./Depth:** 4.6-6.3

△ **Source:** C1-18-01 **Sample No.:** S07 **Elev./Depth:** 9.2-9.8

**Remarks:**

○ Glacial Till

□ Glacial Till

△ Glacial Till

GRAIN SIZE DISTRIBUTION

**HALEY AND ALDRICH, INC.**