FAIRLEE
IM 091-2(91)

VTRANS

Fairlee,
Vermont

GEOTECHNICAL DATA REPORT

May 2024

PREPARED FOR

VTRANS
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Barre, VT 05641

PREPARED BY

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HNTB

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APPENDIX

1.0 PROJECT DESCRIPTION AND SCOPE

HNTB Corporation (HNTB) has prepared this Geotechnical Data Report for the Fairlee IM 091-2(91) subsurface investigation, as requested by the Vermont Agency of Transportation (VTrans). The project is located approximately 0.6 miles south of Exit 15 along Interstate 91 (I-91), over the Lake Morey outlet in Fairlee, VT.

The scope of the project is to replace the double barrel corrugated metal pipes (Bridge 55-2 and 55-3) with a new precast concrete box or frame (dependent on subsurface conditions). Each existing culvert is approximately 300 feet in long and extends beneath I-91, linking Lake Morey to the Connecticut River. Bearing pressures are required to design the wingwalls, as well as the footings if a frame is deemed necessary. The borings are intended to support this effort and provide relevant subsurface information for the designer. In order to assess the existing subsurface conditions which include bedrock elevation and quality and groundwater conditions at the site, 7 borings were proposed with their locations adjacent to embankments and within the median swale of I-91. Among them, Borings B-101, B-103, B-104, B-105, and B-107 are intended to help develop design parameters for a temporary retaining wall. These borings were drilled deeper than the proposed depths to facilitate potential sheeting, soldier piles, or other braced excavation support solutions. A project location map is included in **Figure 1**.

This report includes the results of the geotechnical investigation and associated laboratory testing to evaluate the subsurface conditions and to facilitate the selection of structure type, foundation options, soil parameters and informing decisions on support of excavation and construction methods.

In completing the study, HNTB has performed the following scope of services:

- Reviewed available existing geotechnical data for the project site.
- Developed, implemented, and supervised a subsurface exploration program consisting of 7 borings.
- Completed a laboratory testing program to aid in the classification of soil and rock collected.
- Developed this Geotechnical Data Report.

2.0 SURFICIAL AND BEDROCK GEOLOGY

The project site is situated within the Connecticut Valley Trough, characterized by Glaciolacustrine deposits. These surficial deposits are predominantly comprised of well-sorted sand, commonly referred to as lake sand, devoid of pebbles or boulders. Underlying the surficial deposits lies bedrock composed of Fairlee quartz monzonite (Of) and lustrous dark gray slate (Dm), with numerous thin white quartzite beds distributed throughout the formation. Detailed descriptions of the surficial and bedrock geology are included in **Figure 2** and **Figure 3**, respectively.

3.0 SUBSURFACE EXPLORATIONS

3.1 GENERAL

The subsurface investigation program was conducted by New England Boring Contractors (NEBC) of Derry, New Hampshire between March 4, 2024, and April 17, 2024. An HNTB representative was present full time during the investigation to direct the associated work and log the depth of boring, penetration resistance, subsurface condition, classify subsurface material and indicate groundwater depth. Upon completion of the subsurface investigation, soil samples were delivered to GeoTesting Express in Acton, MA for further evaluation to help refine/amend the field boring logs.

3.2 SOIL BORINGS

The boring program consisted of 7 borings, designated as B-101 through B-107, located within the Fairlee project limits. An as-drilled boring location plan is included in **Appendix I.** The borings were sampled continuously to twelve feet and then every five feet thereafter. Soil samples were retrieved by driving a 24-inch split-spoon sampler (2-inch O.D., 1⅜ inch I.D.) using a 140-lb hammer free falling 30 inches, in accordance with procedures specified in VTrans MREI 11-01 and AASHTO T206, Standard Method of Test for Penetration Test and Split-Barrel Sampling of Soils.

All borings were advanced using a combination of drive/wash, and rotary drilling techniques with a tricone drill bit and water continuously introduced into the borehole. A sediment tank was used during drilling to prevent fluids and cuttings from flowing onto the surrounding areas.

The borings were advanced from the existing surface to depths ranging from 8 feet to 96 feet below existing grade. Borings B-101 and B-106 were advanced using a Versadrill GT-8 truck mounted drill rig with an automatic hammer. The location of borings B-101 and B-106 were offset from their originally staked locations due to the limited mobility the truck mounted drill rig had in soft soil conditions. This deviation resulted in the boreholes being offset closer to the pavement, which were later deemed too unsafe to perform due to the proximity of the roadway, so a track-mounted drill rig was mobilized to the site to conduct the borings closer to the designated locations and to ensure a safe work environment was maintained. Borings B-101A, B-102, B-106A, and B-107 were advanced using a GEFLO SS5 track mounted drill rig with an automatic hammer. Borings B-103, B-104, and B-105 were advanced using a Mobile drill 23 track mounted drill rig with an automatic hammer.

Soils were classified in accordance with the Modified Burmister Soil Classification Method, and the AASHTO Soil Classification System as per VTrans MREI 11-01 and 12-01. A digital photo of every sample was taken and used for verification of the field description during the preparation of the final boring logs. Boring logs are included in **Appendix II.**

The SPT automatic hammers utilized were calibrated prior to the start of drilling operations and submitted by NEBC. The results indicate that the hammer transfer efficiency for the Versadrill GT-8 truck rig varies from 80 to 93 percent with an average efficiency of 87 percent. The hammer transfer efficiency for the Mobile drill 23 rig varies from 59.9 to 86.5 percent with an average efficiency of 76 percent. No data was available from NEBC for the GEFCO SS-5 drill rig so an 80 percent hammer transfer

efficiency was assumed. Hammer efficiency data is included in **Appendix III.** The blow counts indicated on the boring logs have not been corrected for energy, borehole diameter, rod length, or overburden pressure. Each sample was photographed, removed from the sampler in the field, and classified.

Horizontal locations of the as-built borings are reported in the Vermont State Plane Grid Coordinate System NAD83. The boring locations were located based on measurements from existing field features. The coordinates and elevations for all borings were estimated by integrating the field measurements, obtained upon the completion of each boring, into the existing CADD template. From this template, the northing and easting coordinates were then estimated. Elevations were approximated by referencing the existing cross sections provided by the designer and interpolating them according to the measured boring locations. **Table 3-1** presents a summary of the subsurface investigation.

Table 3-1: Summary of Subsurface Investigation by HNTB

Boring Number	Northing (ft)	Easting (ft)	Alignment	Station	Offset	Approximate Ground Elev. (ft)	Total Depth (ft)
B-101	509994.1	1729122.2	I-91 SB	4794+25	27.0 LT	435.0	8.0
B-101A	509988.0	1729113.0	I-91 SB	4795+99	26.6 LT	435.0	67.0
B-102	510020.1	1729163.6	I-91 SB	4796+28	27.3 LT	432.0	92.0
B-103	509912.7	1729109.2	I-91 NB	4794+25	38.5 LT	434.0	81.0
B-104	509945.7	1729176.6	I-91 NB	4794+99	31.2 LT	433.0	96.0
B-105	510018.3	1729282.9	I-91 NB	4796+28	37.1 LT	432.0	96.0
B-106	509926.9	1729252.0	I-91 NB	4795+54	24.4 RT	431.0	46.0
B-106A	509929.9	1729257.0	I-91 NB	4795+59	24.5 RT	430.0	82.0
B-107	509953.5	1729312.3	I-91 NB	4796+19	33.5 RT	430.0	82.0

1. Vertical Datum NAVD 88. Horizontal Datum VTSPG NAD83
2. Borings designated with an "A" describes an offset by drilling from a location other than the original drilled point. Station and offset are approximate.

A temporary groundwater monitoring well was set up at boring B-106A. All data from the temporary groundwater monitoring was documented following the guidelines outlined in VTrans MREI 11-01. The groundwater monitoring well readings were consistently at a depth of 26.0 feet below existing ground surface, which corroborates with the other groundwater readings performed during the advancement of the adjacent borings. The well was decommissioned and backfilled with spoils prior to demobilizing from the project site. The groundwater monitoring well log is included in **Appendix IV.**

4.0 GEOTECHNICAL LABORATORY TESTS

Geotechnical laboratory tests were performed on select representative samples to assist with soil classification and to determine strength parameters. **Table 4-1** contains the summary of the assigned laboratory tests.

Table 4-1: Summary of Assigned Laboratory Tests

Test	Number of Tests	Standard
Water Content	9	ASTM D2216
Atterberg Limits	9	ASTM D4318
Grain Size Analysis	1	ASTM D422
Percent Passing No. 200 Sieve	4	ASTM D1140
Triaxial Unconsolidated Undrained Test	4	ASTM D2850
Triaxial Consolidated Undrained Test	3	ASTM D4767

4.1 INDEX PROPERTIES

Testing to determine properties of soils such as moisture content and specific gravity were performed along the project alignment on disturbed soil samples in all soil strata. Other index properties such as mechanical grain size analysis and Atterberg limits were performed along the project alignment. Grain size analysis was performed on granular soils and Atterberg limits were performed on cohesive soils. **Table 4-2** provides a summary of the laboratory index testing.

Table 4-2: Summary of Laboratory Index Testing Results

Boring Number	Sample No.	Depth (ft)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (%)
B-101A	S-11	35-37	-	-	-	-	83.9
B-101A	S-12	40-42	27.0	24	20	4	92.4
B-101A	S-14	50-52	31.8	NP	NP	NP	-
B-102	S-14	50-52	31.5	35	17	18	-
B-102	S-16	59-61	37.4	NP	NP	NP	-
B-103	S-13	50-52	32.0	33	21	12	80.2
B-103	S-15	59-61	40.1	51	25	26	-
B-103	S-17	74-76	32.0	NP	NP	NP	-
B-104	S-16	59-61	34.5	39	23	16	-
B-104	S-19	74-76	34.9	NP	NP	NP	-
B-105	S-8	19-21	-	-	-	-	97.6

Boring Number	Sample No.	Depth (ft)	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Fines Content (%)
B-106A	S-5	60-62	34.3	38	20	18	-
B-107	S-10	30-32	26.6	26	22	4	-
B-107	S-15	55-57	27.0	NP	NP	NP	78.7

1. NP denotes sample was determined to be "Non-Plastic" by the laboratory testing.

4.2 SOIL STRENGTH TESTING

Soil strength testing for Unconsolidated Undrained Triaxial Compression Test (UU) and Consolidation Undrained Triaxial Compression Test (CIU) were performed to determined undrained strength. See **Table 4-3** and **Table 4-4** for a summary of the results for the UU and CIU testing. The laboratory test results are included in **Appendix V**.

Table 4-3: Summary of UU Testing Results

Boring Number	Sample No.	Depth (ft)	Test No.	Confining Stress (psf)	Peak Deviator Stress (psf)	Undrained Shear Strength, Su (psf)
B-102	UD-1	57-59	1	8050	1610	805.2
			2	5350	1025	512.6
B-107	UD-1	62-64	1	8300	2275	1138.0
			2	5500	2044	1022.0

Laboratory measurement of undrained shear strength from unconsolidated undrained (UU) triaxial tests were performed on undisturbed samples in accordance with ASTM D2850.

Table 4-4: Summary of CIU Testing Results

Boring Number	Sample No.	Depth (ft)	Test No.	Vertical Effective Stress (psf)	Cohesion (psf)	Effective Friction Angle (deg)
B-106A	UD-1	62-64	1	3993	973	16.7
			2	4996		
			3	5972		

Laboratory measurement of shear strength from consolidated undrained (CIU) triaxial tests were performed on undisturbed samples in accordance with ASTM D4767 to verify effective stress parameters for the Cohesive stratum.

5.0 REFERENCES

1. AASHTO. *LRFD Bridge Design Specifications.* 2020.
2. Burmister, D.M. *Suggested Methods of Test for Identification of Soils. 1958*
3. VTrans MREI 11-01 – Geotechnical Guidelines for the Subsurface Investigation Process
4. VTrans MREI 12-01 – Geotechnical Guidelines for Sample Handling, Testing and Data Reporting

FIGURES

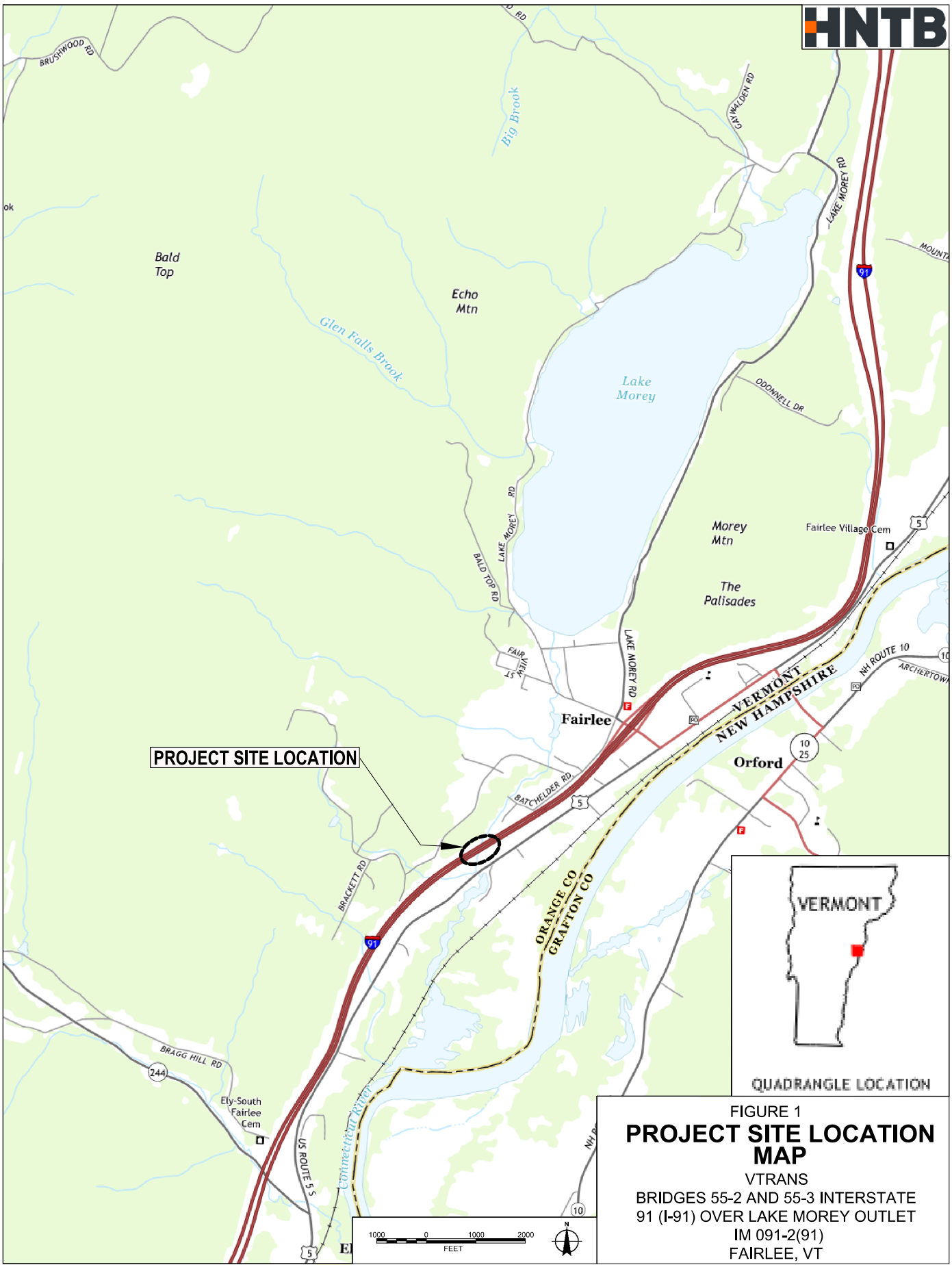


FIGURE 1

PROJECT SITE LOCATION MAP

VTRANS
BRIDGES 55-2 AND 55-3 INTERSTATE 91 (I-91) OVER LAKE MOREY OUTLET
IM 091-2(91)
FAIRLEE, VT

Basemaps: U.S.G.S. Fairlee, VT-NH Quadrangle US Topo, 2015

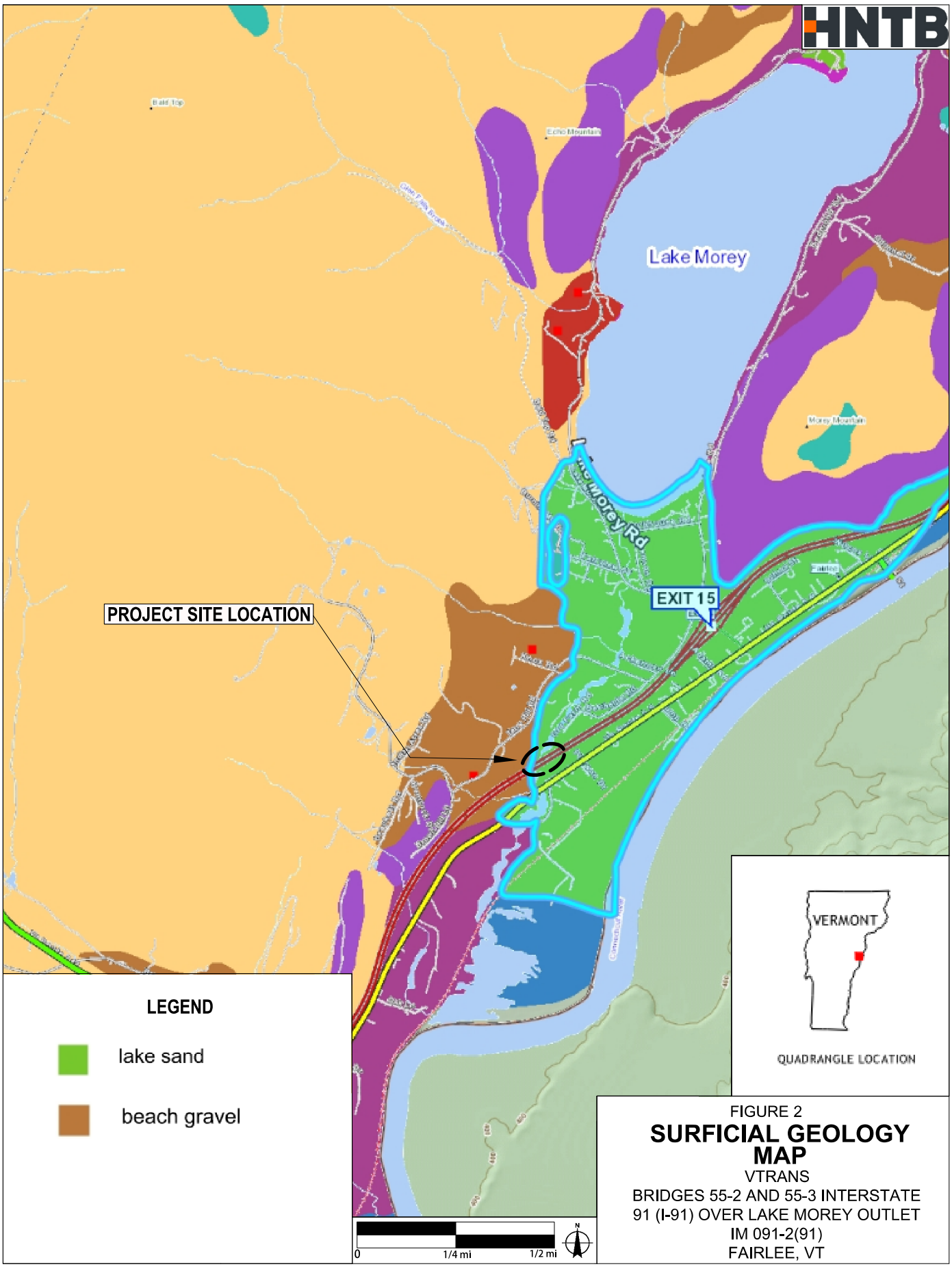


FIGURE 2

SURFICIAL GEOLOGY MAP

VTRANS

BRIDGES 55-2 AND 55-3 INTERSTATE 91 (I-91) OVER LAKE MOREY OUTLET

IM 091-2(91)

FAIRLEE, VT

Basemaps: Vermont Center for Geographic Information, 1984

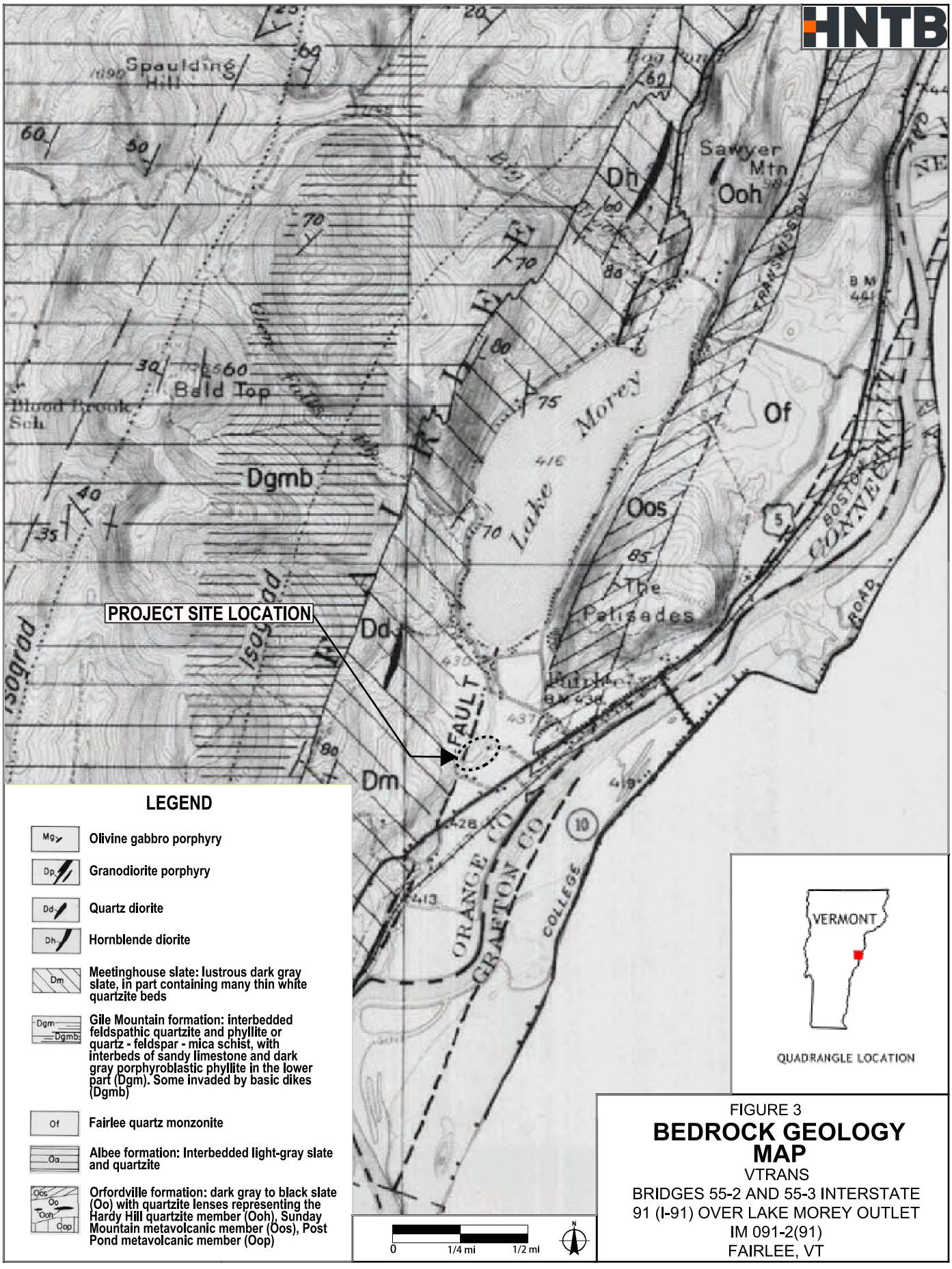


FIGURE 3

BEDROCK GEOLOGY MAP

VTRANS

BRIDGES 55-2 AND 55-3 INTERSTATE 91 (I-91) OVER LAKE MOREY OUTLET

IM 091-2(91)

FAIRLEE, VT

Basemaps: U.S.G.S. Geology of the Bradford-Thetford Area, Orange County, Vermont, 1950

APPENDIX I

AS-DRILLED BORING LOCATION PLAN

SOIL CLASSIFICATION

AASHTO	
A1	Gravel and Sand
A3	Fine Sand
A2	Silty or Clayey Gravel and Sand
A4	Silty Soil - Low Compressibility
A5	Silty Soil - Highly Compressible
A6	Clayey Soil - Low Compressibility
A7	Clayey Soil - Highly Compressible

ROCK QUALITY DESIGNATION

R.Q.D. (%)	ROCK DESCRIPTION
<25	Very Poor
25 to 50	Poor
51 to 75	Fair
76 to 90	Good
>90	Excellent

SHEAR STRENGTH

UNDRAINED SHEAR STRENGTH IN P.S.F.	CONSISTENCY
<250	Very Soft
250-500	Soft
500-1000	Med. Stiff
1000-2000	Stiff
2000-4000	Very Stiff
>4000	Hard

CORRELATION GUIDE OF "N" TO DENSITY/CONSISTENCY

DENSITY (GRANULAR SOILS)		CONSISTENCY (COHESIVE SOILS)	
N	DESCRIPTIVE TERM	N	DESCRIPTIVE TERM
<5	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-24	Med. Dense	5-8	Med. Stiff
25-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		31-60	Hard
		>60	Very Hard

COMMONLY USED SYMBOLS

▼	Water Elevation
⊕	Standard Penetration Boring
⊕	Auger Boring
⊙	Rod Sounding
S	Sample
N	Standard Penetration Test Blow Count Per Foot For: 2" O. D. Sampler 1 ⅜" I. D. Sampler Hammer Weight Of 140 Lbs. Hammer Fall Of 30"
VS	Field Vane Shear Test
US	Undisturbed Soil Sample
B	Blast
DC	Diamond Core
MD	Mud Drill
WA	Wash Ahead
HSA	Hollow Stem Auger
AX	Core Size 1 ⅛"
BX	Core Size 1 ⅝"
NX	Core Size 2 ⅛"
M	Double Tube Core Barrel Used
LL	Liquid Limit
PL	Plastic Limit
PI	Plasticity Index
NP	Non Plastic
w	Moisture Content (Dry Wgt. Basis)
D	Dry
M	Moist
MTW	Moist To Wet
W	Wet
Sat	Saturated
Bo	Boulder
Gr	Gravel
Sa	Sand
Si	Silt
Cl	Clay
HP	Hardpan
Le	Ledge
NLTD	No Ledge To Depth
CNPF	Can Not Penetrate Further
TLOB	Top of Ledge Or Boulder
NR	No Recovery
Rec.	Recovery
%Rec.	Percent Recovery
RQD	Rock Quality Designation
CBR	California Bearing Ratio
℄	Less Than
℈	Greater Than
R	Refusal (N 100)
VTSPG	NAD83 - See Note 7

COLOR

blk	Black	pnk	Pink
bl	Blue	pu	Purple
brn	Brown	rd	Red
dk	Dark	tn	Tan
gry	Gray	wh	White
gn	Green	yel	Yellow
lt	Light	mltc	Multicolored
or	Orange		

DEFINITIONS (AASHTO)

BEDROCK (LEDGE) - Rock in its native location of indefinite thickness.

BOULDER - A rock fragment with an average dimension > 12 inches.

COBBLE - Rock fragments with an average dimension between 3 and 12 inches.

GRAVEL - Rounded particles of rock < 3" and > 0.0787" (#10 sieve).

SAND - Particles of rock < 0.0787" (#10 sieve) and > 0.0029" (#200 sieve).

SILT - Soil < 0.0029" (#200 sieve), non or slightly plastic and exhibits no strength when air-dried.

CLAY - Fine grained soil, exhibits plasticity when moist and consider-able strength when air-dried.

VARVED - Alternate layers of silt and clay.

HARDPAN - Extremely dense soil, cemented layer, not softened when wet.

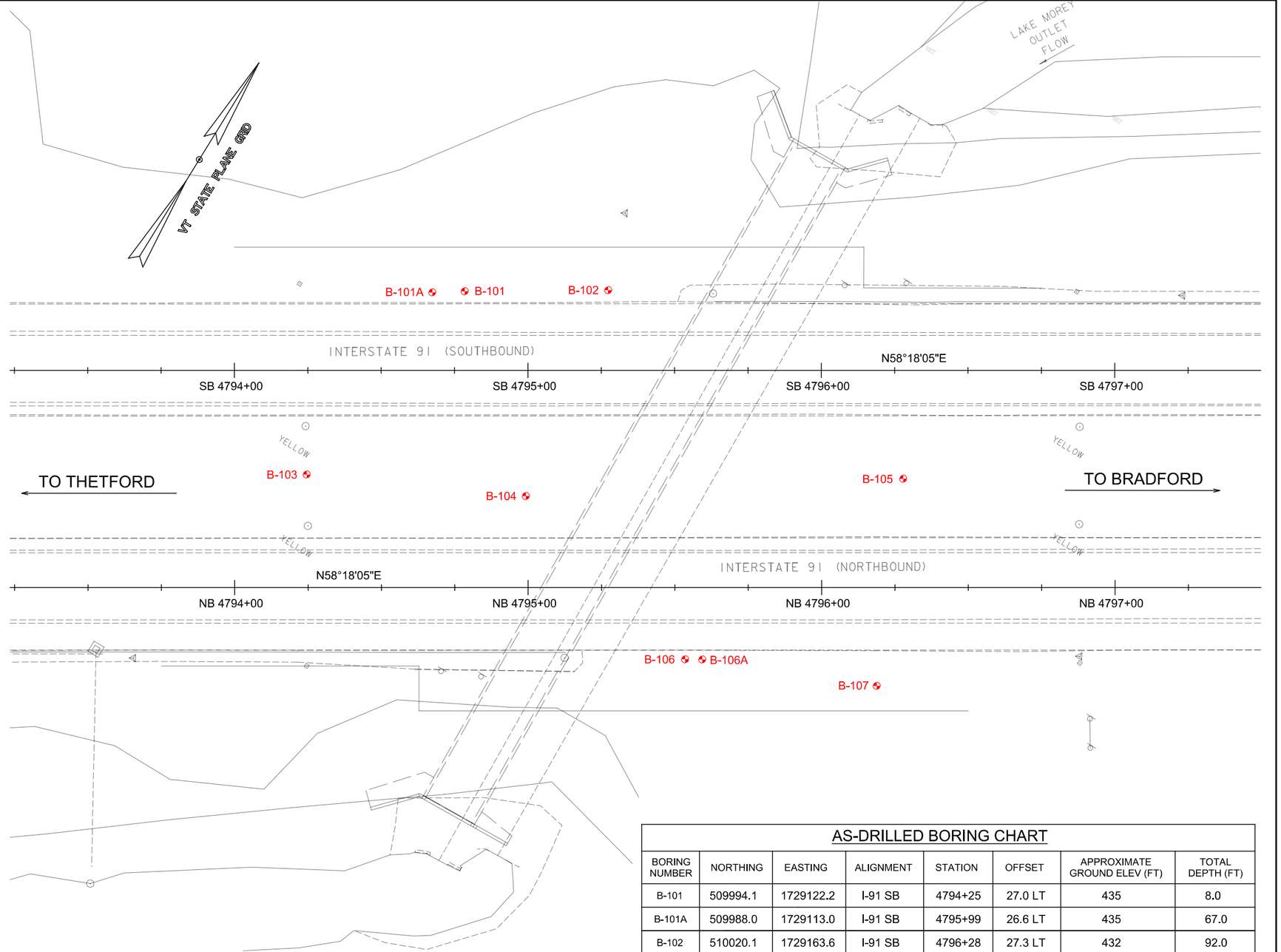
MUCK - Soft organic soil (containing > 10% organic material.

MOISTURE CONTENT - Weight of water divided by dry weight of soil.

FLOWING SAND - Granular soil so saturated (loose) that it flows into drill casing during extraction of wash rod.

STRIKE - Angle from magnetic north to line of intersection of bed with a horizontal plane.

DIP - Inclination of bed with a horizontal plane.



AS-DRILLED BORING CHART

BORING NUMBER	NORTHING	EASTING	ALIGNMENT	STATION	OFFSET	APPROXIMATE GROUND ELEV (FT)	TOTAL DEPTH (FT)
B-101	509994.1	1729122.2	I-91 SB	4794+25	27.0 LT	435	8.0
B-101A	509988.0	1729113.0	I-91 SB	4795+99	26.6 LT	435	67.0
B-102	510020.1	1729163.6	I-91 SB	4796+28	27.3 LT	432	92.0
B-103	509912.7	1729109.2	I-91 NB	4794+25	38.5 LT	434	81.0
B-104	509945.7	1729176.6	I-91 NB	4794+99	31.2 LT	433	96.0
B-105	510018.3	1729282.9	I-91 NB	4796+28	37.1 LT	432	96.0
B-106	509926.9	1729252.0	I-91 NB	4795+54	24.4 RT	431	46.0
B-106A	509929.9	1729257.0	I-91 NB	4795+59	24.5 RT	430	82.0
B-107	509953.5	1729312.3	I-91 NB	4796+19	33.5 RT	430	82.0

GENERAL NOTES

1. BORING LOCATIONS HAVE BEEN SELECTED TO IDENTIFY SUBSURFACE CONDITIONS AT THE PROPOSED IMPROVEMENTS AND ALONG THE PROJECT ALIGNMENT.
2. BORINGS WERE FIELD LOCATED UTILIZING EXISTING SITE FEATURES AND HENDHELD GPS.
3. COORDINATES REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1983 (NAVD83) AND VERMONT STATE PLANE COORDINATE SYSTEM.
4. ALL ELEVATIONS PROVIDED IN FEET IN REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
5. ALL DRILLING OPERATIONS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS.
6. ALL BORINGS WERE PERFORMED UNDER THE SUPERVISION OF HNTB.

LEGEND

AS-DRILLED BORING LOCATION

0 20 40
SCALE IN FEET

PROJECT NAME: FAIRLEE
PROJECT NUMBER: IM 091-2(91)

FILE NAME:
PROJECT LEADER: H. JOVANI
DESIGNED BY:
AS-DRILLED BORING LAYOUT

PLOT DATE:
DRAWN BY: J. BOURGEOIS
CHECKED BY: M. BARAHONA
SHEET OF

APPENDIX II

BORING LOGS

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-101**
Page No.: 1 of 1
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Debojit Sarker
Date Started: 3/05/24 Date Finished: 3/05/24
VTSPG NAD83: N 509994.10 ft E 1729122.20 ft
Station: 4794+25 Offset: 27.0 LT
Ground Elevation: 435.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	TRUCK GT-8	C_E = 1.45

Groundwater Observations

Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Visual Class:, A-1-b; cmf SAND, litle Silt, trace cmf Gravel, Dk/gry-blk, MTD, Rec. = 1.08 ft, Topsoil, roots, and grass present	2-3-4-5 (7)				
		Visual Class:, A-1-b; cmf (+) SAND, little mf Gravel, trace Silt, brn-gry, MTD, Rec. = 1.42 ft	6-7-13-14 (20)				
5		Visual Class:, A-2-4; cmf SAND, some Clayey Silt, trace cmf Gravel, gry, Moist, Rec. = 1.17 ft, Silt and Clay in spoon tip	13-21-19-13 (40)				
		Visual Class:, A-2-4; cmf SAND, some Silt, trace cmf Gravel, gry-brn, Moist, Rec. = 1.33 ft	13-26-29-27 (55)				
		Hole stopped @ 8.0 ft					
10		Remarks: 1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.					
15							
20							
25							
30							

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-101A**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/27/24 Date Finished: 3/28/24
VTSPG NAD83: N 509988.00 ft E 1729113.00 ft
Station: 4795+99 Offset: 26.6 LT
Ground Elevation: 435.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/28/24	12.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, grass/topsoil, brn, Dry, Rec. = 1.0 ft	3-5-7-9 (12)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, Shale Fill, brn, Dry, Rec. = 1.25 ft	2-12-19-22 (31)						
5		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn, Moist, Rec. = 1.17 ft	21-14-8-10 (22)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn, Moist, Rec. = 1.5 ft	21-30-28-25 (58)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, Lt/brn, Moist, Rec. = 1.25 ft, c Gravel/Boulder encountered from 8-9 ft	13-14-16-26 (30)						
10		Visual Class:, A-1-b; cmf SAND, little mf Gravel, layers of Shale Fill, Lt/brn, Moist, Rec. = 2.0 ft, Boulder encountered from 11.5-12 ft Slight rig chatter throughout, Shale cuttings	33-50-50-35 (100)						
15		Visual Class:, Top 1.5': A-1-b; cmf SAND, Bot 0.5': Shale Fill, brn, Moist, Rec. = 0.75 ft	6-6-5-11 (11)						
20		Visual Class:, Top 1.0': A-1-a; mf GRAVEL, Bot 1.0': A-1-b; mf SAND, Lt/brn-gry, Moist, Rec. = 0.92 ft	4-10-12-13 (22)						
25		Visual Class:, A-1-b; cmf SAND, some (+) mf Gravel and Shale Fill, gry-brn, Moist, Rec. = 0.92 ft	8-9-9-11 (18)						
30		Visual Class:, A-1-b; cmf SAND, brn, Moist, Rec. = 1.08 ft	2-2-4-10 (6)						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-101A**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/27/24 Date Finished: 3/28/24
VTSPG NAD83: N 509988.00 ft E 1729113.00 ft
Station: 4795+99 Offset: 26.6 LT
Ground Elevation: 435.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/28/24	12.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Classification:, *A-4; SILT, little mf SAND, brn, Moist, Rec. = 1.42 ft	5-6-7-8 (13)		1.0	15.0	84.0		
40		Classification:, *A-6; Silty CLAY, gry/grn, Moist, Rec. = 1.75 ft	5-7-7-7 (14)				92.4	24	4
45		Visual Class:, A-2-4; f SAND with bands of Clayey Silt, Lt/brn, Moist, Rec. = 1.17 ft	5-6-7-11 (13)						
50		Classification:, *A-4; SILT, gry, Moist, Rec. = 1.5 ft, pp: 0.25 tsf; tv: 1.0 tsf	4-7-7-9 (14)	31.8				NP	NP
55		Visual Class:, A-4; Clayey SILT, gry-brn, MTW, Rec. = 1.58 ft, pp: 1.25 tsf; tv: 2.0 tsf	4-4-5-6 (9)						
60		Visual Class:, A-2-4; mf SAND, little Clayey Silt, brn, MTW, Rec. = 1.67 ft, Silt ended 0.16 ft into spoon (60')	6-3-6-7 (9)						
65		Visual Class:, A-2-4; f SAND, some Silt, trace Clay, brn, MTW, Rec. = 1.58 ft	5-5-5-6 (10)						
		Hole stopped @ 67.0 ft							

Remarks:

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-101A**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/27/24 Date Finished: 3/28/24
VTSPG NAD83: N 509988.00 ft E 1729113.00 ft
Station: 4795+99 Offset: 26.6 LT
Ground Elevation: 435.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/28/24	12.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.							
75									
80									
85									
90									
95									
100									

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-102**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/28/24 Date Finished: 4/01/24
VTSPG NAD83: N 510020.10 ft E 1729163.60 ft
Station: 4796+28 Offset: 27.3 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/01/24	26.0	Measured at 0815

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-b; cmf SAND, some mf Gravel and Shale, gry-brn, Dry, Rec. = 1.17 ft, Grass/topsoil the first 1.0'	9-7-7-7 (14)						
		Visual Class:, Top 0.88': A-1-b; cmf SAND, some (+) mf Gravel, Bot 0.12': Boulder encountered, brn, Dry, Rec. = 1.58 ft	9-20-23-30 (43)						
5		Visual Class:, A-1-b; cmf SAND, some (+) mf Gravel and broken up Shale, brn, MTD, Rec. = 1.17 ft	20-21-12-25 (33)						
		Visual Class:, A-1-b; cmf SAND, some (+) mf Gravel and broken up Shale, brn, Moist, Rec. = 1.33 ft	20-20-13-17 (33)						
		Visual Class:, A-1-a; mf Sand and Gravel w/ intermittent Shale/rock, gry-brn, Moist, Rec. = 1.33 ft, More Shale/rock present at the bottom of the sample	9-15-20-40 (35)						
10		Visual Class:, Same as above, gry-brn, Moist, Rec. = 1.67 ft, More Shale/rock present at the top of the sample Blows on casing were larger than 100/6"; Roller bit used for 0.5'	96-37-27-30 (64)						
15		Visual Class:, Top 1.0': A-1-b; mf SAND, Bot 1.0': A-1-a; mf Gravel and Shale, brn-gry, Moist, Rec. = 1.25 ft, Roller bit used from 19.5'-20.5'; Shale rock cuttings	20-27-32-24 (59)						
20		Visual Class:, A-1-b; mf SAND (compact), some mf Gravel and Shale, brn, Moist, Rec. = 1.25 ft	12-16-18-24 (34)						
25		Visual Class:, A-1-a; cmf Gravel and Shale, gry-blk, Moist, Rec. = 1.0 ft	13-18-23-20 (41)						
30		Visual Class:, A-1-a; cmf Gravel and Shale, some cmf Sand, gry-blk, Moist, Rec. = 1.17 ft	14-14-30-32 (44)						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
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3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-102**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/28/24 Date Finished: 4/01/24
VTSPG NAD83: N 510020.10 ft E 1729163.60 ft
Station: 4796+28 Offset: 27.3 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/01/24	26.0	Measured at 0815

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-a; cmf Gravel and Shale, gry-blk, MTW, Rec. = 0.92 ft	11-14-15-11 (29)						
40		Visual Class:, Top 0.5': PEAT, Mid 1.0': A-1-b; cmf SAND, some mf Gravel, Bot 0.5': A-4; SILT, some (+) f Sand, gry-brn, MTW, Rec. = 1.67 ft	8-13-14-14 (27)						
45		Visual Class:, A-2-4; mf SAND, some Silt, brn, Moist, Rec. = 1.67 ft	6-8-7-9 (15)						
50		Classification:, *A-6; CLAY, gry, Moist, Rec. = 1.0 ft, pp: 0.25 tsf; tv: 2.0 tsf	WOR-WOR-WOH-WOH (WOR/WOH)	31.5				35	18
55		Visual Class:, A-6; Silty CLAY, gry-brn, Moist, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.5 tsf	WOR-WOR-WOR-WOH (WOR)						
		Visual Class:, A-6; Silty CLAY, gry-brn, Moist, Shelby Tube Sample	P-U-S-H						
60		Classification:, *A-4; SILT, gry, Moist, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.0 tsf	3-2-4-4 (6)	37.4					
65		Visual Class:, A-6; CLAY and SILT, gry-brn, Wet, Rec. = 1.92 ft, pp: 0.15 tsf; tv: 0.5 tsf	3-3-2-3 (5)						

Notes:
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2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-102**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/28/24 Date Finished: 4/01/24
VTSPG NAD83: N 510020.10 ft E 1729163.60 ft
Station: 4796+28 Offset: 27.3 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/01/24	26.0	Measured at 0815

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-5; SILT and CLAY, gry-brn, Wet, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 0.5 tsf	3-2-3-3 (5)						
75		Visual Class:, A-5; SILT and CLAY, gry-brn, Wet, Rec. = 2.0 ft	2-4-3-3 (7)						
80		Visual Class:, A-4; Clayey SILT, gry-brn, Wet, Rec. = 0.42 ft, Drill rig chatter at 84.5'	2-1-2-3 (3)						
85		Visual Class:, Top 1.0': A-1-a; mf GRAVEL, Bot: 1.0' Weathered Bedrock, gry-blk, MTW, Rec. = 1.25 ft	29-28-32-28 (60)						
90		Visual Class:, Weathered Bedrock, gry-blk, MTW, Rec. = 0.67 ft	16-24-16-25 (40)						
		Hole stopped @ 92.0 ft							
95		Remarks: 1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.							
100									

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-103**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/09/24 Date Finished: 4/10/24
VTSPG NAD83: N 509912.70 ft E 1729109.20 ft
Station: 4794+25 Offset: 38.5 LT
Ground Elevation: 434.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations

Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, grass/topsoil, brn-gry, Dry, Rec. = 1.25 ft	WOH-3-11-18 (14)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, layers of Shale Fill, brn-gry, Dry, Rec. = 1.67 ft	13-21-21-20 (42)						
5		Visual Class:, A-1-b; c(-)mf SAND, some mf Gravel, layers of Shale Fill, brn-gry, Dry, Rec. = 1.0 ft	7-6-7-12 (13)						
		Visual Class:, A-1-a; Shale/Phyllite FILL, some c(-)mf Sand, gry-blk, Dry, Rec. = 1.42 ft	20-28-35-36 (63)						
10		Visual Class:, A-1-a; Shale FILL, some c(-)mf Sand, gry-blk, Moist, Rec. = 1.58 ft	25-47-36-31 (83)						
15		Visual Class:, A-1-b; mf SAND, some mf Gravel, layers of Shale Fill, gry-brn, Moist, Rec. = 1.42 ft	16-16-15-29 (31)						
20		Visual Class:, A-1-a; Shale FILL, little c(-)mf Sand, gry-blk, Moist, Rec. = 1.17 ft	25-11-17-12 (28)						
25		Visual Class:, A-1-a; Shale FILL and mf Gravel, little c(-)mf Sand, gry-blk, Moist, Rec. = 1.0 ft	19-30-30-26 (60)						
30		Visual Class:, A-1-a; Shale FILL and mf Gravel, gry-blk, Moist, Rec. = 1.17 ft, Void w/ water loss at 29.5'	11-21-26-18 (47)						
		Visual Class:, A-1-b; cmf SAND, little mf Gravel, brn, Moist, Rec. = 1.17 ft	17-15-11-11						

Notes:
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4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-103**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/09/24 Date Finished: 4/10/24
VTSPG NAD83: N 509912.70 ft E 1729109.20 ft
Station: 4794+25 Offset: 38.5 LT
Ground Elevation: 434.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations		
Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
			(26)						
40		Visual Class:, A-2-4; mf SAND, some Silt, brn, MTW, Rec. = 1.67 ft	4-6-6-9 (12)						
45		Visual Class:, A-4; SILT, some Br mf Sand, gry-brn, MTW, Rec. = 1.67 ft	6-6-5-7 (11)						
50		Classification:, *A-6; CLAY, gry, Moist, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.5 tsf	2-3-3-11 (6)	32.0			80.2	33	12
55		Visual Class:, A-1-a; mf GRAVEL, some Shale Fill, gry-brn, Moist, Rec. = 1.08 ft	8-8-9-8 (17)						
60		Classification:, *A-6; CLAY with Gravel, gry, Moist, Rec. = 1.0 ft, pp: 0.5 tsf; tv: 1.0 tsf	WOH-WOH-WOH-6 (WOH)	40.1				51	26
65		Visual Class:, A-4; Clayey SILT, gry, Moist, Rec. = 1.58 ft, pp: 1.0 tsf; tv: 1.5 tsf	5-6-6-7 (12)						
		Visual Class:, A-4; Clayey SILT, gry, Moist, Rec. = 1.33 ft	4-4-9-10 (13)						

Notes:
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2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-103**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/09/24 Date Finished: 4/10/24
VTSPG NAD83: N 509912.70 ft E 1729109.20 ft
Station: 4794+25 Offset: 38.5 LT
Ground Elevation: 434.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations		
Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
75		Classification:, *A-4; SILT, gry, Moist, Rec. = 1.58 ft	5-6-6-6 (12)	32.0					
80		Visual Class:, A-4; SILT, gry, Wet, Rec. = 0.92 ft	6-6-6-10 (12)						
		Hole stopped @ 81.0 ft							

Remarks:
1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.

85
90
95
100

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-104**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/11/24 Date Finished: 4/16/24
VTSPG NAD83: N 509945.70 ft E 1729176.60 ft
Station: 4794+99 Offset: 31.2 LT
Ground Elevation: 433.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations

Date	Depth (ft)	Notes
04/16/24	21.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, grass/topsoil, brn-gry, Dry, Rec. = 1.08 ft	3-4-7-8 (11)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn-gry, Dry, Rec. = 2.0 ft	15-14-20-24 (34)						
5		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn-gry, Dry, Rec. = 1.42 ft	20-23-23-23 (46)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn-gry, Dry, Rec. = 1.75 ft	11-19-37-55 (56)						
10		Visual Class:, A-1-b; mf SAND, some mf Gravel and Fill, brn-gry, MTD, Rec. = 1.33 ft, 0.5' Boulder caused split spoon refusal	52-65-100/4" (165)						
		Visual Class:, A-1-a; Gravel and Shale FILL, some mf Sand, gry-blk, MTD, Rec. = 1.08 ft	20-17-16-24 (33)						
15		Visual Class:, A-1-b; mf SAND, little mf Gravel and Shale Fill, brn-gry, MTD, Rec. = 1.25 ft	8-11-15-14 (26)						
20		Visual Class:, A-1-a; Gravel and Shale FILL, little mf Sand, gry-blk, Moist, Rec. = 1.33 ft, Moderate drill chatter at 23'	19-23-21-19 (44)						
25		Visual Class:, A-1-a; Gravel and Shale FILL, gry-blk, Moist, Rec. = 1.0 ft, Moderate drill chatter from 27'-28'	11-10-11-15 (21)						
30		Visual Class:, Top 1.0': A-1-a; mf Gravel and Shale FILL, Bot 1.0': Boulder, gry-blk, Moist, Rec. = 0.83 ft, Roller bit through boulder	23-100/6" (100)						
		Visual Class:, A-1-a; Gravel and Shale FILL, gry-blk, Moist, Rec. = 0.75 ft	16-12-10-9						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-104**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/11/24 Date Finished: 4/16/24
VTSPG NAD83: N 509945.70 ft E 1729176.60 ft
Station: 4794+99 Offset: 31.2 LT
Ground Elevation: 433.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations

Date	Depth (ft)	Notes
04/16/24	21.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
			(22)						
40		Visual Class:, Top 1.5': A-1-a; Gravel and Shale Fill, Bot 0.5': A-1-b; cmf SAND, some f Gravel, gry-blk, Moist, Rec. = 1.33 ft	16-15-14-14 (29)						
45		Visual Class:, A-4; Clayey SILT, gry, Moist, Rec. = 1.33 ft	5-3-5-4 (8)						
50		Visual Class:, A-4; Clayey SILT, gry, Moist, Rec. = 1.42 ft	5-5-7-8 (12)						
55		Visual Class:, A-4; Clayey SILT, gry, Moist, Rec. = 0.33 ft	2-2-2-1 (4)						
60		Classification:, *A-6; CLAY, gry, Moist, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 1.5 tsf	WOR-WOH-WOH-3 (WOH)	34.5				39	16
65		Visual Class:, A-5; SILT and CLAY, gry, Moist, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 1.5 tsf	WOR-WOH-WOH-3 (WOH)						
		Visual Class:, A-5; SILT and CLAY, gry, Moist, Rec. = 2.0 ft, pp: 0.5 tsf; tv:	WOR-WOR-4-8						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-104**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brandon Gomm, Josef Bourgeois
Date Started: 4/11/24 Date Finished: 4/16/24
VTSPG NAD83: N 509945.70 ft E 1729176.60 ft
Station: 4794+99 Offset: 31.2 LT
Ground Elevation: 433.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations

Date	Depth (ft)	Notes
04/16/24	21.0	Measured at 0830

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		1.5 tsf	(4)						
75		Classification:, *A-4; SILT, gry, Moist, Rec. = 1.83 ft, pp: 0.5 tsf; tv: 1.5 tsf	WOH-WOH-4-3 (4)	34.9					
80		Visual Class:, A-4; Clayey SILT, gry, Wet, Rec. = 1.67 ft	WOH-4-4-8 (8)						
85		Visual Class:, A-4; SILT, gry, Wet, Rec. = 1.42 ft	2-5-6-8 (11)						
90		Visual Class:, A-4; SILT, gry, Wet, Rec. = 2.0 ft	2-4-5-8 (9)						
95		Visual Class:, A-4; SILT, some weathered Bedrock, gry, Wet, Rec. = 1.0 ft	6-13-20-32 (33)						
100		Hole stopped @ 96.0 ft							

Remarks:
1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-105**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brad Enos, Josef Bourgeois
Date Started: 4/16/24 Date Finished: 4/17/24
VTSPG NAD83: N 510018.30 ft E 1729282.90 ft
Station: 4796+28 Offset: 37.1 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK	C_E = 1.27	

Groundwater Observations

Date	Depth (ft)	Notes
04/17/24	19.0	Measured at 0820

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Visual Class:, A-1-b; cmf SAND, some topsoil/grass, brn, Dry, Rec. = 1.25 ft	WOH-1-4-7 (5)				
		Visual Class:, A-1-b; cmf SAND, some Shale Fill, brn, Dry, Rec. = 0.67 ft, Shale boulder caused split spoon refusal	75-100/4" (100)				
5		Visual Class:, A-1-a; Shale FILL, some cmf Sand, gry-blk, Moist, Rec. = 1.17 ft	11-7-6-11 (13)				
		Visual Class:, A-1-a; cmf SAND, some mf Gravel and Shale Fill, brn, Dry, Rec. = 1.5 ft	12-15-18-17 (33)				
		Visual Class:, A-1-b; c(-)mf SAND, little mf Gravel, brn, Dry, Rec. = 1.25 ft	11-12-13-12 (25)				
10		Visual Class:, A-1-b; mf SAND, some mf Gravel, brn, MTD, Rec. = 1.17 ft	9-17-18-22 (35)				
15		Visual Class:, A-1-b; mf SAND, little mf Gravel, brn, Moist, Rec. = 1.0 ft, One 1.5" rock at 14'	21-17-15-15 (32)				
20		Classification:, *A-4; SILT, gry/grn, Moist, Rec. = 1.42 ft	4-3-3-4 (6)				97.6
25		Visual Class:, A-4; SILT, gry/grn, Moist, Rec. = 1.75 ft, pp: 0.5 tsf; tv: 0.5 tsf	2-2-3-2 (5)				
30		Visual Class:, A-4; SILT, gry/grn, MTW, Rec. = 1.25 ft, pp: 1.25 tsf; tv: 1.0 tsf	4-5-7-8 (12)				
		Visual Class:, A-4; SILT, gry, MTW, Rec. = 1.58 ft, pp: 0.25 tsf; tv: 1.0 tsf	1-2-3-5 (5)				

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-105**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brad Enos, Josef Bourgeois
Date Started: 4/16/24 Date Finished: 4/17/24
VTSPG NAD83: N 510018.30 ft E 1729282.90 ft
Station: 4796+28 Offset: 37.1 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK		C_E = 1.27

Groundwater Observations

Date	Depth (ft)	Notes
04/17/24	19.0	Measured at 0820

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
40		Visual Class:, A-4; SILT, some f Sand, gry, Wet, Rec. = 1.25 ft	6-7-7-9 (14)				
45		Visual Class:, A-4; SILT, little f Sand, gry, Wet, Rec. = 1.42 ft	3-5-5-6 (10)				
50		Visual Class:, A-4; SILT, gry, Wet, Rec. = 2.0 ft	1-3-3-3 (6)				
55		Visual Class:, A-4; SILT, some f Sand, gry, Wet, Rec. = 1.42 ft	4-6-7-10 (13)				
60		Visual Class:, A-4; Clayey SILT, gry, Wet, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.0 tsf	WOH-WOH-1-1 (2)				
65		Visual Class:, A-5; CLAY and SILT, gry, Wet, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.0 tsf	WOR-WOR-WOH-2 (WOR/WOH)				
		Visual Class:, A-5; CLAY and SILT, gry, Wet, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.5 tsf	WOR-WOH-				

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-105**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Brad Enos, Josef Bourgeois
Date Started: 4/16/24 Date Finished: 4/17/24
VTSPG NAD83: N 510018.30 ft E 1729282.90 ft
Station: 4796+28 Offset: 37.1 LT
Ground Elevation: 432.0 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig: MOBILE 23 TRACK	C_E = 1.27	

Groundwater Observations

Date	Depth (ft)	Notes
04/17/24	19.0	Measured at 0820

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
			WOH-3 (WOH)				
75		Visual Class:, A-5; CLAY and SILT, gry, Wet, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.5 tsf	WOR-WOR-WOH-WOH (WOR/WOH)				
80		Visual Class:, A-5; CLAY and SILT, gry, Wet, Rec. = 2.0 ft, pp: 0.75 tsf; tv: 2.5 tsf	WOH-WOH-WOH-WOH (WOH)				
85		Visual Class:, A-5; CLAY and SILT, gry, Wet, Rec. = 1.83 ft, pp: 0.75 tsf; tv: 2.5 tsf	WOH-2-6-6 (8)				
90		Visual Class:, A-4; Clayey SILT, gry, Wet, Rec. = 1.5 ft, pp: 0.5 tsf; tv: 1.5 tsf	4-3-5-6 (8)				
95		Visual Class:, A-4; SILT, gry, Wet, Rec. = 1.17 ft	10-16-16-18 (32)				
		Hole stopped @ 96.0 ft					
100		Remarks: 1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.					

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-106**
Page No.: 1 of 2
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Debojit Sarker
Date Started: 3/04/24 Date Finished: 3/04/24
VTSPG NAD83: N 509926.90 ft E 1729252.00 ft
Station: 4795+54 Offset: 24.4 RT
Ground Elevation: 431.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	TRUCK GT-8	C_E = 1.45

Groundwater Observations

Date	Depth (ft)	Notes
03/04/24	31.65	Measured at 1440

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Visual Class:, A-1-b; cmf SAND, some cmf Gravel, little Silt, trace organics, top soil, grass, roots, gry-Lt/brn-blk, Dry, Rec. = 1.33 ft	5-5-4-4 (9)				
		Visual Class:, A-1-b; cmf(+) SAND, some cmf Gravel, little Silt, brn-gry, Moist, Rec. = 1.42 ft	3-4-6-11 (10)				
5		Visual Class:, A-4; Clayey SILT, some cmf Gravel, little cmf Sand, brn-Dk/gry-blk, MTW, Rec. = 0.83 ft	8-9-9-5 (18)				
		Visual Class:, A-1-a; cmf Gravel and cmf Sand, trace Clayey Silt, Dk/gry-blk, MTW, Rec. = 1.5 ft	15-10-6-5 (16)				
		Visual Class:, No Recovery, Rec. = 0.0 ft	11-10-6-4 (16)				
10		Visual Class:, A-1-b; cmf(+) SAND, little Clayey Silt, trace mf Gravel, brn-Dk/gry, MTW, Rec. = 1.17 ft, 0.17' Clayey Silt pocket	4-3-5-7 (8)				
		Boulder encountered from 14.0' to 14.5'					
15		Visual Class:, A-1-a; cmf Gravel and cmf Sand, trace (-) Clayey Silt, Dk/gry-brn, MTW, Rec. = 1.08 ft, Clayey Silt at tip of split spoon	23-17-11-7 (28)				
20		Visual Class:, Top 0.58': A-1-b; mf(+) SAND, trace Silt, Bot 0.58': A-1-b; cmf SAND, some cmf Gravel, trace Silt, blk-gry, Moist, Rec. = 1.17 ft	18-19-15-19 (34)				
25		Visual Class:, A-1-b; mf(+) SAND, little Silt, brn, Moist, Rec. = 1.17 ft	8-9-11-14 (20)				
30		Visual Class:, Top 0.17': A-1-a; cmf Sand and cmf Gravel, Mid 0.58': A-1-b; cmf(+) SAND, trace Silt, Bot 0.5': A-1-b; cmf SAND, some cmf Gravel, little Silt, Dk/gry-brn-blk, MTW, Rec. = 1.25 ft, Observed three layers in split spoon	21-20-20-20 (40)				
		Visual Class:, A-1-a; cmf Gravel, trace cmf Sand, some wood fragments, brn-Dk/gry,	6-5-3-5 (8)				

Notes:
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3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-106**
Page No.: 2 of 2
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Debojit Sarker
Date Started: 3/04/24 Date Finished: 3/04/24
VTSPG NAD83: N 509926.90 ft E 1729252.00 ft
Station: 4795+54 Offset: 24.4 RT
Ground Elevation: 431.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	TRUCK GT-8	C_E = 1.45

Groundwater Observations

Date	Depth (ft)	Notes
03/04/24	31.65	Measured at 1440

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		MTW, Rec. = 0.33 ft, Spoon tip filled with wood pieces					
40		Visual Class:, A-2-4; mf(+) SAND, some Silt, one piece of m Gravel, brn-gry, Moist, Rec. = 0.83 ft	23-10-8-8 (18)				
45		Visual Class:, A-4; Clayey SILT, some (+) f Sand, gry, Moist, Rec. = 1.67 ft	3-3-3-4 (6)				
		Hole stopped @ 46.0 ft					
50		Remarks: 1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.					
55							
60							
65							

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-106A**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Chris Testa/Josef Bourgeois
Date Started: 3/12/24 Date Finished: 3/21/24
VTSPG NAD83: N 509929.90 ft E 1729257.00 ft
Station: 4795+59 Offset: 24.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/22/24	24.0	Measured at 0930
03/25/24	26.0	Meas. daily to 3/29
04/17/24	26.0	Well removed

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, SEE BORING B-106 for 0 - 40'							
5									
10									
15									
20									
25									
30									

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-106A**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Chris Testa/Josef Bourgeois
Date Started: 3/12/24 Date Finished: 3/21/24
VTSPG NAD83: N 509929.90 ft E 1729257.00 ft
Station: 4795+59 Offset: 24.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/22/24	24.0	Measured at 0930
03/25/24	26.0	Meas. daily to 3/29
04/17/24	26.0	Well removed

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
40		Visual Class:, A-2-4; mf(+) SAND, some Silt, gry-brn, Moist, Rec. = 1.0 ft	12-14-19-30 (33)						
45		Visual Class:, A-4; Clayey SILT, some f Sand, gry-brn, Moist, Rec. = 1.33 ft, pp: 0.5 tsf; tv: 1.0 tsf	5-5-7-11 (12)						
50		Visual Class:, A-4; Clayey SILT, gry-brn, Moist, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 1.0 tsf	WOH-4-8-6 (12)						
55		Visual Class:, A-5; SILT and CLAY, gry-brn, Moist, Rec. = 1.25 ft, pp: 0.25 tsf; tv: 1.0 tsf	4-6-6-10 (12)						
60		Classification:, *A-6; CLAY, gry, Moist, Rec. = 1.92 ft, pp: 0.25 tsf; tv: 1.0 tsf	1-1-2-3 (3)	34.3				38	18
		Visual Class:, A-5; CLAY and SILT, gry-brn, MTW, Shelby Tube Sample	P-U-S-H						
65		Visual Class:, A-6; Silty CLAY, some mf Gravel, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.0 tsf	1-1-6-5 (7)						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
AGENCY OF TRANSPORTATION
CONSTRUCTION AND
MATERIALS BUREAU
CENTRAL LABORATORY

BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-106A**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Chris Testa/Josef Bourgeois
Date Started: 3/12/24 Date Finished: 3/21/24
VTSPG NAD83: N 509929.90 ft E 1729257.00 ft
Station: 4795+59 Offset: 24.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
03/22/24	24.0	Measured at 0930
03/25/24	26.0	Meas. daily to 3/29
04/17/24	26.0	Well removed

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-6; Silty CLAY, gry-brn, Moist, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.0 tsf	1-2-5-4 (7)						
75		Visual Class:, A-6; CLAY, gry-brn, Wet, Rec. = 1.83 ft, pp: 0.25 tsf; tv: 2.0 tsf	3-7-4-5 (11)						
80		Visual Class:, A-6; CLAY, gry-brn, Wet, Rec. = 1.83 ft, pp: 0.25 tsf	4-4-6-7 (10)						
		Hole stopped @ 82.0 ft							

Remarks:
1. Installed temporary water well after completing hole.
2. When Fairlee boring work was completed, temporary well PVC and steel well cover were removed.
3. Boring backfilled with spoils and sand until reaching firm, non-yielding state.

85 90 95 100

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
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BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-107**
Page No.: 1 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/22/24 Date Finished: 3/26/24
VTSPG NAD83: N 509953.50 ft E 1729312.30 ft
Station: 4796+19 Offset: 33.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, brn-gry, Dry, Rec. = 1.0 ft	2-4-9-10 (13)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, layers of Shale, brn-gry, Dry, Rec. = 1.25 ft	7-7-8-10 (15)						
5		Visual Class:, A-1-b; cmf SAND, some mf Gravel, layers of Shale, brn-gry, Moist, Rec. = 1.0 ft	8-10-8-7 (18)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, layers of Shale, brn-gry, Moist, Rec. = 1.0 ft	8-7-16-11 (23)						
		Visual Class:, A-1-b; cmf SAND, some mf Gravel, layers of Shale, brn-gry, Moist, Rec. = 0.75 ft	6-5-5-5 (10)						
10		Visual Class:, A-1-b; mf SAND, little mf Gravel, trace Silt, Lt/brn, Moist, Rec. = 1.25 ft, Roller bit through boulder at 14'	5-10-10-20 (20)						
15		Visual Class:, A-2-4; mf SAND, little Silt, Lt/brn, MTD, Rec. = 0.75 ft	9-8-7-7 (15)						
20		Visual Class:, A-4; Clayey SILT, some (+) f Sand, brn, Moist, Rec. = 1.17 ft	3-3-3-3 (6)						
25		Visual Class:, A-5; SILT and CLAY, some f Sand, brn, Moist, Rec. = 1.42 ft	2-3-3-3 (6)						
30		Classification:, *A-6; Silty CLAY, gry, Moist, Rec. = 1.5 ft	2-3-3-4 (6)	26.6				26	4
		Visual Class:, A-2-4; mf SAND, some Silt, brn-gry, Moist, Rec. = 1.25 ft	5-4-5-7 (9)						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
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3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

STATE OF VERMONT
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BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-107**
Page No.: 2 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/22/24 Date Finished: 3/26/24
VTSPG NAD83: N 509953.50 ft E 1729312.30 ft
Station: 4796+19 Offset: 33.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
40		Visual Class:, A-4; Clayey SILT, some f Sand, gry-brn, MTW, Rec. = 1.42 ft	4-3-5-7 (8)						
45		Visual Class:, A-4; Clayey SILT, some (+) f Sand, gry-brn, MTW, Rec. = 1.5 ft	4-4-6-7 (10)						
50		Visual Class:, A-5; SILT and CLAY, little f Sand, gry-brn, MTW, Rec. = 2.0 ft	3-3-3-3 (6)						
55		Classification:, *A-2-4; Silty SAND, gry, MTW, Rec. = 1.25 ft	4-5-7-7 (12)				78.7		
60		Visual Class:, A-5; CLAY and SILT, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 2.0 tsf	2-1-1-1 (2)						
		Visual Class:, A-6; Silty CLAY, gry-brn, MTW, Shelby Tube Sample	P-U-S-H						
65		Visual Class:, A-6; Silty CLAY, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 2.0 tsf	WOH-5-5-7 (10)						

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

STATE OF VERMONT
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BORING LOG

Fairlee IM 091-2(91)
Bridge 55-2 and 55-3 I-89 NB and SB
Fairlee, Vermont 78773

Boring No.: **B-107**
Page No.: 3 of 3
Pin No.: 21a024
Checked By: CHD

Boring Crew: Kenneth Smith, Josef Bourgeois
Date Started: 3/22/24 Date Finished: 3/26/24
VTSPG NAD83: N 509953.50 ft E 1729312.30 ft
Station: 4796+19 Offset: 33.5 RT
Ground Elevation: 430.0 ft

	Casing	Sampler
Type:	WB	SS & TUBE
I.D.:	4 in	1.38 in
Hammer Wt:	140 lb.	140 lb.
Hammer Fall:	30 in.	30 in.
Hammer/Rod Type:		Auto
Rig:	GEFCO SS-5	C_E = 1.33

Groundwater Observations		
Date	Depth (ft)	Notes
		Not Measured

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %	LL %	PI %
		Visual Class:, A-6; Silty CLAY, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.25 tsf; tv: 2.0 tsf	WOR-WOR-WOH-5 (WOR/WOH)						
75		Visual Class:, A-6; Silty CLAY, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.0 tsf	WOH-3-11-7 (14)						
80		Visual Class:, A-6; Silty CLAY, gry-brn, MTW, Rec. = 2.0 ft, pp: 0.5 tsf; tv: 2.0 tsf	4-4-5-7 (9)						
		Hole stopped @ 82.0 ft							
85		Remarks: 1. Boring backfilled with spoils and sand until reaching a firm, non-yielding state.							
90									
95									
100									

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. Ç is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.
4. * Indicates that soil description has been verified based upon laboratory results.
5. Strata column graphic indicates AASHTO soil classification system.

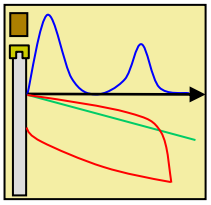
BORING LOG VTRANS FAIRLEE.GPJ VERMONT AOT.GDT 5/31/24

APPENDIX III

SUMMARY OF ENERGY MEASUREMENT DRILL RIG CALIBRATION SHEETS

GEOSCIENCES TESTING AND RESEARCH, INC.

55 Middlesex Street, Suite 225, N. Chelmsford, MA 01863
Ph: (978)251-9395, Fx: (978)251-9396



January 6, 2021 GTR Project # 19.306

Mr. Tom Garside
New England Boring Contractors
40 Fordway Street
Derry, NH 03038

RE: Standard Penetration Test Energy Measurement Calibration- Revised
White Versadrill GT-8 Truck Rig with Automatic Hammer (VIN #4712-A-GT8-P)
Derry, NH

Dear Tom:

At your request, we have analyzed the standard penetration test energy measurement calibrations taken on October 9, 2019. The testing was conducted in order to evaluate the energy delivered to the sampling rods for various drill rig and hammer combinations. This information was used to determine the appropriate energy correction factor for the rig-hammer system. The particular rig tested in this report was the White Versadrill GT-8 Truck Rig with Automatic Hammer (VIN #4712-A-GT8-P) and designated as Rig 3. The dynamic testing was carried out in general accordance with ASTM D4633-10, "Standard Test Method for Energy Measurement for Dynamic Penetrometers".

Field Information

One White Versadrill GT-8 Truck Rig with Automatic Hammer (VIN #4712-A-GT8-P) was evaluated. See Appendix B for pictures of the rig. The rig was fitted with an automatic hammer. A sacrificial borehole was performed in New England Boring's (NEB) yard in Derry, NH to enable the testing. The drilling was accomplished using 4" ID HW Casing and NWJ rods. A standard split spoon sampler was used to collect the samples. Standard penetration tests (SPTs) were conducted at depths of 20, 24, 27, 30, 33 and 36 feet in general accordance with ASTM D1586. The collected soil samples generally indicated fine to coarse sand with minor amounts of silt and gravel. Refer to Table 1 for details on the field information and conditions.

Instrumentation

For tests the instrumentation consisted of an 18 inch long NWJ rod sub section. The rod was equipped with two full bridge foil resistance strain gages. Two piezo resistive accelerometer transducers were also attached to each of the instrumented sub sections. A Pile Driving Analyzer™ (PDA) Model 8G, manufactured by Pile Dynamics, Inc. was used to collect the data. The PDA is a computer fitted with a data acquisition and signal conditioning system. During driving of the drill string, the strain and acceleration signals are recorded and processed for each hammer blow. The

strain signal is converted to a force record and the acceleration signal is converted to a velocity record. The PDA saves selected hammer blows containing this information to disk and determines the compressive stresses, displacement, and energy at the point of measurement. This information can be viewed on the computer screen during driving. Refer to Appendix A for literature and background on dynamic testing in general.

Energy Measurement

The primary purpose of the testing was to determine the energy transferred from the hammer to the instrumented subsection. The PDA measurements of force and velocity were analyzed to calculate the energy using the FV method (EMX), which is based on both force and velocity measurements as follows:

$$EMX = \int F(t)\, v(t) dt$$

Another method, known as the EF2 method, was not used due to the limitations associated with the measurements (i.e. based on force alone assuming proportionality at the gage locations since velocity is not used in the analysis). The EF2 method is not the recommended method in ASTM D4633.

The rated energy (designated as ER) for the hammer is 0.35 kip-ft based on the 2.5 feet (30 inch) drop height and 0.14 kip (140 pound) ram. The actual efficiency or energy transfer ratio (ETR) for the hammer system can then be determined using EMX and ER as follows:

$$ETR = (EMX/ER)*100\%$$

For SPT, the typical ETR is taken as 60%, based on history and experience from prior studies. To adjust the measured SPT N values (Nmeasured) for actual hammer performance, the ETR can be used to correct the Nmeasured to N_{60} by using the correction factor (Cn) determined as:

$$Cn = ETR/60\%$$
and $N_{60} = Cn * Nmeasured.$

This is a correction for energy only. The application of additional corrections for overburden, non conventional samplers, etc., was not considered in this study and should be evaluated for appropriateness by the geotechnical engineer for this project.

Results

The results of the testing program are summarized in Tables 1 for the automatic hammer. The tables include EMX, ER, ETR, FMX (maximum measured force in the rod subsection), and BPM (blows per minute). The blow count, including the SPT N- value, and the soil description were recorded by others. See Appendix C for the boring log. The data was presented with statistical information including the average, maximum, minimum and standard deviation for the N-value associated with group of data sets (sample depths) for the hammer. In addition, the data for all depths for a particular hammer combined are also presented in the tables. Note that the N-value

may not match the number of blows analyzed due to differences between the inspector's blow count observations and the PDA recorded number. In some cases, bad blows or unreliable data from the PDA may also have been omitted. These results for the blows are presented in Appendix D as plots with blow number and in tabular form. Additional information is also presented in Appendix D including maximum velocity, maximum acceleration, maximum displacement and final displacement.

For the White Versadrill GT-8 Truck Rig with Automatic Hammer (VIN #4712-A-GT8-P) the results indicate that the average ETR varied between 80.1% and 92.5% for the five depths. The average ETR for all data with N-Values between 10 and 14 (5 locations) was around 87%, resulting in an overall Cn = 1.45. The typical blow rate was around 44 bpm for the automatic hammer.

This report has been prepared in accordance with generally accepted geotechnical engineering principles with specific application to this project. Our conclusions are based on applicable standards of practice, including any information reported to and/or prepared for us. No other warranty, expressed or implied, is made.

We have appreciated this opportunity to work with you on this project. If you have any questions regarding this report, please contact us at (978) 251-9395.

Sincerely,
Geosciences Testing and Research, Inc.

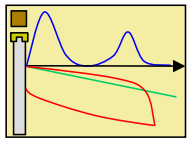
Domenic E. Valeri
Geotechnical Engineer

Les R. Chernauskas, P.E.
Principal

Curtis A. George
Principal

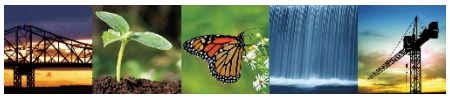
Attachments: Table, Appendices A - D
19.306 NE Boring SPT Report-VIN #4712-A-GT8-P.docx

TABLE 1
SPT ROD[1] CALIBRATION
WHITE VERSADRILL GT-8 TRUCK RIG WITH AUTOMATIC HAMMER
SUMMARY OF RESULTS



RIG TYPE	HAMMER TYPE	BORING	DATE	Test Number	OPERATOR	DEPTH	SAMPLE [2] DESCRIPTION	BLOW [2] COUNT	BLOWS [3] ANALYZED		EMX[4] (k-ft)	ER[5] (k-ft)	ETR[6] (%)	FMX (kips)	BPM (bpm)	Cn[7]
White Versadrill GT-8 Truck Rig (VIN 4712-A-GT8-P)	Auto Hammer	GT-8	10/9/19	#1	M.D	20-22	f-c SAND, trace inorganic Silt	3-3-4-4	9	Average	0.285	0.350	81.4	41.9	43.0	1.36
										Std.Dev.	0.002	0.000	0.7	0.3	0.2	
										Maximum	0.289	0.350	82.6	42.3	43.1	
										Minimum	0.287	0.350	80.6	41.3	42.6	
				#2	M.D	24-46	f.SAND	4-5-5-5	10	Average	0.293	0.350	83.7	42.5	43.0	1.40
										Std.Dev.	0.006	0.000	1.6	0.6	0.2	
										Maximum	0.300	0.350	85.6	43.6	43.4	
										Minimum	0.280	0.350	80.1	41.6	42.7	
				#3	M.D	27-29	f-c SAND, trace inorganic Silt	4-5-5-4	10	Average	0.294	0.350	84.1	43.2	42.2	1.40
										Std.Dev.	0.004	0.000	1.2	0.3	0.4	
										Maximum	0.301	0.350	86.1	43.7	43.0	
										Minimum	0.288	0.350	82.3	42.6	41.6	
				#4	M.D	30-32	f-c SAND, trace inorganic Silt	4-7-7-8	14	Average	0.305	0.350	87.2	42.0	43.4	1.45
										Std.Dev.	0.007	0.000	2.1	0.6	0.4	
										Maximum	0.324	0.350	92.5	43.1	44.0	
										Minimum	0.292	0.350	83.4	40.5	42.8	
				#5	M.D	33-35	f-c SAND	3-6-8-7	14	Average	0.307	0.350	87.7	38.5	43.5	1.46
										Std.Dev.	0.005	0.000	1.4	0.7	0.6	
										Maximum	0.317	0.350	90.7	40.2	44.3	
										Minimum	0.299	0.350	85.4	37.6	42.5	
				#6	M.D	36-38	f-m SAND, trace Silt	5-6-8-8	14	Average	0.317	0.350	90.6	36.5	45.4	1.51
										Std.Dev.	0.004	0.000	1.2	0.7	0.1	
										Maximum	0.322	0.350	92.0	37.9	45.7	
										Minimum	0.306	0.350	87.5	34.7	45.2	
				Average	M.D	-	-	-	62	Average	0.304	0.294	87.0	33.4	43.6	1.45
										Maximum	0.324	0.350	92.5	43.7	45.7	
										Minimum	0.280	0.350	80.1	34.7	41.6	

Notes:
1. NWJ rods used with NWJ instrumented rod.
2. The soil description and SPT N-value were recorded by others. The SPT N-value is the sum of the middle 2 numbers when the sampler s driven for 4 - six inch intervals
3. Blows analyzed correspond to SPT N-value and may not match up exactly with the N-value due to differences in blow count logging between PDA and inspector or poor data quality.
4. EMX is the integration of F and V obtained from the PDA.
5. ER is the rated energy of 0.35 kip-ft based on 140 pound hammer and 2.5 feet drop height.
6. ETR is the energy transfer ratio based on (EMX/ER)*100%.
7. Cn is the energy correction factor which is equal to ETR/60% and is used to convert the measured SPT N-value to the corrected equivalent value representing 60% energy transfer.



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35 Nutmeg Drive
Suite 325
Trumbull, CT 06611
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F: 203.375.1529
www.gza.com

April 27, 2023
Project No. 02.0177160.00

Mr. Thomas Garside
New England Boring Contractors
40 Fordway Street
Derry, New Hampshire 03038

Re: SPT Energy Testing
Mobile B-53 Drill Rig No. D-20
Mobile B-53 Drill Rig No. D-23
Mobile B-53 Drill Rig No. D-28
Winterport, Maine

Dear Mr. Garside,

This report summarizes the results of the dynamic energy measurements performed on the ***All-Terrain Vehicle Mounted Mobile B-53 Drill Rigs No. D-20, D-23, and D-28 equipped with a Northeast Geotechnical customized automatic hammer***. The SPT Energy Testing on the above drill rigs was performed on April 21, 2023 at the Bangor gravel pit located in Winterport, Maine. The tests were conducted by Michael Deery of GZA using a Pile Driving Analyzer®, Model 8G manufactured by Pile Dynamics, Inc. The measurements were performed in accordance with ASTM D4633-16 using the force velocity method (EFV).

Energy Measurement Program

The purpose of the energy measurement program was to evaluate the energy imparted during Standard Penetration Tests on each of the above three (3) drill rigs. The Standard Penetration test is conducted by driving a 1-3/8 inch I.D. split-spoon sampler (normally) 24 inches into the ground with a 140 lb. hammer falling 30 inches. The nominal driving energy of such a system is 4200 in.-lbs., or 350 ft.-lbs. However, actual energy output varies due to inefficiencies arising from the method of lifting and dropping the weight, as well as energy losses along the drill rods connecting the hammer to the sampler. Typical SPT results assume that the automatic hammer is operating at ***80 percent efficiency***, that is, that the energy per blow imparted by the hammer is 0.80 x 350 ft. lbs., or 280 ft.-lbs. This is based on the average results found when conducting SPT tests with similar automatic safety hammers.

The above drill rigs used a 140 lb. automatic hammer to perform the standard penetration testing. The automatic hammer is operated using a hydraulically powered chain drive which lifts the 140-lb. weight and releases it at the 30-inch drop height inside a closed steel cylinder. SPT data obtained when using any type of hammer should therefore be corrected based on the actual energy per blow, which allows traditional correlations between N-values and soil properties to be valid.

Drilling Equipment Details

The test borings were made by New England Boring Contractors using three (3) All-Terrain Vehicle Mounted Mobile B-53 Drill Rigs (i.e. Drill Rig # 20, Drill Rig #23, Drill Rig #28). A hollow-stem auger was used to provide an open hole from which Standard Penetration Tests could be performed for the samples. The Standard Penetration Tests were performed with the 140-pound automatic hammer customized for each tested drill rig. The hammer was physically linked to the top of the NWJ drill rods. Photographs of each drill rig can be found in the appendices.

Dynamic Energy Testing Equipment Details

The energy measurements were made using an instrumented 24-inch-long section of NWJ drill rod. Two piezoresistive accelerometers and two foil strain gages were mounted on the outside of the drill rod. Data was collected and stored using Pile Driving Analyzer®, model 8G. All the testing equipment was manufactured by Pile Dynamics, Inc., Cleveland, Ohio. Equipment calibration certificates can be found in Appendix B.

Energy Measurement Test Results

The Maine DOT requirements specify that energy measurements for each automatic drill rig be performed on a minimum of 5 SPT tests. Each test is to be conducted at locations between 10 and 40 feet below the ground surface with N-values between 10 and 50 blows per foot in predominately sandy subsurface conditions.

SPT testing for Drill Rig 20 was performed at sample depths of 10-12 feet, 15-17 feet, 20-22 feet, 25-27 feet, 30-32 feet, and 35-37 feet. The sample at depth 10-12 feet indicated gravel, therefore an additional sample was taken at 35-37 feet to meet the Maine DOT requirements.

SPT testing for Drill Rig 23 was performed at sample depths of 15-17 feet, 20-22 feet, 25-27 feet, 30-32 feet, and 35-37 feet. Given that the sample at depth 25-27 feet experienced an N-value of 65 blows per foot, an additional sample was taken at 37-39 feet to meet the Maine DOT requirements.

SPT testing for Drill Rig 28 was performed at sample depths of 15-17 feet, 20-22 feet, 25-27 feet, 30-32 feet, and 35-37 feet. Given that the sample at depth 20-22 feet experienced an N-value of 65 blows per foot, an additional sample was taken at 40-42 feet (slightly outside the maximum depth limit) to meet the Maine DOT requirements of a minimum of 5 SPT tests.

Each sample depth represents a data set in the attachments.

The attachments contain the SPT results for all tests conducted on each drill rig. Each data set includes a representative plot of force and normalized velocity verses time for a typical blow, the Maine DOT specified quantities for each hammer strike, and the average, maximum, minimum, and standard deviation of the tabulated data set. Note that each test was conducted over a 24-inch drill rod penetration with hammer strikes recorded over each 6-inch increment. All hammer strikes are presented in the attachments, but only the middle two (2) 6-inch increments are considered for the computed averaged quantities and the N-value.

A summary of the SPT test results for each drill rig are provided on the attached Tables 1 through 3. The summary tabulates the averaged Maine DOT quantities from each data set and provides Overall average, Overall maximum, and Overall minimum values for the tested penetrations.

Please contact the undersigned if you have any questions regarding the test findings.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Michael J. Deery
Project Engineer

Jon J. Jagello, P.E. (CT)
Senior Project Manager

STATE OF MAINE
Andrew
R.
Blaisdell
10957
LICENSED
PROFESSIONAL ENGINEER
04/27/2023

Andrew Blaisdell, P.E.
Senior Principal

Attachments:

Summary Tables
Appendix A - Mobil B-53 NEBC Drill Rig #20 (Test Results, Field Boring Log B-20, Photographs)
Mobil B-53 NEBC Drill Rig #23 (Test Results, Field Boring Log B-23, Photographs)
Mobil B-53 NEBC Drill Rig #28 (Test Results, Field Boring Log B-28, Photographs)
Appendix B - Calibration Certificates

TABLE 1 - SUMMARY OF SPT TEST RESULTS
MOBIL B53 - NEBC DRILL RIG #20 (SERIAL NUMBER 755609D)

SPT Analyzer Results

PDA-S Ver. 2022.35.2 - Printed: 4/23/2023

Summary of SPT Test Results

Project: Mobil B53 D-20, Test Date: 4/21/2023

BPM: Blows/Minute
FMX: Maximum Force
AMX: Maximum Acceleration
VMX: Maximum Velocity

DMX: Maximum Displacement
DFN: Final Displacement
EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated

Instr. Length ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average AMX g's	Average VMX ft/s	Average DMX in	Average DFN in	Average EMX ft-lb	Average ETR %
14.00	**15-21-21-27**	**42**	**51**	52.3	34	2885	12.4	0.38	0.29	246	70.4
19.00	**16-22-22-23**	**44**	**54**	57.3	35	2821	12.8	0.33	0.27	251	71.8
24.00	**13-21-25-21**	**46**	**56**	58.0	34	3778	14.0	0.33	0.26	268	76.5
29.00	**15-10-8-9**	**18**	**22**	55.8	34	2554	17.0	1.21	0.67	284	81.0
34.00	**5-7-13-16**	**20**	**24**	56.3	36	3399	15.6	0.53	-0.63	265	75.7
39.00	**6-9-11-21**	**20**	**24**	55.8	35	3578	15.8	0.60	0.60	260	74.4
		Overall Average Values:		55.9	35	3186	14.0	0.47	0.25	260	74.2
		Standard Deviation:		4.3	1	526	1.8	0.28	0.35	14	3.9
		Overall Maximum Value:		58.5	38	4925	18.3	1.48	0.75	308	88.1
		Overall Minimum Value:		1.9	31	2264	10.5	0.28	-1.18	235	67.0

TABLE 2 - SUMMARY OF SPT TEST RESULTS
MOBIL B53 - NEBC DRILL RIG #23 (SERIAL NUMBER D23-8/16)

SPT Analyzer Results

PDA-S Ver. 2022.35.2 - Printed: 4/23/2023

Summary of SPT Test Results

Project: Mobil B53 D-23, Test Date: 4/21/2023

BPM: Blows/Minute
FMX: Maximum Force
AMX: Maximum Acceleration
VMX: Maximum Velocity

DMX: Maximum Displacement
DFN: Final Displacement
EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated

Instr. Length ft	Blows Applied /6"	**N Value**	**N60 Value**	Average BPM bpm	Average FMX kips	Average AMX g's	Average VMX ft/s	Average DMX in	Average DFN in	Average EMX ft-lb	Average ETR %
19.00	**17-22-28-20**	**50**	**63**	55.4	40	3769	14.6	0.31	0.24	272	77.7
24.00	**11-12-14-18**	**26**	**32**	52.5	37	3885	16.8	0.51	0.46	275	78.5
29.00	**14-34-31-20**	**65**	**82**	51.4	40	3653	14.5	0.29	0.18	260	74.2
34.00	**33-14-13-15**	**27**	**34**	51.1	38	2966	13.8	0.48	0.44	272	77.7
39.00	**14-15-12-11**	**27**	**34**	53.2	40	2706	14.9	1.70	1.68	287	81.9
44.00	**11-10-13-14**	**23**	**29**	54.9	37	4128	15.5	0.56	0.52	231	66.0
		Overall Average Values:		53.0	39	3552	14.9	0.55	0.49	266	76.0
		Standard Deviation:		1.7	2	554	1.1	0.47	0.49	17	4.8
		Overall Maximum Value:		55.8	43	5373	18.8	2.52	2.52	303	86.5
		Overall Minimum Value:		50.7	33	2571	13.2	0.23	0.18	210	59.9

TABLE 3 - SUMMARY OF SPT TEST RESULTS
MOBIL B53 - NEBC DRILL RIG #28 (SERIAL NUMBER D28-2/21)

SPT Analyzer Results

PDA-S Ver. 2022.35.2 - Printed: 4/23/2023

Summary of SPT Test Results

Project: Mobil B53 D-28, Test Date: 4/21/2023

BPM: Blows/Minute
FMX: Maximum Force
AMX: Maximum Acceleration
VMX: Maximum Velocity
DMX: Maximum Displacement
DFN: Final Displacement
EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated

Instr. Length ft	Blows Applied /6"	N Value	N60 Value	Average BPM bpm	Average FMX kips	Average AMX g's	Average VMX ft/s	Average DMX in	Average DFN in	Average EMX ft-lb	Average ETR %
19.00	**12-19-20-25**	**39**	**49**	50.0	39	3725	14.2	0.42	0.31	252	72.0
24.00	**8-39-26-26**	**65**	**82**	52.7	37	4030	15.1	0.33	0.18	268	76.6
29.00	**5-8-11-13**	**19**	**24**	54.3	40	4426	15.5	0.67	0.63	277	79.2
34.00	**8-7-8-6**	**15**	**19**	54.3	39	3041	14.4	0.83	0.80	270	77.1
39.00	**3-4-6-5**	**10**	**12**	54.2	39	2906	14.4	1.22	1.20	279	79.7
44.00	**11-14-23-15**	**37**	**47**	54.2	40	2694	12.9	0.41	0.32	275	78.7
		Overall Average Values:		52.8	39	3598	14.4	0.49	0.39	268	76.5
		Standard Deviation:		1.6	1	700	1.1	0.26	0.28	11	3.1
		Overall Maximum Value:		55.1	40	5470	17.0	1.50	1.50	288	82.3
		Overall Minimum Value:		49.7	36	2058	12.2	0.25	0.15	240	68.7

APPENIDX IV

GROUNDWATER MONITORING WELL LOG

HNTB CORPORATION
Consulting Engineers

Observation Well Installation Log

WELL NO.: B-106A-1

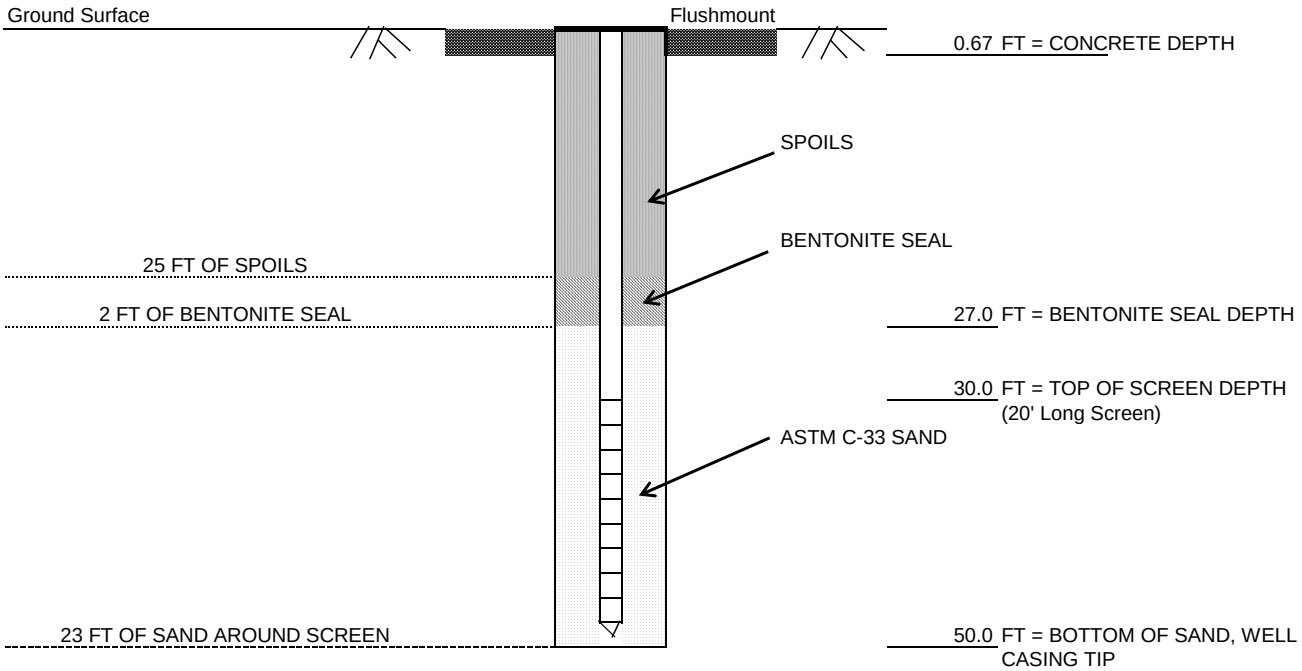
PROJECT NAME: VTrans Fairlee T.O. #7 PROJECT NO.: 78773

DATE INSTALLED: 3/22/2024 INSPECTOR: Josef Bourgeois HOLE DEPTH: 82 ft

CONTRACTOR: NEBC DRILLER: Kenneth Smith HELPER: Rick LaRhette

LOCATION: Fairlee, VT GROUND ELEVATION: 430 ft

SKETCH OF SOIL STRATIGRAPHY



Not to Scale

POINTS OF INTEREST

WELL READINGS

DATE	TIME	BY	DEPTH(FT)	ELEVATION (FT)
3/25/2024	9:00 AM	JPB	24.4	405.6
3/26/2024	9:00 AM	JPB	26	404.0
3/27/2024	7:30 AM	JPB	26	404.0
3/28/2024	8:30 AM	JPB	26	404.0
3/29/2024	8:30 AM	JPB	26	404.0
4/10/2024	8:30 AM	JPB	26	404.0
4/17/2024	1:00 PM	JPB	26	404.0

Depth recorded is depth below ground surface

WELL DATA

ITEM	DESCRIPTION
PVC Well Casing Inside Diameter	2"
Lock Installed	YES
Standpipe or Flushmount	FLUSHMOUNT
Bags of Sand Used	4
Bags of Bentonite Used	1
Development	YES

NOTES: Hole filled with 32 FT of spoils from bottom of boring to well casing tip

APPENIDX V

LABORATORY TEST RESULTS

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	04/26/24	Checked By:	ank
Depth :	---	Test Id:	767302		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-101A	S- 14	50-52	Moist, gray silt	31.8
B-102	S- 14	50-52	Moist, gray clay	31.5
B-102	S- 16	59-61	Moist, gray silt	37.4
B-103	S- 15	59-61	Moist, gray clay with gravel	40.1
B-103	S- 17	74-76	Moist, gray silt	32.0
B-104	S- 16	59-61	Moist, gray clay	34.5
B-104	S- 19	74-76	Moist, gray silt	34.9
B-106A	S- 5	60-62	Moist, gray clay	34.3
B-107	S- 10	30-32	Moist, gray silty clay	26.6

Notes: Temperature of Drying : 110º Celsius

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	---	Sample Type:	---	Tested By:	ajl
Sample ID:	---	Test Date:	05/04/24	Checked By:	ank
Depth :	---	Test Id:	767316		

Amount of Material Passing #200 Sieve - ASTM D1140

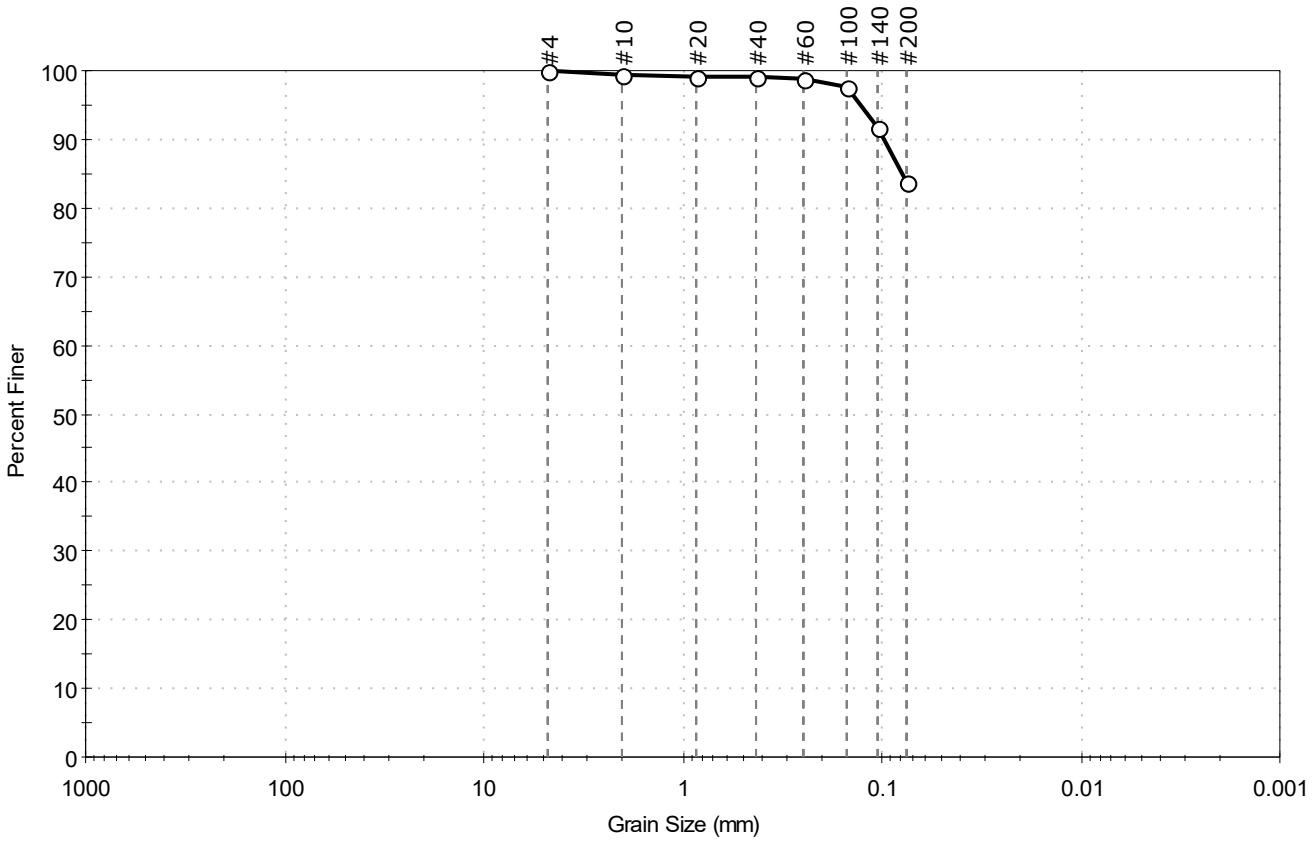
Boring ID	Sample ID	Depth	Visual Description	Fines, %
B-101A	S-12	40-42	Moist, olive gray silty clay	92.4
B-103	S-13	50-52	Moist, gray clay	80.2
B-105	S-8	19-21	Moist, olive gray silt	97.6
B-107	S-15	55-57	Moist, gray silty sand	78.7

Notes: Tests performed using Method B - washing using a wetting agent
Dry mass of test specimen was determined directly

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-101A	Sample Type:	Jar	Tested By:	ajl
Sample ID:	S-11	Test Date:	05/04/24	Checked By:	ank
Depth :	35-37	Test Id:	767312		

Test Comment: ---
Visual Description: Moist, olive gray silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	16.1	83.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	99		
#60	0.25	99		
#100	0.15	98		
#140	0.11	92		
#200	0.075	84		

Coefficients

D_{85} = 0.0787 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

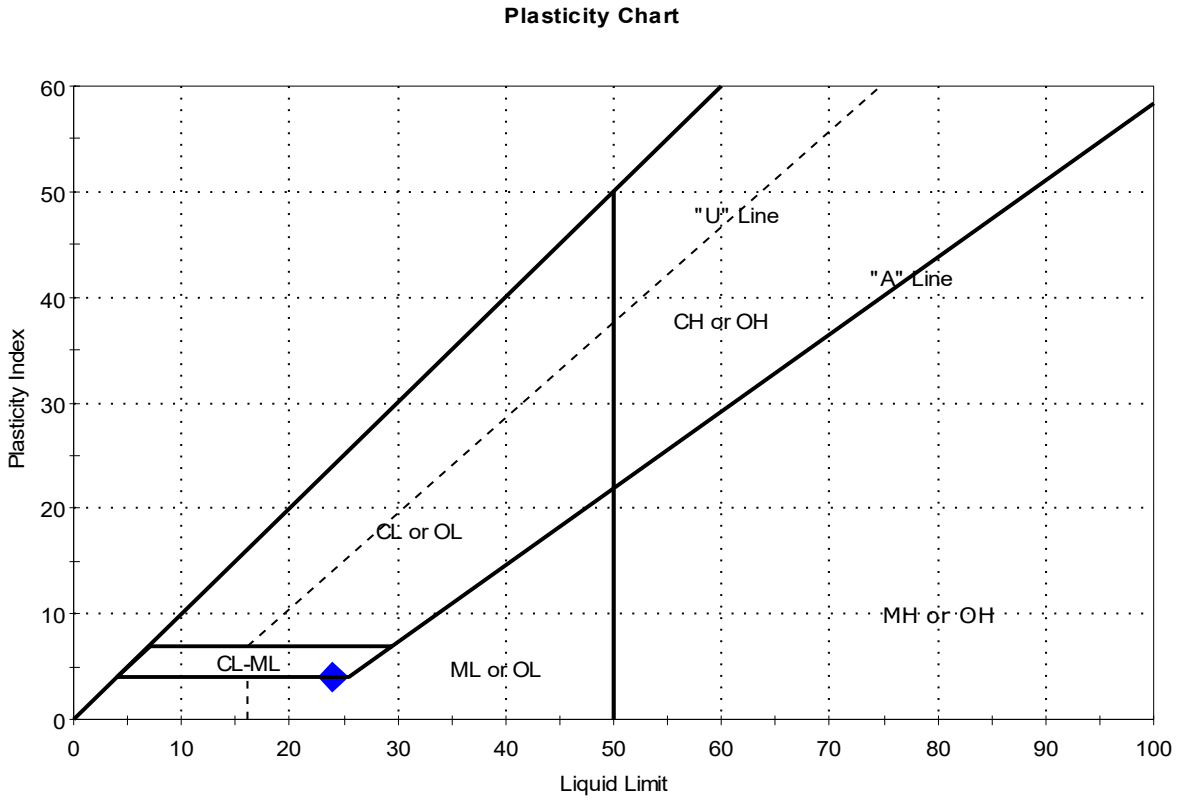
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-101A	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-12	Test Date:	05/03/24	Checked By:	ank
Depth :	40-42	Test Id:	767420		
Test Comment:	---				
Visual Description:	Moist, olive gray silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-12	B-101A	40-42	27	24	20	4	1.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-101A	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-14	Test Date:	05/02/24	Checked By:	ank
Depth :	50-52	Test Id:	767303		
Test Comment:	---				
Visual Description:	Moist, gray silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-14	B-101A	50-52	32	n/a	n/a	n/a	n/a	

Dry Strength: LOW

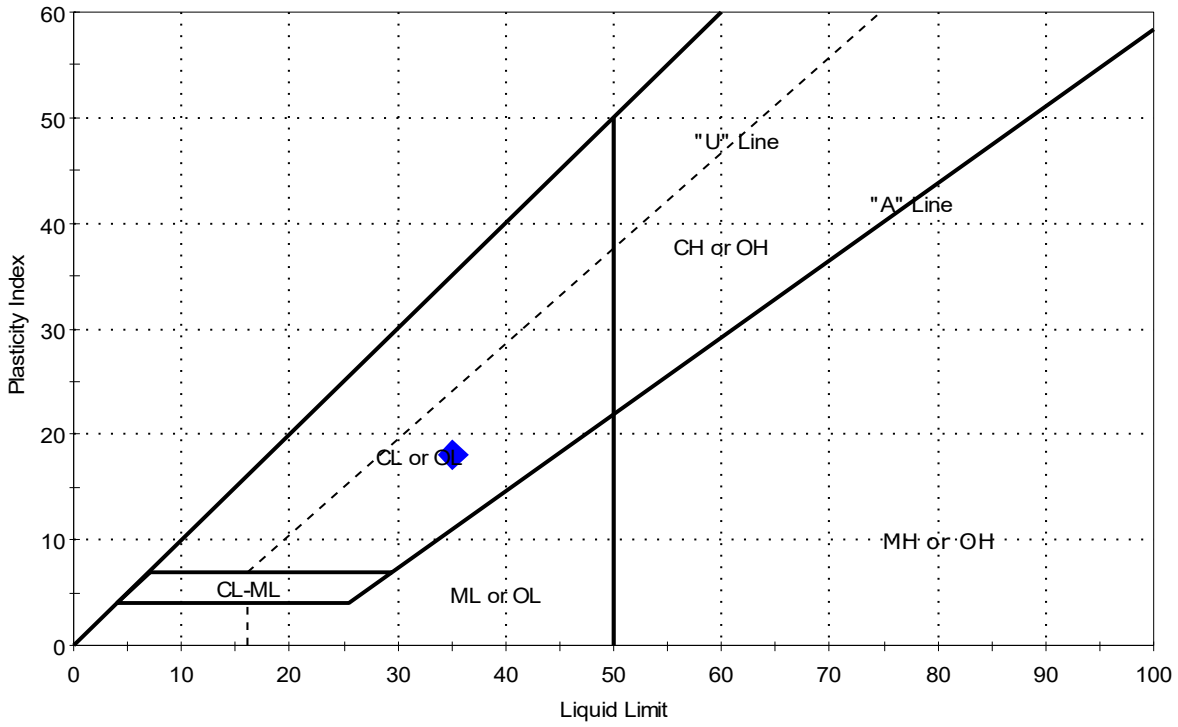
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-102	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-14	Test Date:	05/07/24	Checked By:	ank
Depth :	50-52	Test Id:	767304		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-14	B-102	50-52	31	35	17	18	0.8	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-102	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-16	Test Date:	04/30/24	Checked By:	ank
Depth :	59-61	Test Id:	767305		
Test Comment:	---				
Visual Description:	Moist, gray silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-16	B-102	59-61	37	n/a	n/a	n/a	n/a	

Dry Strength: LOW

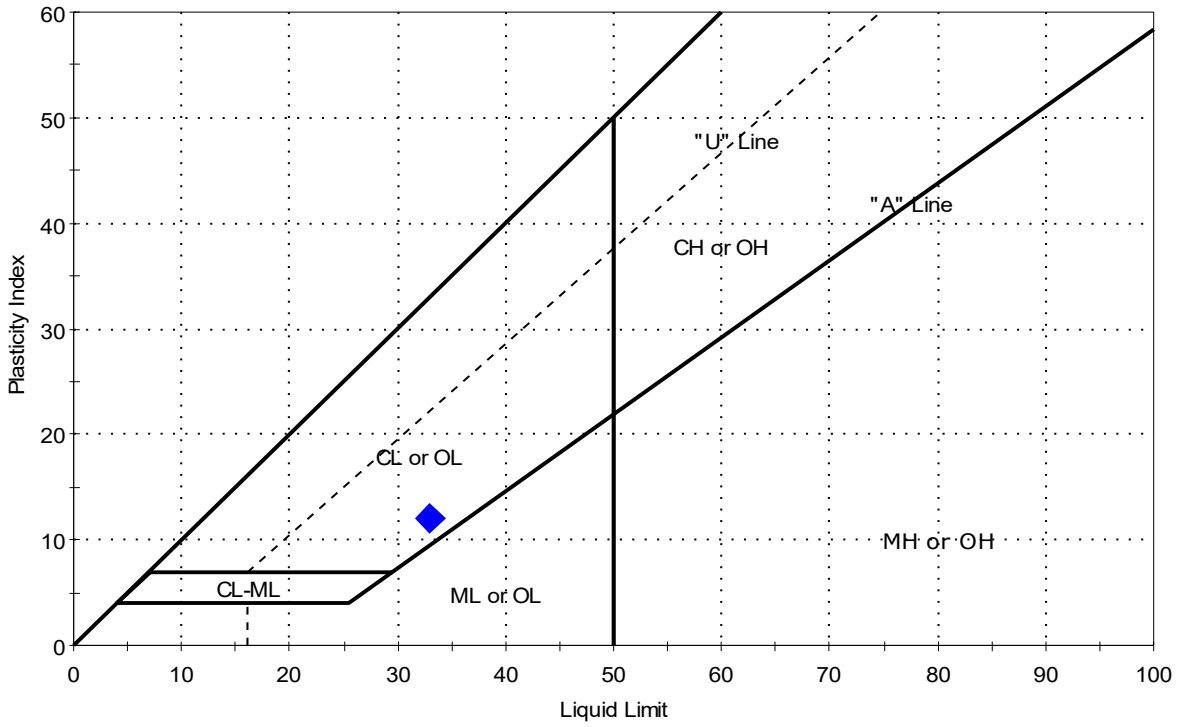
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-103	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-13	Test Date:	05/03/24	Checked By:	ank
Depth :	50-52	Test Id:	767318		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-13	B-103	50-52	32	33	21	12	0.9	

Sample Prepared using the WET method

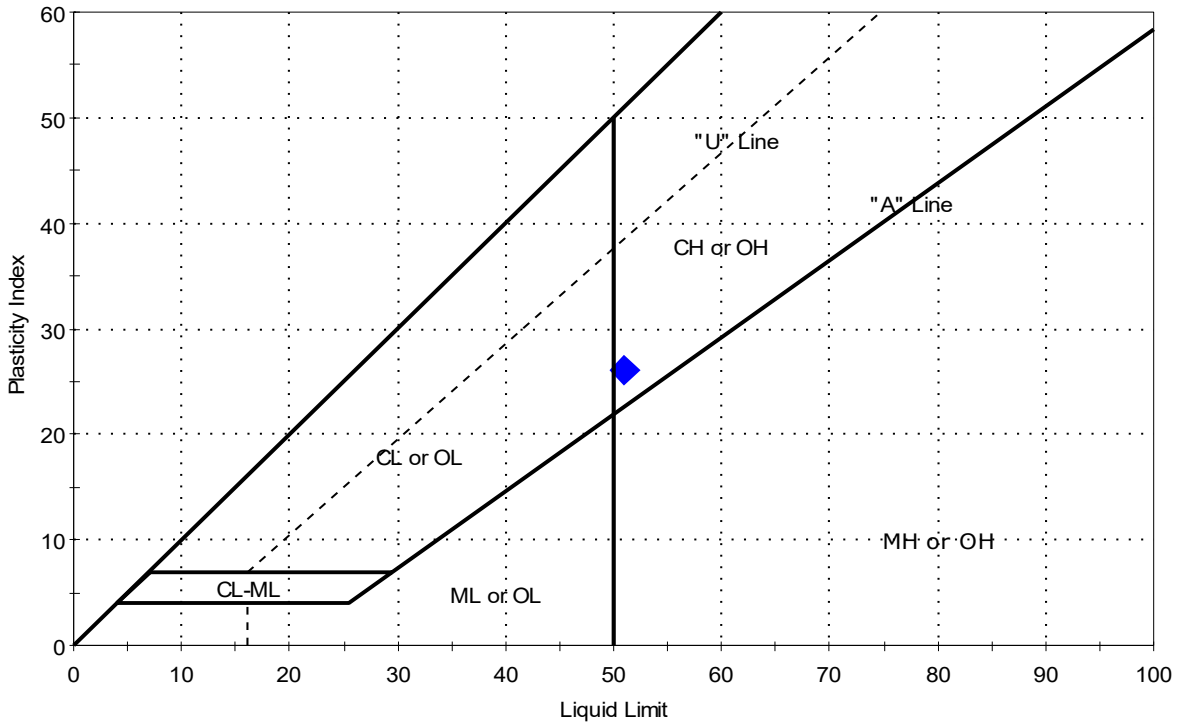
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-103	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-15	Test Date:	05/07/24	Checked By:	ank
Depth :	59-61	Test Id:	767306		
Test Comment:	---				
Visual Description:	Moist, gray clay with gravel				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-15	B-103	59-61	40	51	25	26	0.6	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

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Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-103	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-17	Test Date:	05/06/24	Checked By:	ank
Depth :	74-76	Test Id:	767307		
Test Comment:	---				
Visual Description:	Moist, gray silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-17	B-103	74-76	32	n/a	n/a	n/a	n/a	

Dry Strength: LOW

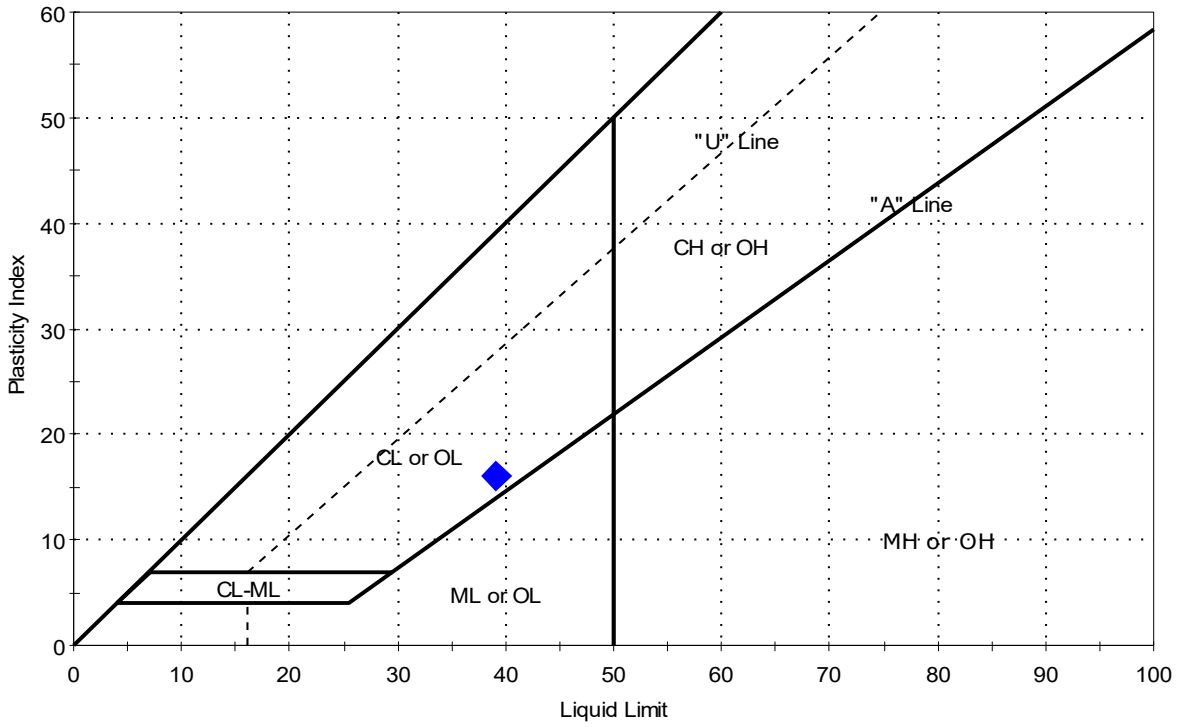
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-104	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-16	Test Date:	05/02/24	Checked By:	ank
Depth :	59-61	Test Id:	767308		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-16	B-104	59-61	34	39	23	16	0.7	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-104	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-19	Test Date:	05/02/24	Checked By:	ank
Depth :	74-76	Test Id:	767309		
Test Comment:	---				
Visual Description:	Moist, gray silt				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-19	B-104	74-76	35	n/a	n/a	n/a	n/a	

Dry Strength: LOW

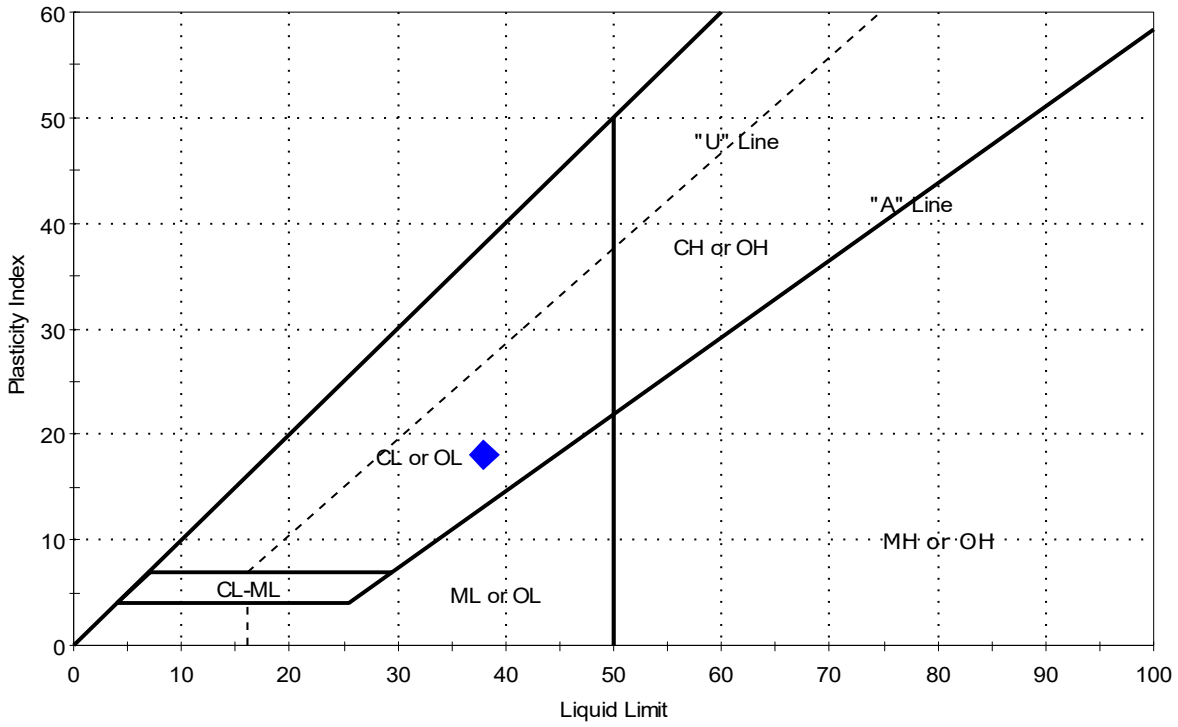
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-106A	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-5	Test Date:	05/06/24	Checked By:	ank
Depth :	60-62	Test Id:	767310		
Test Comment:	---				
Visual Description:	Moist, gray clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-5	B-106A	60-62	34	38	20	18	0.8	

Sample Prepared using the WET method

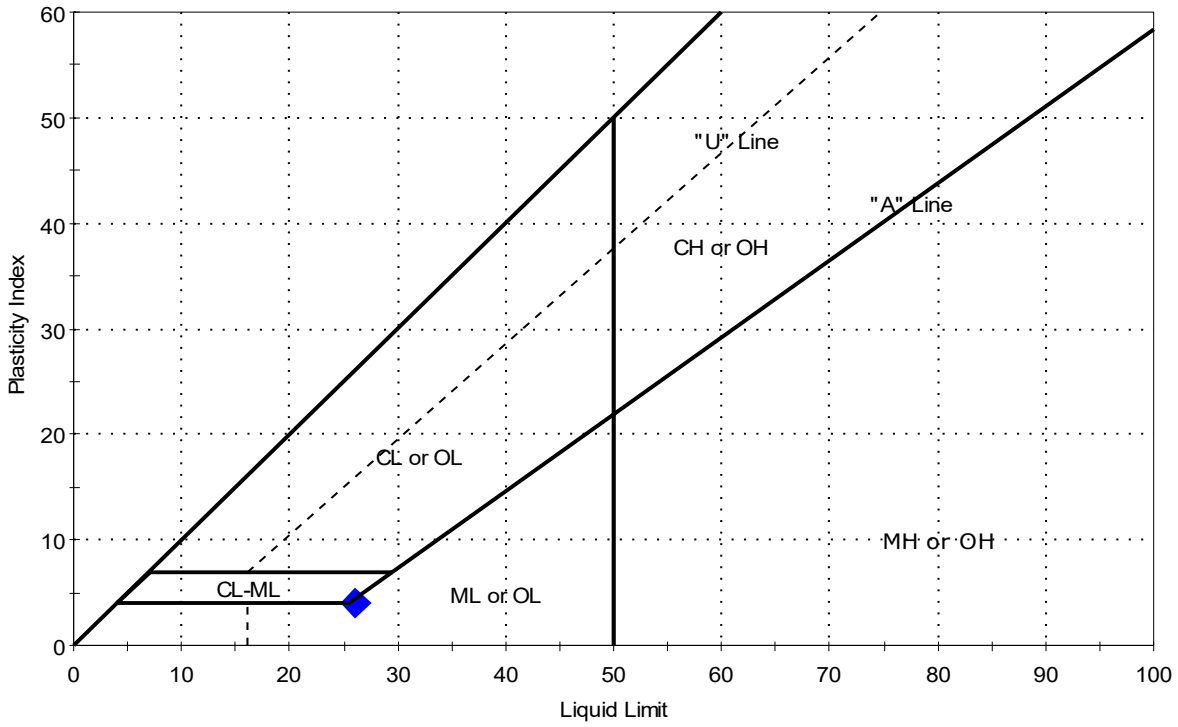
Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-107	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-10	Test Date:	05/06/24	Checked By:	ank
Depth :	30-32	Test Id:	767311		
Test Comment:	---				
Visual Description:	Moist, gray silty clay				
Sample Comment:	---				

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-10	B-107	30-32	27	26	22	4	1.1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW

Toughness: LOW

Client:	HNTB Corporation				
Project:	Vtrans Fairlee T.O #7				
Location:	Fairlee, VT			Project No:	GTX-318995
Boring ID:	B-107	Sample Type:	Jar	Tested By:	cam
Sample ID:	S-15	Test Date:	05/06/24	Checked By:	ank
Depth :	55-57	Test Id:	767320		
Test Comment:	---				
Visual Description:	Moist, gray silty sand				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-15	B-107	55-57	27	n/a	n/a	n/a	n/a	

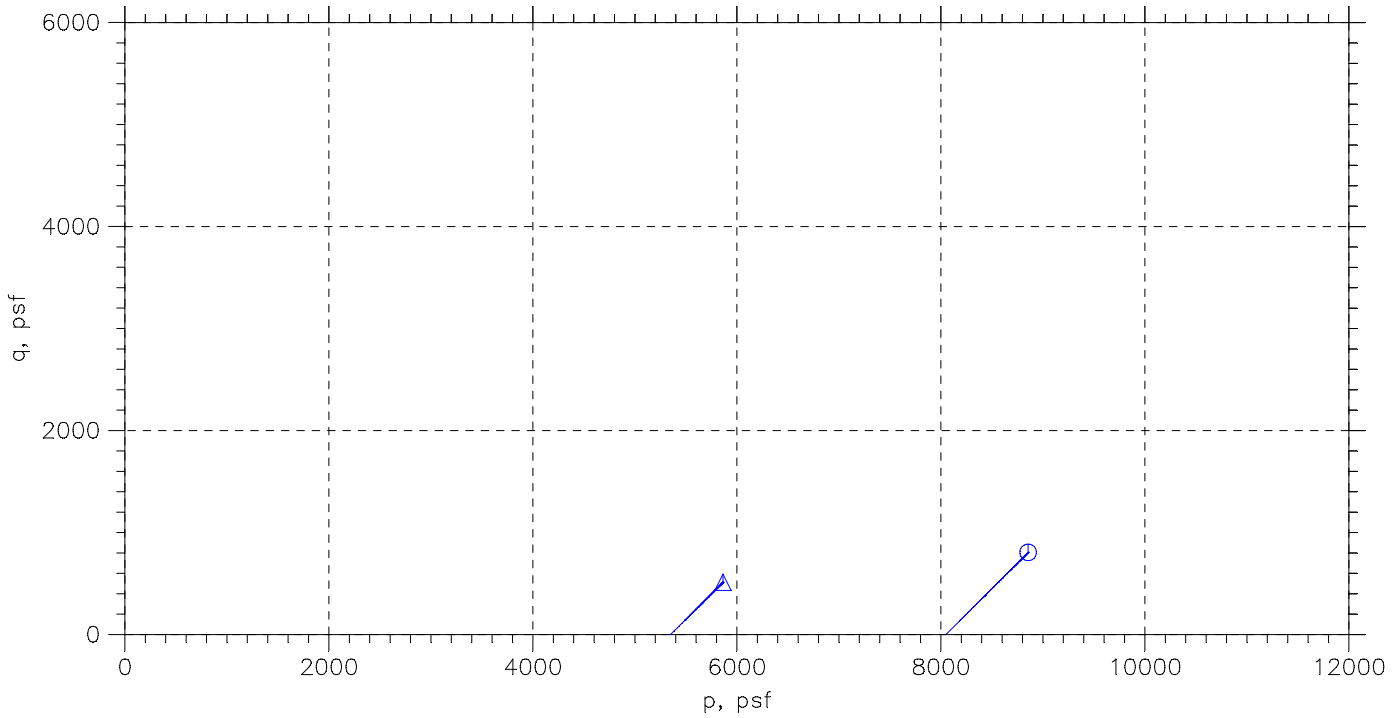
Dry Strength: LOW

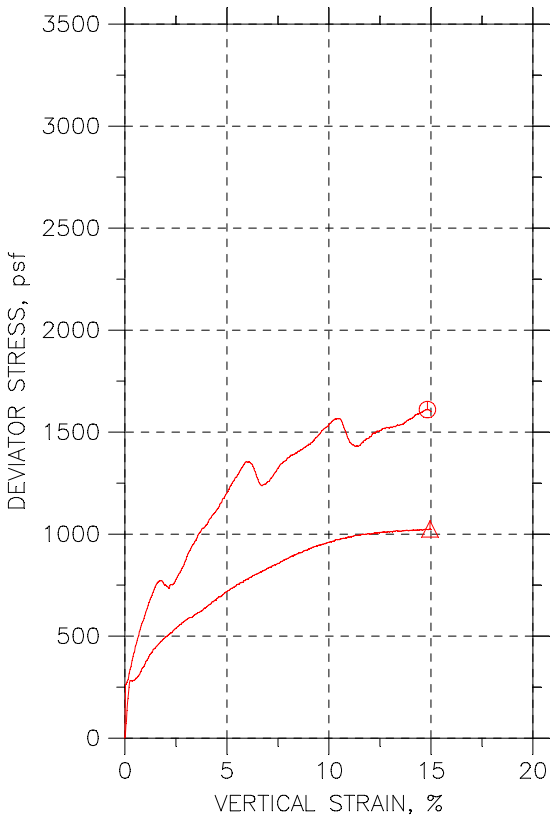
Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⏲	△		
Sample No.	UD-1	UD-1		
Test No.	UU-1-1R	UU-1-2		
Depth	57-59	57-59		
Tested by	te	te		
Test Date	5/2/24	4/25/24		
Checked by	anm	anm		
Check Date	5/08/24	5/08/24		
Diameter, in	2.01	2.01		
Height, in	4.45	4.12		
Water Content, %	41.0	32.4		
Dry Density, pcf	79.09	90.22		
Saturation, %	96.6	99.0		
Void Ratio	1.16	0.896		
Confining Stress, psf	8050	5350		
Undrained Strength, psf	805.2	512.6		
Max. Dev. Stress, psf	1610	1025		
Strain at Failure, %	14.8	15		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.74	2.74		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		

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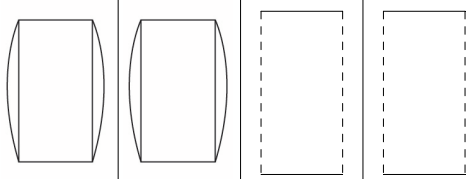
Project: Vtrans Fairlee T.O. #7

Location: Fairlee, VT

Project No.: GTX-318995

Boring No.: B-102

Sample Type: intact



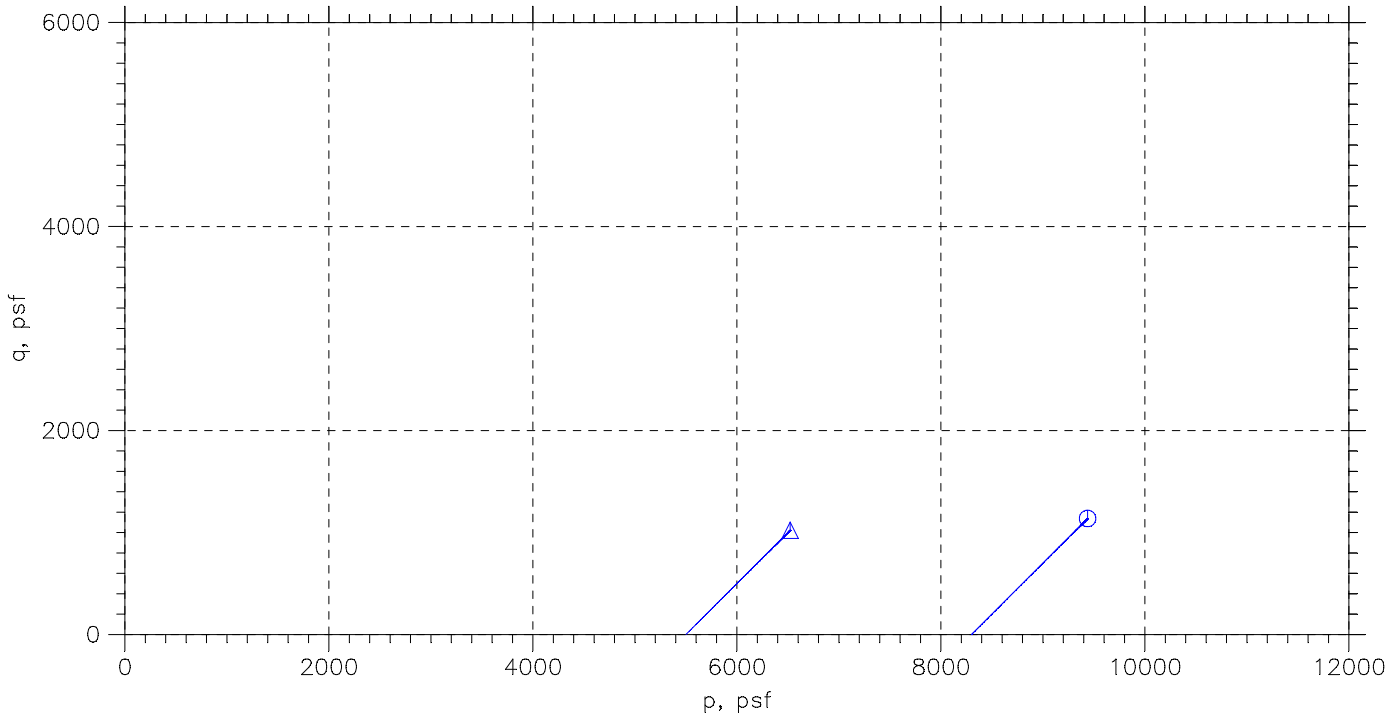
Description: Moist, dark gray silt

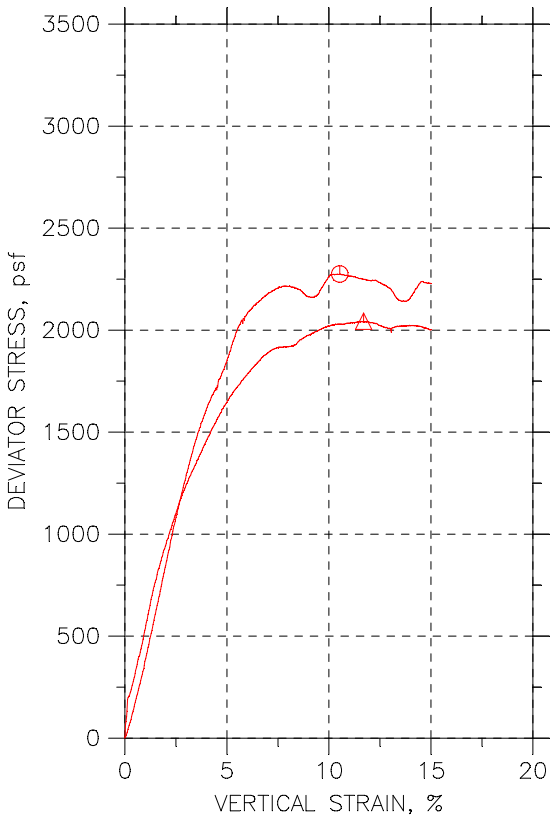
Remarks: TX-027

Phase calculations based on start of test.

Wed, 08-MAY-2024 16:12:21

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⏲	△		
Sample No.	UD-1	UD-1		
Test No.	UU-2-1	UU-2-2		
Depth	62-64	62-64		
Tested by	te	te		
Test Date	4/25/24	4/25/24		
Checked by	anm	anm		
Check Date	5/01/24	5/01/24		
Diameter, in	2.02	2.03		
Height, in	4.45	4.41		
Water Content, %	30.4	30.1		
Dry Density, pcf	92.62	93.		
Saturation, %	98.4	98.3		
Void Ratio	0.847	0.839		
Confining Stress, psf	8300	5500		
Undrained Strength, psf	1138	1022		
Max. Dev. Stress, psf	2275	2044		
Strain at Failure, %	10.5	11.7		
Strain Rate, %/min	1	1		
Estimated Specific Gravity	2.74	2.74		
Liquid Limit	---	---		
Plastic Limit	---	---		
Plasticity Index	---	---		

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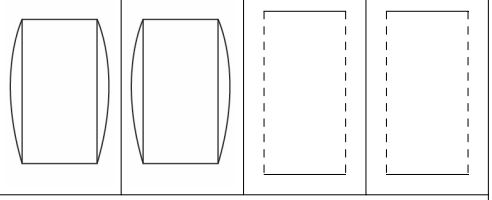
Project: Vtrans Fairlee T.O. #7

Location: Fairlee, VT

Project No.: GTX-318995

Boring No.: B-107

Sample Type: intact



Description: Moist, dark gray clay

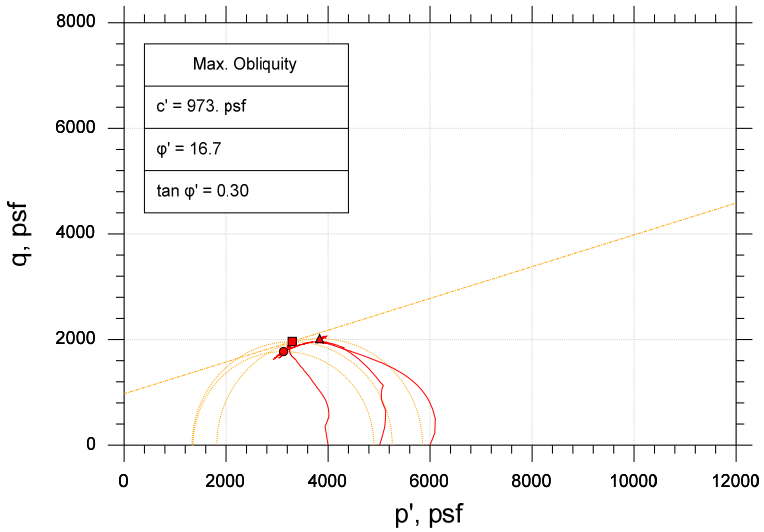
Remarks: TX-027, Contains multiple small sand layers.

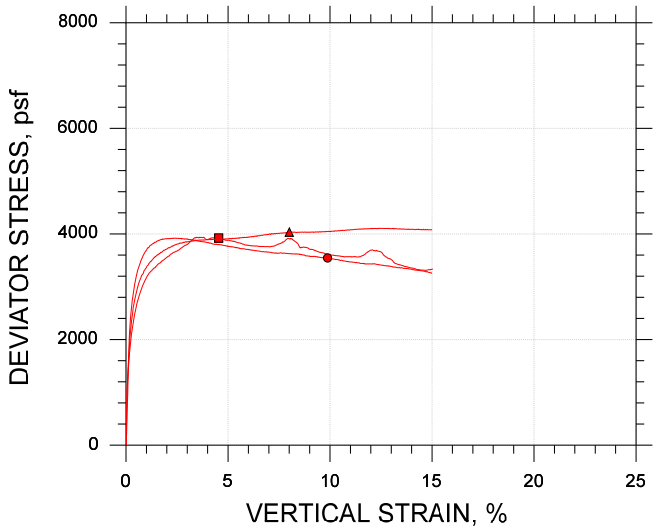
Phase calculations based on start of test.

Wed, 01-MAY-2024 16:30:15

Client: HNTB Corporation	
Project Name: Vtrans Fairlee T.O #7	
Project Location: Fairlee, VT	
Project Number: GTX-318995	
Tested By: sjt	Checked By: anm
Boring ID: B106A	
Preparation: intact	
Description: Moist, very dark gray clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

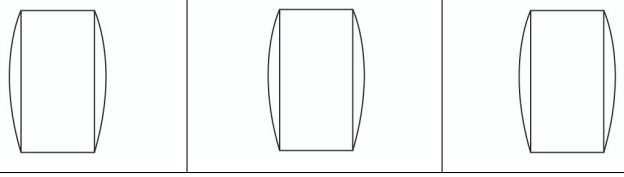




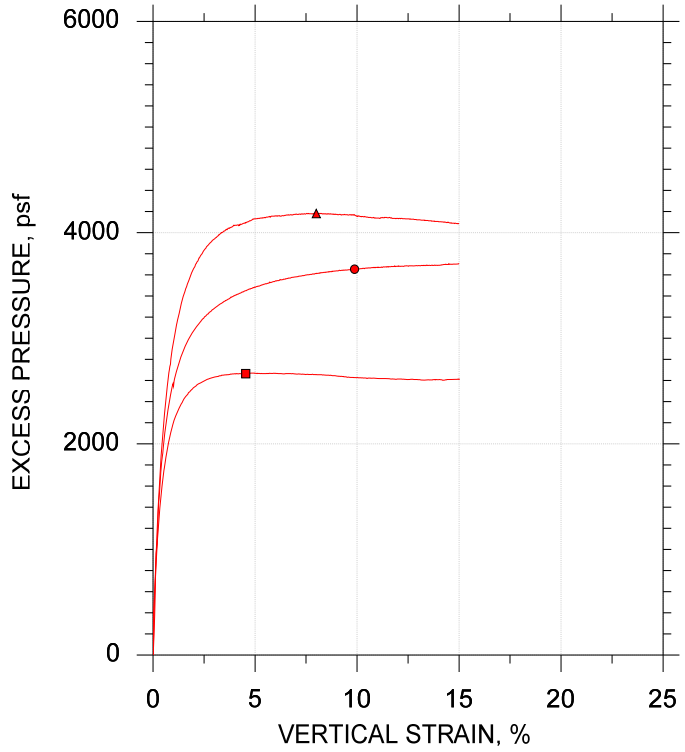
Symbol		■	●	▲	
Sample ID		UD-1	UD-1	UD-1	
Depth, ft		62-64	62-64	62-64	
Test Number		CU-1-1	CU-1-2	CU-1-3	
Initial	Height, in	4.550	4.550	4.500	
	Diameter, in	2.020	2.020	2.020	
	Moisture Content (from Cuttings), %	33.8	35.6	32.7	
	Dry Density, pcf	86.8	85.8	89.5	
	Saturation (Wet Method), %	96.8	99.7	99.9	
	Void Ratio	0.942	0.964	0.882	
Before Shear	Moisture Content, %	34.3	30.1	29.0	
	Dry Density, pcf	87.5	93.0	94.5	
	Cross-sectional Area (Method A), in²	3.206	3.003	3.118	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.926	0.812	0.784	
	Back Pressure, psf	2.318e+004	9350.	2.892e+004	
Vertical Effective Consolidation Stress, psf		3993.	4996.	5972.	
Horizontal Effective Consolidation Stress, psf		4002.	5008.	5999.	
Vertical Strain after Consolidation, %		0.8462	1.258	2.215	
Volumetric Strain after Consolidation, %		0.7677	7.011	4.108	
Time to 50% Consolidation, min		---	---	49.00	
Shear Strength, psf		1961.	1773.	2018.	
Strain at Failure, %		4.54	9.88	8.00	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psf		3922.	3545.	4036.	
Effective Minor Principal Stress at Failure, psf		1335.	1353.	1817.	
Effective Major Principal Stress at Failure, psf		5257.	4898.	5852.	
B-Value		0.72	0.96	0.90	

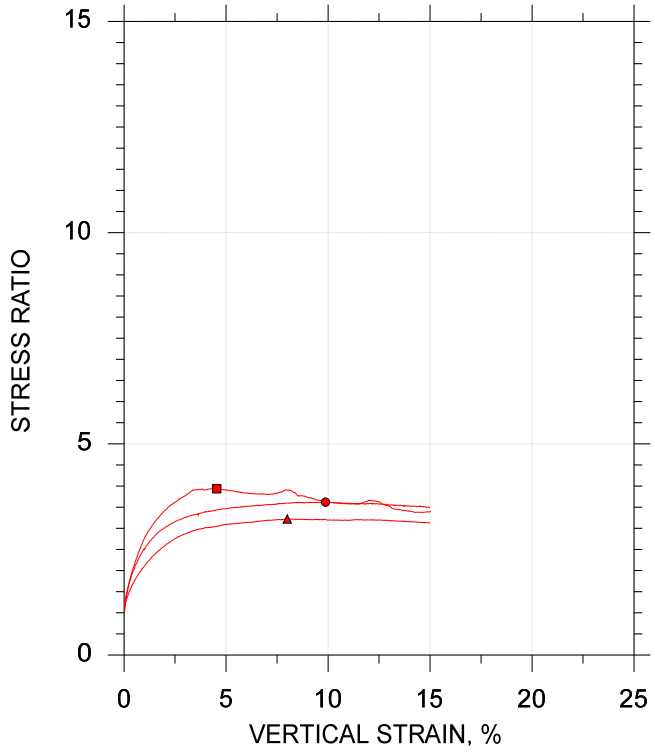
Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

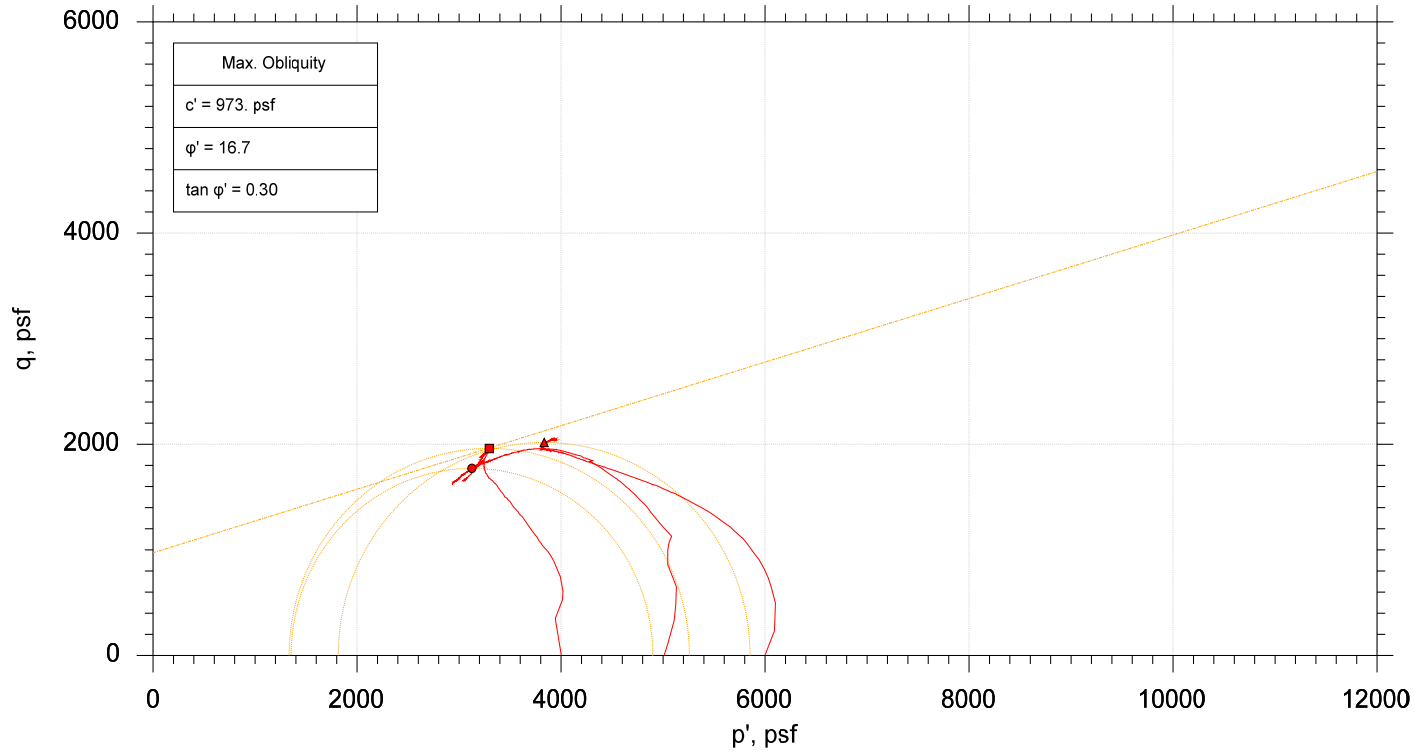
Remarks:



CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	UD-1	CU-1-1	62-64	sjt	04/26/24	anm	5/8/24	318995-CU-1-1v.dat
●	UD-1	CU-1-2	62-64	trm	4/26/2024	anm	5/8/24	318995-CU-1-2v.dat
▲	UD-1	CU-1-3	62-64	trm	4/29/2024	anm	5/8/24	318995-CU-1-3v.dat

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Project: Vtrans Fairlee T.O #7	Location: Fairlee, VT	Project No.: GTX-318995
Boring No.: B106A	Sample Type: intact	
Description: Moist, very dark gray clay		
Remarks: TX-005		