Package 3 Boring Locations

Champlain Hudson Power Express

New York

PROJECT NUMBER 20001480

CREATED BY Kiewit

DATE 12/02/2022

Legend Key

- Kiewit Borings (2022)



EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-136.2-DRAFT

PROJECT NUMBER	20001480	**LOGGED BY**	S. Crowley	**COORDINATES**	N 1611022.64 E 732641.05
START DATE	11/11/2022	**DRILLER/RIG**	John and Eric /	**GROUND ELEV.**	140 ft approx.
FINISH DATE	11/14/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0		FILL: Railroad ballast, some clay and sand, brown, firm			21%		1-3-1-4 (4)	
					38%		4-3-3-3 (6)	
	135.5	Gravelly SAND (SP), brown, firm to stiff, fine grained sand, subangular gravel, poorly graded			25%		5-4-3-3 (7)	
5					34%		3-6-4-5 (10)	
					29%		7-5-6-4 (11)	
10					38%		8-8-6-7 (14)	
15	124.5	CLAY (CL), light brown, soft to stiff, moist			88%		3-7-9-12 (16)	
20		sandy at 20-25 ft			92%		1-2-2-4 (4)	
25		light brown to gray, very soft			88%		0-0-0-0 (0)	
30								

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

DRAFT

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-136.2-DRAFT

PROJECT NUMBER	20001480	**LOGGED BY**	S. Crowley	**COORDINATES**	N 1611022.64 E 732641.05
START DATE	11/11/2022	**DRILLER/RIG**	John and Eric /	**GROUND ELEV.**	140 ft approx.
FINISH DATE	11/14/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			CLAY (CL), gray, very soft, moist			88%		0-0-0-0	3 inch ring sampler
35						96%		0-0-0-0 (0)	
40						100%		0-0-0-0 (0)	
45						100%		0-0-0-0 (0)	
50									
55						100%		0-0-0-0 (0)	
60									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

DRAFT

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-136.2-DRAFT

PROJECT NUMBER	20001480	**LOGGED BY**	S. Crowley	**COORDINATES**	N 1611022.64 E 732641.05
START DATE	11/11/2022	**DRILLER/RIG**	John and Eric /	**GROUND ELEV.**	140 ft approx.
FINISH DATE	11/14/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			CLAY (CL), gray, very soft, moist			96%		3-2-0-0 (2)	
65	74.5		Boring Terminated at 65 ft						

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

DRAFT

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-136.3-DRAFT

PROJECT NUMBER	20001480	**LOGGED BY**	Shahbaz Ahmad	**COORDINATES**	N 1610509.42 E 732437.10
START DATE	11/15/2022	**DRILLER/RIG**	Eric /	**GROUND ELEV.**	140 ft approx.
FINISH DATE	11/16/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			No recovery, stone ballast at bottom of SPT sample			0%		1-2-2-3 (4)	
						0%		1-2-1-1 (3)	
5						0%		1-1-2-1 (3)	
	133.5		CLAY (CL), brown with gray seams, soft, moist			92%		1-2-2-3 (4)	
						0%		1-3-3-4 (6)	
10			sandy at 10-15 ft, gray			100%		3-4-4-4 (8)	
15			with some gravel			34%		2-3-4-4 (7)	
20						100%		0-0-0-0 (0)	
25	114.5		SAND (SW), gray, medium dense, moist, fine grained			62%		6-9-10-9 (19)	
30									

Legend

- SPT N Value
- MC (%)
- PL & LL (%)
- Fines Content (%)

20 40 60 80

DRAFT

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-136.3-DRAFT

PROJECT NUMBER	20001480	**LOGGED BY**	Shahbaz Ahmad	**COORDINATES**	N 1610509.42 E 732437.10
START DATE	11/15/2022	**DRILLER/RIG**	Eric /	**GROUND ELEV.**	140 ft approx.
FINISH DATE	11/16/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0			SAND (SW), gray, medium dense, moist, fine grained			0%		11-11-4-3	3 inch ring sampler
35	104.5		Clayey SAND (SC), gray, very dense, moist			53%		3-3-6-50/1" (9)	
	102.5		Shale, gray, laminated, widely spaced discontinuities, good condition, fresh			100% 89			
40	97.5		Boring Terminated at 42 ft						
45									
50									
55									
60									

Legend

▲ SPT N Value
● MC (%)
— PL & LL (%)
⊠ Fines Content (%)

20 40 60 80

DRAFT

Kiewit

MEMORANDUM

DATE: December 6, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 4 – Package 3 – HDD Crossing 25.A – Revision 1
Champlain Hudson Power Express Project
Glen Falls, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Glen Falls, New York. The approximate station for the start of HDD crossing Number 25.A is STA 30213+50 (43.2474°N, 73.5991°W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by AECOM and the recent investigation by Atlantic Testing Laboratories (ATL), referenced below.

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 3, Glens Falls to Ballston Spa, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 25.A
Borings K-136.5, K-136.6, FES-4
Segment 4 - Design Package 3

CHPE Segments 4 & 5 - Package 3
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A136.0-1	1611762.7	732951.9	146.6
	B134.5-1	1618254.8	737493.3	137.7
	B134.6-1	1617614.3	737160.7	140.2
	B135.1-1	1615942.5	735298.2	130.7
	B135.35-1	1615043.9	734326.1	147.7
	B137.9-1	1602848.9	729488.6	157.2
	B140.0-1	1594313.7	721767.2	205.0
	B144.2-1	1577578.6	707868.0	307.5
	B144.3-1	1577307.0	707733.5	307.4
	B144.5-1	1576380.0	707249.6	308.5
	B144.8-1	1574825.2	706447.7	310.8
	B145.0-1	1574014.3	706034.4	312.7
	B145.48	1571450.2	704693.3	320.4
	B146.1-1	1568896.3	703364.4	321.4
	B146.5-1	1566773.3	702083.1	323.6
	B148.4-1	1561976.4	694067.5	326.0
	B148.4-5	1561817.7	693531.9	327.4
	B149.87-1	1559610.1	686723.2	325.2
	B151.58-1	1553784.9	679646.1	336.4
	B152.6-0	1550004.2	676432.6	329.3
	B153.1-1	1547302.8	676031.8	322.5
	B154.3-1	1541375.5	674232.0	321.5
	B155.2-1	1536685.4	674403.7	313.7
	B155.7-1	1534202.1	674175.1	340.0
	B157.9-1	1524284.2	668932.6	246.0
	B158.1-1	1523474.2	668924.1	243.0
	B158.22-1	1522640.9	669168.4	279.1
AECOM**	BM-1A	1521184.8	669107.0	292.4
	FES-3	1616410.4	736040.4	143.9
	FES-3A	1616311.4	735904.6	139.3
	FES-3B	1611359.3	732784.5	142.5
	FES-4	1608699.4	732017.0	142.6
	FES-5	1605493.6	731399.7	147.1
	FES-6	1598212.9	725299.3	174.4
	FES-9	1583302.9	711497.9	271.6
	FES-10A	1563547.6	698025.3	321.4
	FES-12	1560130.5	687972.2	322.5
	SB-1A	1547803.7	676160.2	321.0
	SB-1B	1551257.2	677175.4	327.5
	SB-2	1545717.0	675698.7	316.3
	SB-3	1540348.5	674275.0	322.4

Notes:

- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

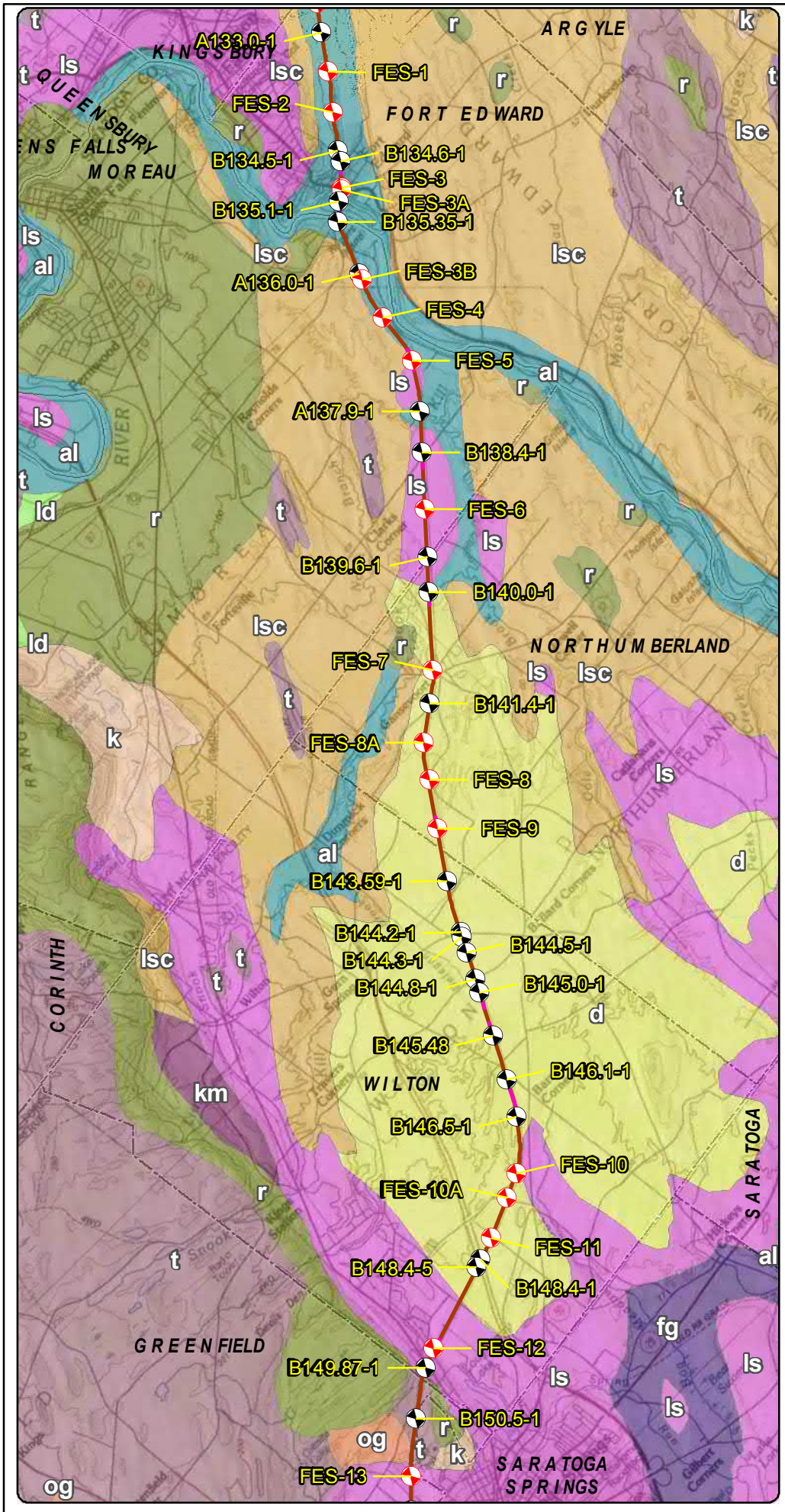
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

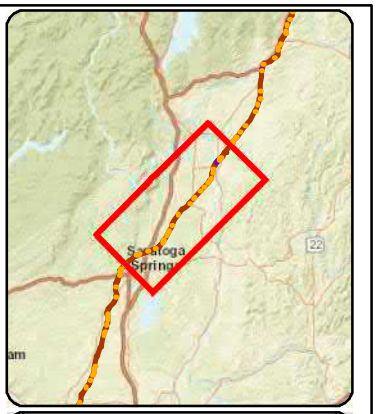
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- d - Dunes
- fg - Fluvial sand and/or gravel
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

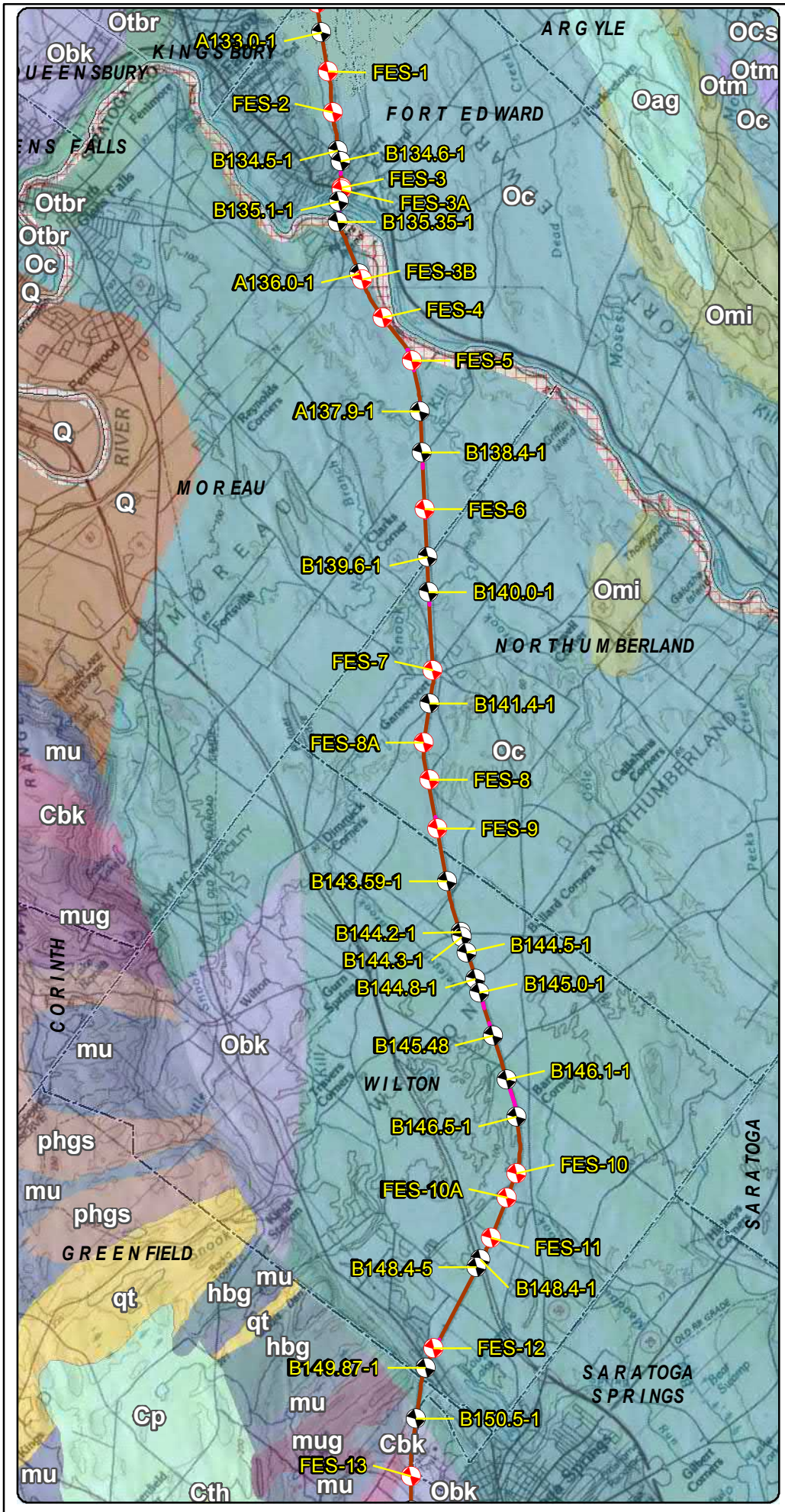
Champlain Hudson Power Express Inc.

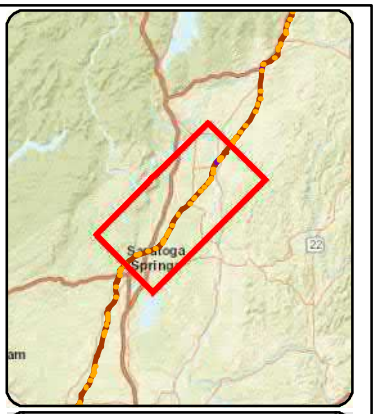
Surficial Geology and Geotechnical Borings
Fort Edward to Saratoga
Figure 3-4

Prepared on 4/29/2021
by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190908oring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Surficial_May_2021_Report.mxd





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Cth - Theresa (Galway) Formation
- No Label
- OCs - Cambrian thru Middle Ordovician
- Oag - Austin Glen Form (graywacke, shale)
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- hbg - Biotite/hornblende granite gneiss
- mu - Undivided metasedimentary rock
- mug - Interlayered metasedimentary rock
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

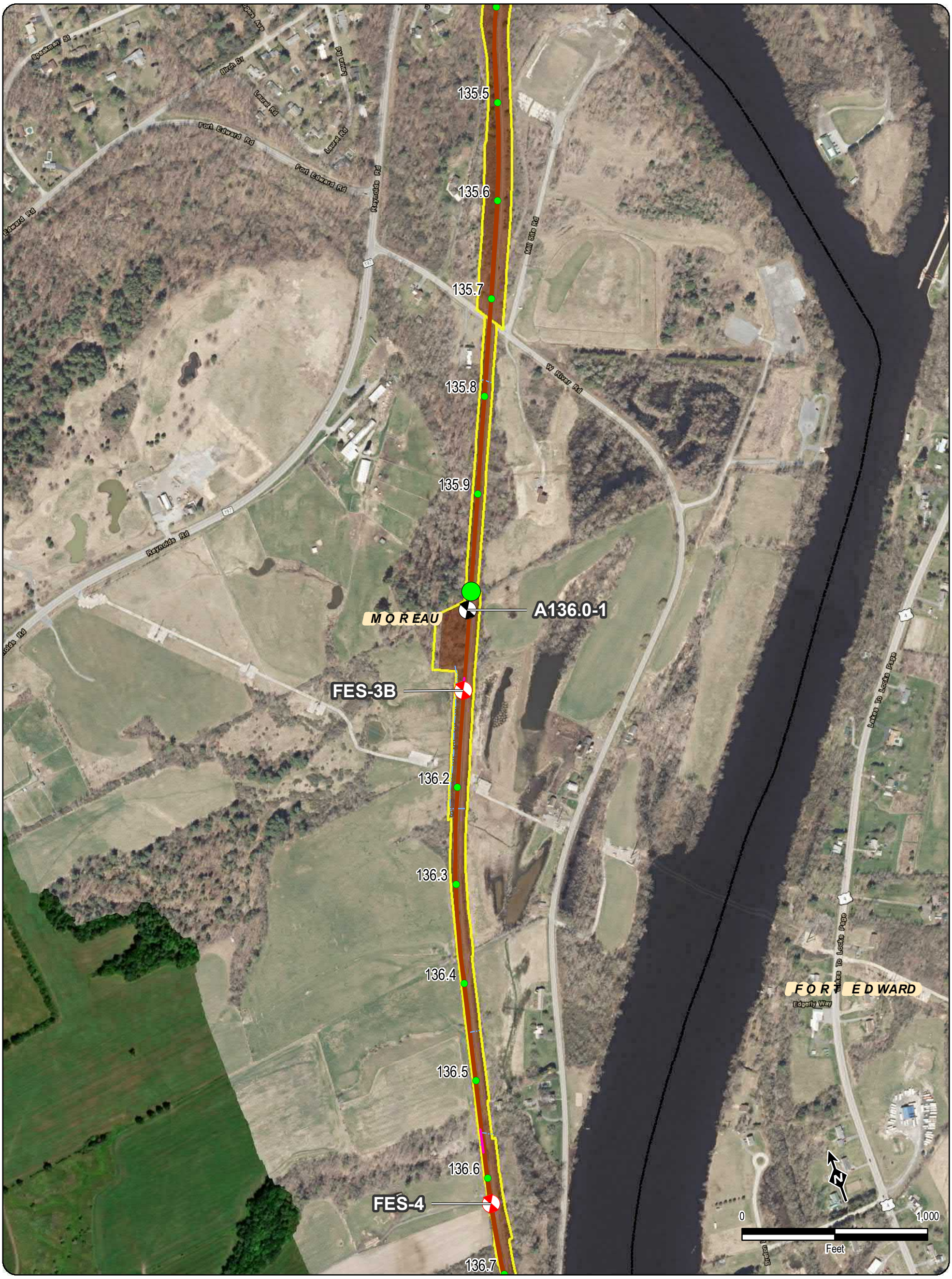
Bedrock Geology and Geotechnical Borings Fort Edward to Saratoga Figure 4-4

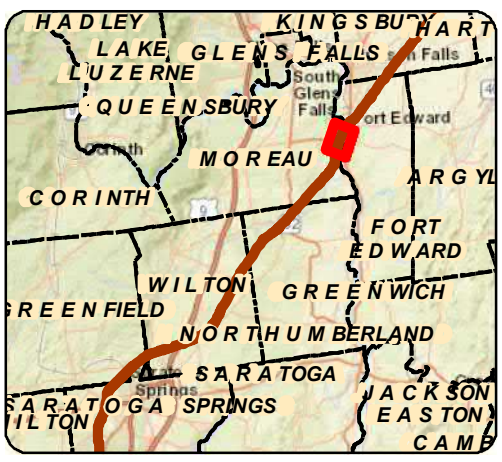
Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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111.8 Certified Milepost - Tenths

135 Certified Milepost

111.8 Preferred Alternative Milepost - Tenths

135 Preferred Alternative Milepost

Terrestrial Route HVDC

Submarine Route HVDC

Terrestrial Route HVAC

Preliminary HDD Locations

Preliminary Pipe Bridge Location

2021 Boring Location

Previous (2013) Boring Location

LEGEND

Streams/Ditches

Railroad ROW

Deviation Zone

Deviation Zone Outside ROW

Preferred Alternative Deviation Zone

Preferred Alternative Deviation Zone Outside ROW

Town Boundary

Village Boundary

State Park (OPRHP)

Parcel Ownership

TOWN NAME

Road Name

Village Name

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Fort Edward to Saratoga

Figure A-4

Sheet 3 of 15

Prepared by: AECOM 5/19/2021

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT	AECOM		SHEET 1 OF 1
DRILLER: Chris Chaillou			PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French	**BORING LOG**		PROJECT NO.: 60323056
LOCATION: Moreau, NY (CP Rail) MP - 136.6			HOLE NO.: **FES-4**
			START DATE: 1/18/21
			FINISH DATE: 1/19/21
			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55
Water at 8.5' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT
	SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"
	SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:
	HAMMER WT.	140 lbs	140 lbs			LONGITUDE:
	HAMMER FALL	30"	30"			LATITUDE:

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)	N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared		SW	SAND and SILT (fill)	Black fine-coarse SAND, little angular gravel, little silt; frozen
1.0								SM		0.9': Dark brown fine-medium SAND, some silt, little coarse sand, trace subangular-subrounded gravel; medium dense, moist
2.0										
3.0								ML		2.6': Brown SILT, little clay, little fine-coarse sand; medium stiff, moist
		3'-5'	S-1							TR-1; (3.0'-5.0')
4.0										
5.0										
		5'-7'	S-2	24"	24"	6 13 16 21	19	ML	SILT	Brown SILT, little clay, trace fine sand; stiff, moist
6.0										
7.0										
		7'-9'	S-3	24"	24"	16 21 22 18	28	ML/SP		SAA
8.0										TR-2; (8.0'-8.5')
9.0										8.5': Brown fine SAND, little silt; medium dense, saturated
		9'-11'	S-4	24"	17"	2 3 4 6	5	SM	SAND	Brown fine SAND, some silt; loose, saturated
10.0										
11.0										
		11'-'13'	S-5	24"	8"	4 3 6 12	6	SP		Brown fine SAND, little silt; very loose, saturated
12.0										
13.0										
		13'-15'	S-6	22"	22"	5 7 11 50/4"	12	SP		Brown fine SAND, little medium sand, trace silt; loose, saturated
14.0										TR-3; (14.0'-14.5')
15.0								GP	GRAVEL	14.6': Black small angular GRAVEL, little fine sand (weathered bedrock, cobbles or boulders)
		15'-17'	S-7	5.5"	2"	75/5.5"	-			
16.0								GP		SAA
17.0										
										Boring terminated at 15.5', grouted to surface
18.0										
19.0										
20.0										

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $N_{corr}=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%



Boring Location Plans Page 3 of 18	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: April 2022

Champlain Hudson Power Express
Design Package 3
Glens Falls to Ballston Spa, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/11/2022** Finish Date: **2/11/2022**

Boring No.: **K-136.5** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/11/2022	PM	*3.0'	10.0'

Coordinates
Northing **732155** (approx.)
Easting **1609190** (approx.)

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **140** (approx.)

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary/NX Core**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	8 15 5 1	2.0	Blackish-Grey cmf GRAVEL; and cmf SAND; trace SILT (frozen, non-plastic) COBBLE Fragments; FILL GW	16
3	CASING	2	2.0	4.0	SS	3 5 8 3	4.0	Brown cmf SAND; and mf GRAVEL; little CLAY; trace SILT (moist, slightly plastic) SC	12
5		3	4.0	6.0	SS	3 3 4 5	6.0	Brown CLAY; little SILT; trace f GRAVEL; trace cmf SAND (moist, plastic) CL	16
7		4	6.0	8.0	SS	7 7 6 3		Greyish-Brown SILT; some CLAY; little cmf SAND; trace ORGANIC MATERIAL (moist, moderately plastic) w = 31.9%	12
9		5	8.0	10.0	SS	4 4 6 9		LL = 29, PL = 14, PI = 15, % Fines = 85.0% MP-ML Greyish-Brown SILT; some CLAY; trace cmf SAND; trace ORGANIC MATERIAL (moist, moderately plastic) OC = 0.8% ML	24
11	WET ROTARY						12.0	Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
15		6	14.0	16.0	SS	3 3 3 6		Brown mf+ SAND; little SILT (wet, non-plastic) % Fines = 15.0% SM	16
19		7	19.0	19.0	SS	50/0"	19.0 20.0	NO RECOVERY Encountered probable WEATHERED ROCK at 19.0 feet. Advanced 3 7/8" tri-cone roller bit to 20.0 feet and began coring.	0
21	NX CORE (WET)		20.0	25.0	NX	RUN 1	25.0	Greyish-Black SHALE 59" or 98% Recovery 16 Pieces (43") - 27% Chips and Fragments 5 Pieces longer than 4" (25") - RQD = 42%	59

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/15/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-136.5** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine and - 35-50% m - medium some - 20-35% c - course little - 10-20% trace - 0-10%	
			25.0	30.0	NX	RUN 2		Greyish-Black SHALE 12" or 20% Recovery 3 Pieces (3") - 75% Chips and Fragments 0 Pieces longer than 4" (0") - RQD = 0%	12
30							30.0		
			30.0	35.0	NX	RUN 3		Greyish-Black SHALE 42" or 70% Recovery 6 Pieces (20") - 52% Chips and Fragments 2 Pieces longer than 4" (12") - RQD = 20%	42
35							35.0		
			35.0	40.0	NX	RUN 4		Greyish-Black SHALE 52" or 87% Recovery 7 Pieces (28") - 46% Chips and Fragments 2 Pieces longer than 4" (18") - RQD = 30%	52
40							40.0	Boring terminated at 40.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/14/2022** Finish Date: **2/15/2022**

Boring No.: **K-136.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/15/2022	**PM**	***7.3'**	**20.0'**

Coordinates
Northing **1608870.3**
Easting **732092**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **139.9**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary/NX Core**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	12 6 4 4	2.0	Blackish-Grey cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic) FILL SW	18
2	CASING	2	2.0	4.0	SS	5 12 9 5		Brown CLAY; trace SILT (moist, plastic) CL	10
4		3	4.0	6.0	SS	4 3 3 4	6.0	Similar Soil (moist, plastic) CL	22
7		4	6.0	8.0	SS	4 3 3 4	8.0	Brown SILT; trace mf SAND; trace CLAY (moist, very slightly plastic) w = 39.7%, LL = 30, PL = 19, PI = 11, % Fines = 98.3% ML	19
8		5	8.0	10.0	SS	2 4 3 4		Brown mf SAND; little SILT; trace CLAY (wet, very slightly plastic) SM	24
10	WET ROTARY							Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14		6	14.0	16.0	SS	3 6 3 5	17.0	Brown f SAND; some SILT (wet, non-plastic) w = 22.8% % Fines = 34.0% SM	6
19		7	19.0	21.0	SS	WH/12" 6 10	23.0	Grey cmf SAND; little CLAY; trace SILT (wet, slightly plastic) SC	22
23								Encountered probable WEATHERED ROCK at 23.0 feet.	
24							25.0	Advanced 3 7/8" tri-cone roller bit to 25.0 feet and began coring.	

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-136.6** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
25	NX CORE (WET)		25.0	30.0	NX	RUN 1		Greyish-Black SHALE 37" or 62% Recovery 8 Pieces (13") - 65% Chips and Fragments 1 Piece longer than 4" (7") - RQD = 12%	37
30			30.0	35.0	NX	RUN 2	30.0	Greyish-Black SHALE 38" or 63% Recovery 5 Pieces (16") - 58% Chips and Fragments 1 Piece longer than 4" (6") - RQD = 10%	38
35			35.0	40.0	NX	RUN 3	35.0	Greyish-Black SHALE 30" or 50% Recovery 10 Pieces (12") - 60% Chips and Fragments 0 Pieces longer than 4" (0") - RQD = 0%	30
40							40.0	Boring terminated at 40.0 feet. Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classification. 3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-134.4	S-3	4.0 - 6.0	Black cmf GRAVEL; and cmf SAND; trace SILT	--	--	--	--	--	--	600	40	8.14	47,730	--	--	--
	S-6	14.0 - 16.0	Light Brown c-mf SAND; trace SILT; trace m+f GRAVEL	9.4	19.1	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.5 - 26.5	Grey CLAY; and SILT; trace f SAND	99.8	52.9	53	19	34	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; and SILT; trace f SAND	--	34.4	--	--	--	--	--	--	--	--	--	--	--
K-134.5	S-5	8.0-10.0	Brown mf SAND; trace SILT	--	21.0	--	--	--	--	--	--	--	--	--	--	--
	S-8C	27.0 - 29.0	Brown cm+f SAND; little SILT; trace mf+ GRAVEL	15.0	15.3	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0-36.0	Brownish-Black cm+f SAND; little mf GRAVEL; trace SILT	7.2	19.2	--	--	--	--	--	--	--	--	--	--	--
K-134.7	S-4	6.0-8.0	Brown cmf SAND; trace SILT; trace CLAY	--	7.6	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brownish-Grey cm+f SAND; little SILT; trace mf GRAVEL; trace CLAY	24.0	16.9	--	--	--	--	--	--	--	--	--	--	--
	S-8	23.0-25.0	Grey cm+f SAND; little SILT; little f GRAVEL; trace CLAY	22.0	12.6	--	--	--	--	--	--	--	--	--	--	--
K-134.8	S-5	8.0-10.0	Brown mf SAND; little CLAY; trace SILT	--	16.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Brownish-Grey CLAY; some SILT; trace f SAND	56.5	29.9	25	20	5	--	--	--	--	--	--	--	--
	ST-1	37.0-37.9	Grey cmf+ SAND; trace SILT; trace f GRAVEL	8.3	17.1	--	--	--	--	--	--	--	--	--	--	--
K-136.1	S-5	8.0-10.0	Brownish-Grey CLAY; little SILT; trace f SAND	99.1	40.3	62	23	39	--	--	--	--	--	--	--	--
	S-8	23.0-25.0	Brownish-Grey CLAY; little SILT; trace f SAND	99.5	34.8	34	18	16	--	--	--	--	--	--	--	--
	S-10	34.0-36.0	Black c-m+f SAND; trace SILT ; trace f GRAVEL	8.4	18.6	--	--	--	--	--	--	--	--	--	--	--
K-136.5	S-4	6.0-8.0	Greyish-Brown SILT; some CLAY; little cmf SAND; trace OM	85.0	31.9	29	14	15	--	--	--	--	--	--	--	--
	S-5	8.0-10.0	Greyish-Brown SILT; some CLAY; trace cmf SAND; trace OM	--	--	--	--	--	0.8	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brown mf+ SAND; little SILT	15	--	--	--	--	--	--	--	--	--	--	--	--
	RC-2	25.0-30.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	3,650	599	1.46
K-136.6	S-4	6.0-8.0	Brown SILT; trace mf SAND; trace CLAY	98.3	39.7	30	19	11	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brown f SAND; some SILT	34.0	22.8	--	--	--	--	--	--	--	--	--	--	--
	RC-1	25.0-30.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	550	956	2.16

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-136.1	S-5	8-10	40.3
	S-8	23-25	34.8
	S-10	34-36	18.6
K-136.5	S-4	6-8	31.9
K-136.6	S-4	6-8	39.7
	S-6	14-16	22.8
K-137.1	S-5	8-10	41.3
	S-8 [1]	23-24.8	15.3
K-137.8	S-5	8-10	23.5
	S-8	24-26	30.0
	ST-1c	44-46	32.6
K-142.8	S-4	6-8	26.5
	S-7	19-21	22.0
	S-9	29-31	28.4
	ST-1c	37-39	22.8
K-142.9	S-5	8-10	45.7
	S-8	24-26	40.8
	ST-1c	37-39	25.8
K-144.3	S-5	8-10	25.5
	S-7	19-21	21.7
	ST-1c	34-36	26.7

ATLANTIC TESTING LABORATORIES

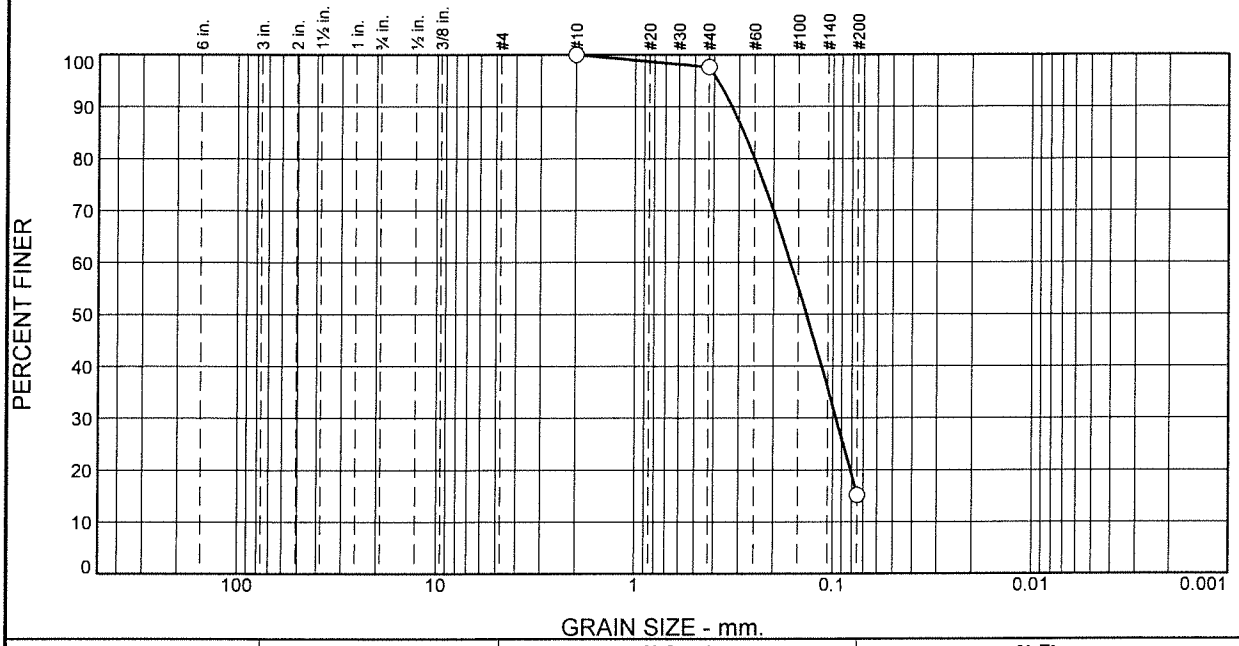
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-05-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/03/22

Sample No: K-136.5, S-6 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 14-16'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	83	15	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#10	100		
#40	98		
#200	15		

Soil Description

Brown mf+ SAND; little SILT

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 0.2831 D_{60}= 0.1642 D_{50}= 0.1364
D_{30}= 0.0962 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

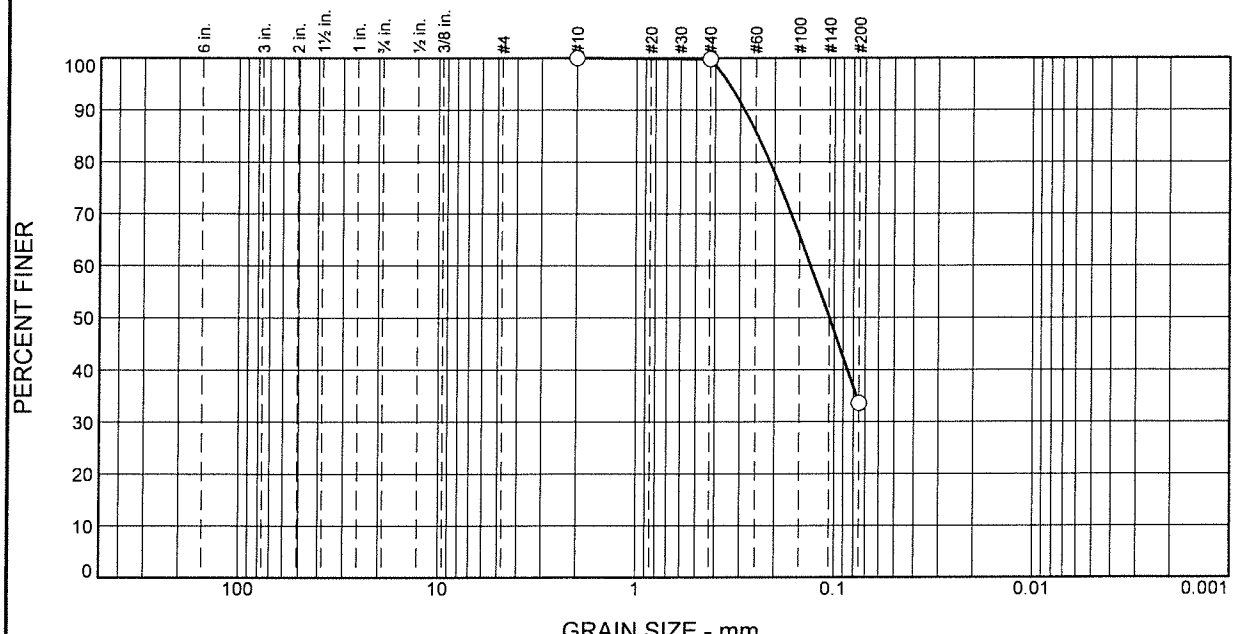
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-05-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/03/22

Sample No: K-136.6, S-6 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 14-16'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	66	34	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#10	100		
#40	100		
#200	34		

Soil Description

Brown f SAND; some SILT

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 0.2441 D_{60}= 0.1313 D_{50}= 0.1057
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 22.8%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-05-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 3, 2022
	United Cable Installation	**Test Date:**	February 18, 2022
	Various Locations, New York	**Performed By:**	A. Rivers

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-136.1	S-5	8-10	A	10	44.67	99.1
K-136.1	S-8	23-25	A	10	175.81	99.5
K-136.5	S-4	6-8	A	10	40.42	85.0
K-136.6	S-4	6-8	A	10	30.04	98.3
K-137.1	S-5	8-10	A	10	23.69	93.8
K-142.8	S-7	19-21	A	10	23.68	89.5
K-142.9	S-8	24-26	A	10	23.42	99.8

Reviewed By: _____ Date: March 3, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-136.1	S-5	62	23	39
K-136.1	S-8	34	18	16
K-136.5	S-4	29	14	15
K-136.6	S-4	30	19	11
K-137.1	S-5	77	26	51
K-137.8	ST-1c	NP	NP	NP
K-142.8	S-7	47	18	29
K-142.9	S-8	37	16	21

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-136.1	S-5	0.074	0	40.3
K-136.1	S-8	0.002	0	34.8
K-136.5	S-4	0.074	0	31.9
K-136.6	S-4	0.074	0	39.7
K-137.1	S-5	0.074	0	41.3
K-137.8	ST-1c	0.42	1	32.6
K-142.8	S-7	0.074	0	22.0
K-142.9	S-8	0.002	0	40.8

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-136.1	S-5	Air Dry	Not Necessary
K-136.1	S-8	Air Dry	Not Necessary
K-136.5	S-4	Air Dry	Not Necessary
K-136.6	S-4	Air Dry	Not Necessary
K-137.1	S-5	Air Dry	Not Necessary
K-137.8	ST-1c	Air Dry	Pulverizing and Screening
K-142.8	S-7	Air Dry	Not Necessary
K-142.9	S-8	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: _____ Date: 03/03/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-05-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 3, 2022
	United Cable Installation	**Date Received:**	February 23, 2022
	Various Locations, New York		

PERCENT ORGANICS, ASH CONTENT, AND MOISTURE CONTENT

ASTM D 2974

Boring No.	Sample No.	Organics (%)	Ash (%)	Moisture (%)	Test Method	Furnace Temperature (°C)
K-136.5	S-5	0.8	99.2	27.2	A	440
K-142.9	S-4	8.7	91.3	54.8	A	440

Reviewed By: _____ Date: 03/03/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

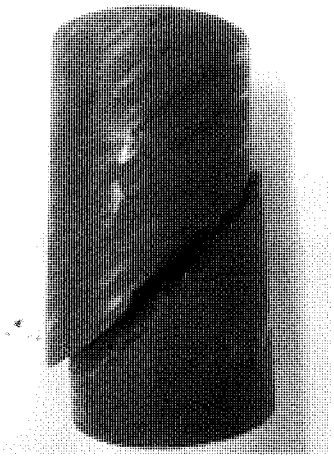
ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 18, 2022

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS
ASTM D 7012, Method C

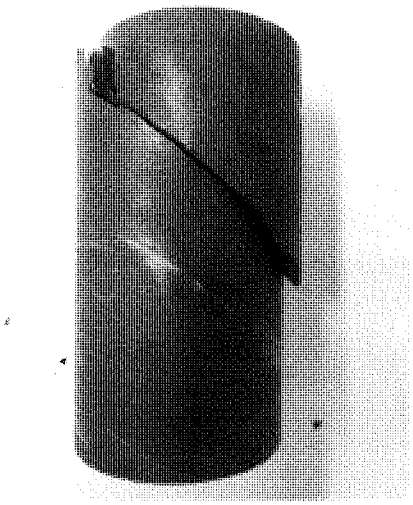
Boring No.	Sample No.	Depth (ft)	Diameter (in)	Length (in)	Load Rate (lbs/sec)	Total Load (lbs)	Area (in^2)	Compressive Strength (psi)
K-136.5	RC-2	20.5-20.8	1.98	4.03	300	11,240	3.08	3,650
K-136.6	RC-1	25.1-25.4	1.98	4.05	200	1,690	3.08	550
K-137.1	RC-2	33.5-33.8	1.98	4.04	300	17,170	3.08	5,570

Failure Pictures

K-136.5, RC-2, 20.5-20.8'



K-136.6, RC-1, 25.1-25.4'



ADVANCED TERRA TESTING

Splitting Tensile Strength
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	JOB NO.	2161-014
PROJECT	Champlain Hudson Power Express	LOCATION	--
PROJECT NO.	CD10279		

BORING NO.					
DEPTH	23.6-24	26.1-26.6	35.1-35.5	[redacted]	38.8-39.4
SAMPLE NO.	K-136.5-RC2	K-136.6-RC1	K-137.1-RC2	[redacted]	K-137.3-R2
DATE SAMPLED					
DATE TESTED	03/14/22	03/14/22	03/14/22	[redacted]	03/18/22
TECHNICIAN	DL	DL	DL	[redacted]	DL
ROCK TYPE					
Diameter (in):	1.986	1.972	1.964	[redacted]	1.994
Height (in):	1.337	1.281	1.332	[redacted]	1.324
Mass of Wet Rock (g):	184.00	175.30	178.60	[redacted]	181.80
Wet Density (lbs/ft³):	169.2	170.7	168.6	[redacted]	167.5
Wet Density (g/cm³):	2.711	2.734	2.701	[redacted]	2.68
Peak Load (lbs):	2498	3792	2838	[redacted]	989
Splitting Tensile Strength (psi):	599	956	691	[redacted]	238
Splitting Tensile Strength (kPa):	4129	6588	4762	[redacted]	1644
Failure Type:	Single Plane	Multiple Plane	Single Plane	[redacted]	Multiple Plane

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
ROCK TYPE	
Diameter (in):	
Height (in):	
Mass of Wet Rock (g):	
Wet Density (lbs/ft³):	
Wet Density (g/cm³):	
Peak Load (lbs):	
Splitting Tensile Strength (psi):	
Splitting Tensile Strength (kPa):	
Failure Type:	

NOTES	

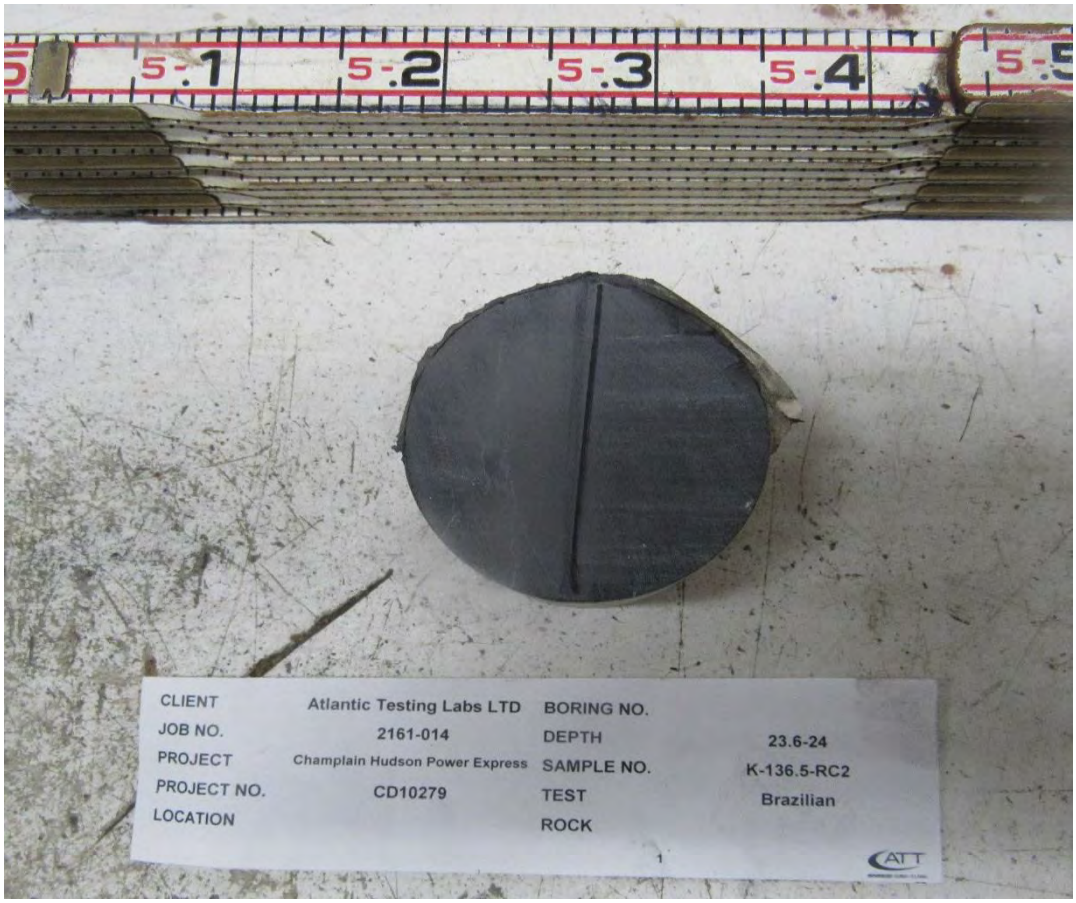
Data entry by:	DL		Date: 03/18/22
Checked by:	HN		Date: 03/18/22
File name:	2161014__Brazilian ASTM D3967_0.xlsm		

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	23.6-24
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.5-RC2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

Before Picture



NOTES

Picture File: 1.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	23.6-24
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.5-RC2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

After Picture



NOTES

Picture File: 1a.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	26.1-26.6
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.6-RC1
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

Before Picture



NOTES

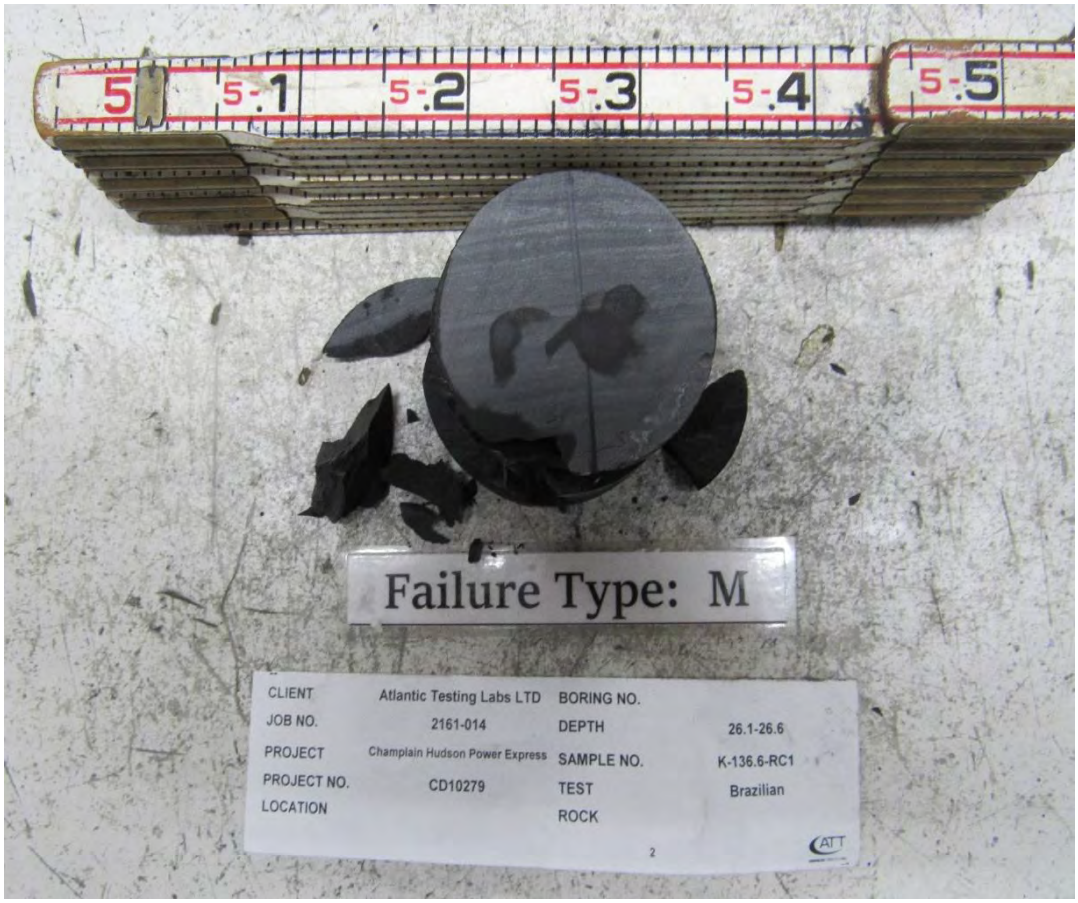
Picture File: 2.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	26.1-26.6
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.6-RC1
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

After Picture



NOTES

Picture File: 2a.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

CERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	JOB NO.	2161-014
PROJECT	Champlain Hudson Power Express	LOCATION	--
PROJECT NO.	CD10279		

BORING NO.				CD10279
DEPTH	21.3-21.9	27.8-28.2	31.5-32.0	[redacted]
SAMPLE NO.	K-136.5-RC2	*K-136.6-RC1	K-137.1-RC2	[redacted]
DATE SAMPLED				
DATE TESTED	04/06/22	04/06/22	04/06/22	[redacted]
TECHNICIAN	HN	HN	HN	[redacted]
ROCK TYPE				
Surface Type:	Saw Cut	Saw Cut	Saw Cut	[redacted]
Moisture Condition	As Received	As Received	As Received	[redacted]
Reading A.1 (in):	0.00373	0.00651	0.00389	[redacted]
Reading A.2 (in):	0.00540	0.00913	0.00429	[redacted]
Reading A.3 (in):	0.00373	0.00778	0.00310	[redacted]
Reading A.4 (in):	0.00310	0.00484	0.00357	[redacted]
Reading A.5 (in):	0.00373	0.00381	0.00405	[redacted]
Reading B.1 (in):	0.00437	0.00754	0.00429	[redacted]
Reading B.2 (in):	0.00563	0.00881	0.00238	[redacted]
Reading B.3 (in):	0.00278	0.00810	0.00389	[redacted]
Reading B.4 (in):	0.00341	0.00611	0.00421	[redacted]
Reading B.5 (in):	0.00325	0.00421	0.00413	[redacted]
Average Reading (in):	0.00391	0.00668	0.00378	[redacted]
Average Reading (mm):	0.0994	0.1698	0.0960	[redacted]
Uncorrected CAI or CAI_s:	**0.99**	**1.70**	**0.96**	[redacted]
Corrected CAI:	**1.46**	**2.16**	**1.43**	[redacted]

NOTES

CAI_s is the CAI calculated on saw cut specimens.

Corrected CAI for saw cut specimens based on R. Plinger and H. Kasling
Suggested formula CAI = 0.99*CAIs + 0.48.

Applied pins had a Rockwell Hardness of 54-56.

* Last pin created a crack on surface of specimen.

Data entry by:	HN	Date: 4/7/22
Checked by:	CL	Date: 04/08/22
File name:	2161014__CHERCHAR ASTM D7625_0.xlsm	

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	21.3-21.9
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.5-RC2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

Before Picture



NOTES	* Last pin created a crack on surface of specimen.

Picture File: 1.JPG
File name: 2161014__CHERCHAR ASTM D7625_0.xlsm

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	21.3-21.9
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-136.5-RC2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

After Picture



NOTES	* Last pin created a crack on surface of specimen.

Picture File: 1a.JPG
File name: 2161014__CHERCHAR ASTM D7625_0.xlsm

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	27.8-28.2
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	*K-136.6-RC1
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

Before Picture



NOTES	* Last pin created a crack on surface of specimen.

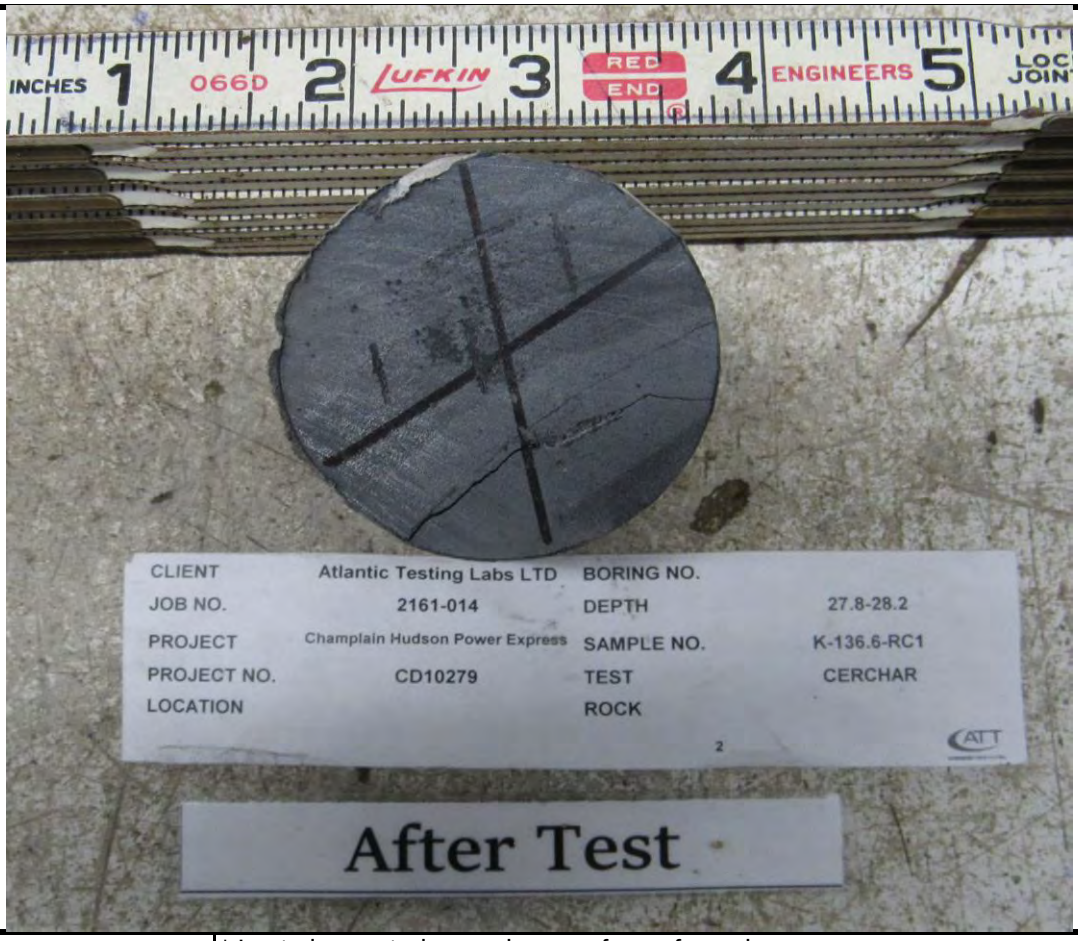
Picture File: 2.JPG
File name: 2161014__CHERCHAR ASTM D7625_0.xlsm

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	27.8-28.2
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	*K-136.6-RC1
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

After Picture



NOTES	* Last pin created a crack on surface of specimen.

Picture File: 2a.JPG
File name: 2161014__CHERCHAR ASTM D7625_0.xlsm

Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-136.5 - Runs 1 and 2



K-136.5 - Runs 3 and 4



Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-136.6 - Runs 1 through 3



Kiewit

MEMORANDUM

DATE: December 6, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 4 – Package 3 – HDD Crossing 26 – Revision 1
Champlain Hudson Power Express Project
Glen Falls, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Glen Falls, New York. The approximate station for the start of HDD crossing Number 26 is STA 30240+50 (43.2399°N, 73.6007°W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by AECOM and the recent investigation by Atlantic Testing Laboratories (ATL), referenced below.

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 3, Glens Falls to Ballston Spa, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 26
Borings K-137.1, FES-5, K-137.3
Segment 4 - Design Package 3

CHPE Segments 4 & 5 - Package 3
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A136.0-1	1611762.7	732951.9	146.6
	B134.5-1	1618254.8	737493.3	137.7
	B134.6-1	1617614.3	737160.7	140.2
	B135.1-1	1615942.5	735298.2	130.7
	B135.35-1	1615043.9	734326.1	147.7
	B137.9-1	1602848.9	729488.6	157.2
	B140.0-1	1594313.7	721767.2	205.0
	B144.2-1	1577578.6	707868.0	307.5
	B144.3-1	1577307.0	707733.5	307.4
	B144.5-1	1576380.0	707249.6	308.5
	B144.8-1	1574825.2	706447.7	310.8
	B145.0-1	1574014.3	706034.4	312.7
	B145.48	1571450.2	704693.3	320.4
	B146.1-1	1568896.3	703364.4	321.4
	B146.5-1	1566773.3	702083.1	323.6
	B148.4-1	1561976.4	694067.5	326.0
	B148.4-5	1561817.7	693531.9	327.4
	B149.87-1	1559610.1	686723.2	325.2
	B151.58-1	1553784.9	679646.1	336.4
	B152.6-0	1550004.2	676432.6	329.3
	B153.1-1	1547302.8	676031.8	322.5
	B154.3-1	1541375.5	674232.0	321.5
	B155.2-1	1536685.4	674403.7	313.7
	B155.7-1	1534202.1	674175.1	340.0
	B157.9-1	1524284.2	668932.6	246.0
	B158.1-1	1523474.2	668924.1	243.0
	B158.22-1	1522640.9	669168.4	279.1
AECOM**	BM-1A	1521184.8	669107.0	292.4
	FES-3	1616410.4	736040.4	143.9
	FES-3A	1616311.4	735904.6	139.3
	FES-3B	1611359.3	732784.5	142.5
	FES-4	1608699.4	732017.0	142.6
	FES-5	1605493.6	731399.7	147.1
	FES-6	1598212.9	725299.3	174.4
	FES-9	1583302.9	711497.9	271.6
	FES-10A	1563547.6	698025.3	321.4
	FES-12	1560130.5	687972.2	322.5
	SB-1A	1547803.7	676160.2	321.0
	SB-1B	1551257.2	677175.4	327.5
	SB-2	1545717.0	675698.7	316.3
	SB-3	1540348.5	674275.0	322.4

Notes:

- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

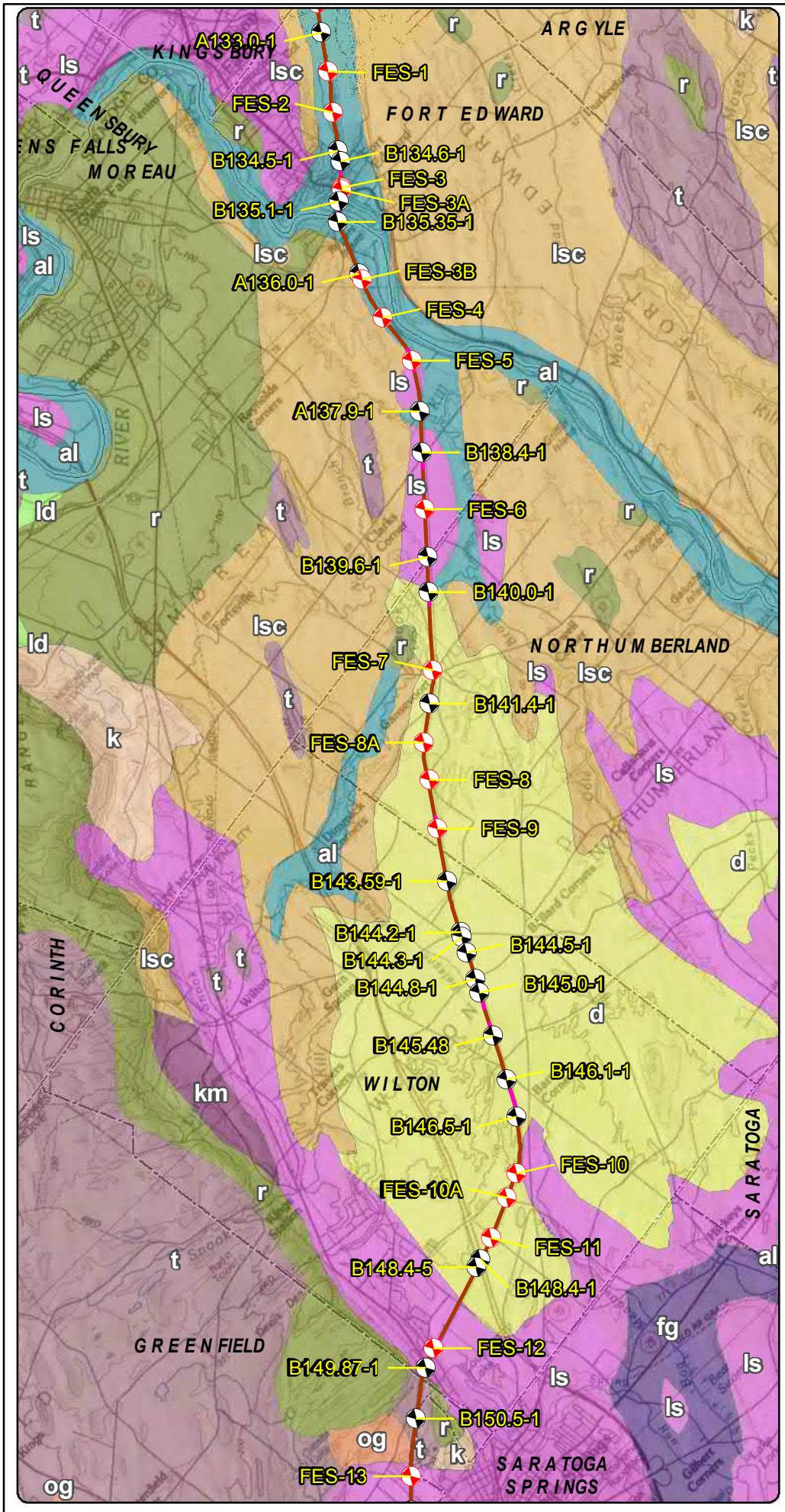
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

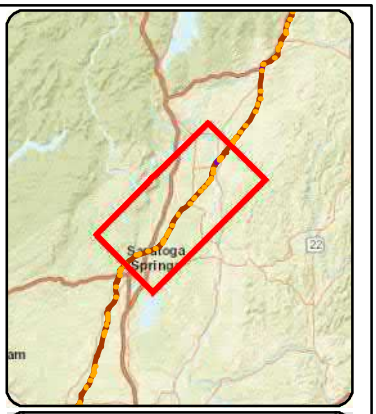
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- d - Dunes
- fg - Fluvial sand and/or gravel
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

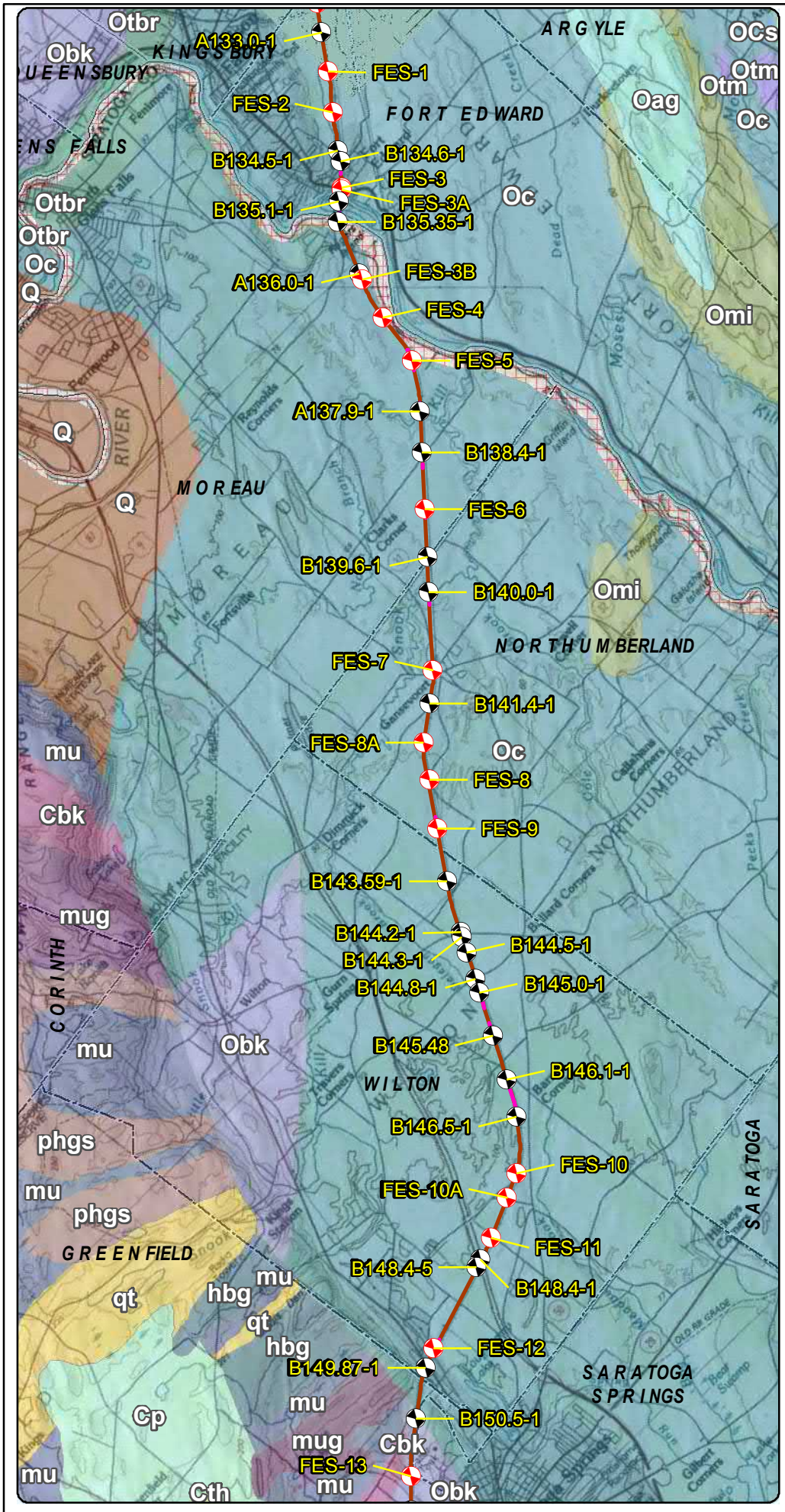
Champlain Hudson Power Express Inc.

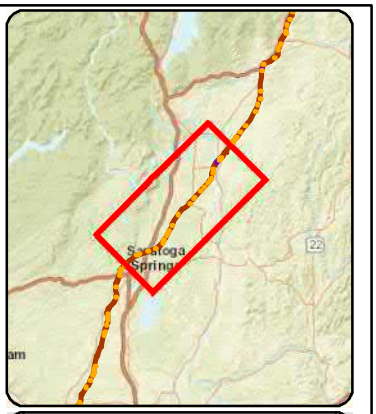
Surficial Geology and Geotechnical Borings
Fort Edward to Saratoga
Figure 3-4

Prepared on 4/29/2021
by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190908oring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Surficial_May_2021_Report.mxd





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Cth - Theresa (Galway) Formation
- No Label
- OCs - Cambrian thru Middle Ordovician
- Oag - Austin Glen Form (graywacke, shale)
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- hbg - Biotite/hornblende granite gneiss
- mu - Undivided metasedimentary rock
- mug - Interlayered metasedimentary rock
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Fort Edward to Saratoga Figure 4-4

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190909Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Bedrock_May_2021_Report.mxd





LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Fort Edward to Saratoga

Figure A-4

Sheet 4 of 15

Prepared by: AECOM 5/19/2021

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER/GEOLOGIST: Chris French

LOCATION: Moreau, NY (CP Rail) MP - 137.25

AECOM

BORING LOG

SHEET 1 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **FES-5**

START DATE: 1/19/2021

FINISH DATE: 1/19/2021

OFFSET: N/A

DRILL RIG: CME LC-55

BORING TYPE: SPT/Core

BORING O.D.: 4.5"/3"

SURFACE ELEV.:

LONGITUDE:

LATITUDE:

GROUND WATER OBSERVATIONS: No water observed

	CASING	SAMPLER	DRILL BIT	CORE BARREL
TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	NQ
SIZE I.D.	4"	2.5"	- -	1 7/8"
SIZE O.D.	4.5"	3"	3 7/8"	3"
HAMMER WT.	140 lbs	140 lbs		
HAMMER FALL	30"	30"		

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared					SW	SAND and GRAVEL	Black fine-coarse SAND, some angular gravel, trace silt; frozen
1.0													
											SW		0.4':Black fine-coarse SAND, some angular gravel, trace silt; loose, moist
2.0													
											SW		1.3': Dark brown fine-coarse SAND, trace silt; loose, moist
3.0													
		3'-5'	S-1								ML		2.0': Brown SILT, some clay, trace fine-medium sand; medium stiff, moist
4.0													
													TR-1; (3.0'-5.0')
5.0													
		5'-7'	S-2	24"	19"	4	5	4	9	6	ML		Brown SILT and clay, trace fine-medium SAND; stiff, moist
6.0													
7.0													
		7'-9'	S-3	24"	24"	10	12	15	16	18	CL		Brown silty CLAY; stiff, moist
8.0													
													TR-2; (7.0'-9.0')
9.0													
		9'-11'	S-4	24"	18"	4	4	6	9	7	ML		Brown SILT, some clay; stiff, moist
10.0													
11.0													
		11'-'13'	S-5	24"	24"	14	13	13	14	17	ML	SILT and CLAY	SAA
12.0													
13.0													
		13'-15'	S-6	24"	24"	4	8	11	11	12	CL		Brown silty CLAY; very stiff, moist
14.0													
15.0													
		15'-17'	S-7	24"	24"	13	14	15	14	19	CL		SAA
16.0													
													TR-3; (15.0'-17.0)
17.0													
18.0													
19.0													
20.0													

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $N_{corr}=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Moreau, NY (CP Rail) MP - 137.25

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **FES-5**

START DATE: 1/19/2021

FINISH DATE: 1/19/2021

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		20'-22'	S-8	24"	24"	6	15	15	16	20	CL		SAA
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	3"	2"	100/3"					GW	GRAVEL	Black angular small-medium GRAVEL, little fine-coarse sand; loose, saturated
26.0													
27.0													
28.0													
29.0													
30.0													
	4.8	30'-34'	R-1	60"	59"	RQD: 41.5"=65%						SHALE	Dark gray shale, very thinly laminated, unweathered, moderate mechanical jointing, erratic fracture angles from 0°-60°
31.0													
32.0													
33.0													
34.0													
35.0													Light mechanical jointing, fracture from 36.4'-36.6' at 75°
	4.4	35'-39'	R-2	60"	58"	RQD: 54.5"=91%							TR-4; (35.2'-35.9')
36.0													
37.0													
38.0													
39.0													
	4.8	39'-40'	R-3	12"	12"	RQD: 9"=75%							
40.0													
													FES-5 terminated at 40'
41.0													
42.0													
43.0													
44.0													
45.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

ROCK CORE PHOTOGRAPHIC LOG

AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Fort Edward - Saratoga Segment**

Boring No.	Depth (ft.)
FES-3A	37.0-40.0



Boring No.	Depth (ft.)
FES-5	29.0-40.0

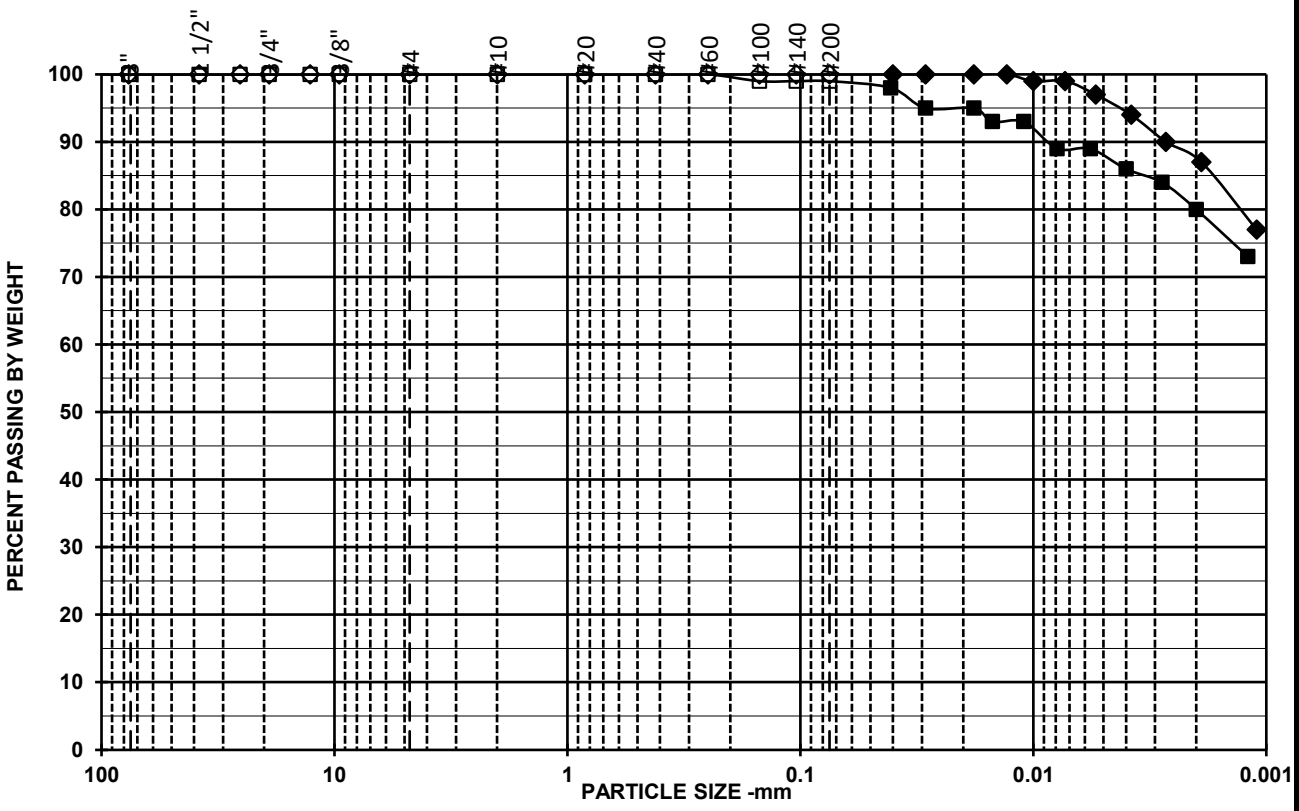


Note: Black foam inserts represent core pieces that were removed for geotechnical and/or thermal resistivity laboratory testing

Aquifer
CHPE - Ft. Edward - Saratoga Borings
LABORATORY SOIL TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS							REMARKS
			WATER CONTENT (%)	LIQUID LIMIT (-)	PLASTIC LIMIT (-)	PLAS. INDEX (-)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 μm (%)	
FES-1	S-2	5-7	18.9				ML	75.9	5	
FES-1	S-4	9-11	19.5				SM	35	4	
FES-3	S-2	7-9	18.4	20	15	5	SC-SM	34.5	13	
FES-3	S-5	13-15	7.0				SW-SM	9	2	
FES-3B	S-3	7-9	15.6				SM	28	7	
FES-3B	S-8	20-22	24.8	42	18	24	CL	80.3	29	
FES-3B	S-10	30-32	19.1	-	16	NP	SP-SM	9.6	3	
FES-5	S-3	7-9	40.2	97	28	69	CH	99	80	
FES-5	S-7	15-17	44.0	84	27	57	CH	100	87	
FES-7	S-3	7-9	26.2				SP-SM	9.6	2	
FES-7	S-7	15-17	23.2				SP-SM	11.2	2	
FES-7	S-10	30-32	54.0	65	21	44	CH	99	67	
FES-9	S-3	7-9	26.3				SM	22.1	2	
FES-9	S-7	15-17	22.6				SM	20.5	3	
FES-9	S-9	25-27	55.4	63	19	44	CH	99	54	
FES-10A	S-3	7-9	11.0				SM	13.1	2	
FES-10A	S-7	15-17	21.3				SM	13.7	3	
FES-10A	S-9	25-27	24.8				SP-SM	8.5	2	
FES-12	S-3	7-9	6.3				SP-SM	6.2	2	
FES-12	S-6	15-17	10.2				SM	43.7	2	
FES-12	S-8	25-27	2.6				SP-SM	6.8	2	

Note: (1) USCS symbol based on visual observation and Sieve and Atterberg limits reported.



Open Symbols: Sieve analysis by ASTM D6913
Filled symbols: Hydrometer analysis by ASTM D7928 corrected for complete sample

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	40.2	97	28	69	CH		Brown, Fat clay	03/25/21
◇	44.0	84	27	57	CH		Brown, Fat clay	03/25/21
○								

Aquifer

TerraSense, LLC #7853-21002

CHPE - Ft. Edward - Saratoga Borings

Symbol	□	◇	○
Boring	FES-5	FES-5	
Sample	S-3	S-7	
Depth	7-9	15-17	
% +3"	0	0	
% Gravel	0	0	
% SAND	1	0	
%C SAND	0	0	
%M SAND	0	0	
%F SAND	1	0	
% FINES	99	100	
D_{100} (mm)	2	2	
D_{60} (mm)			
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

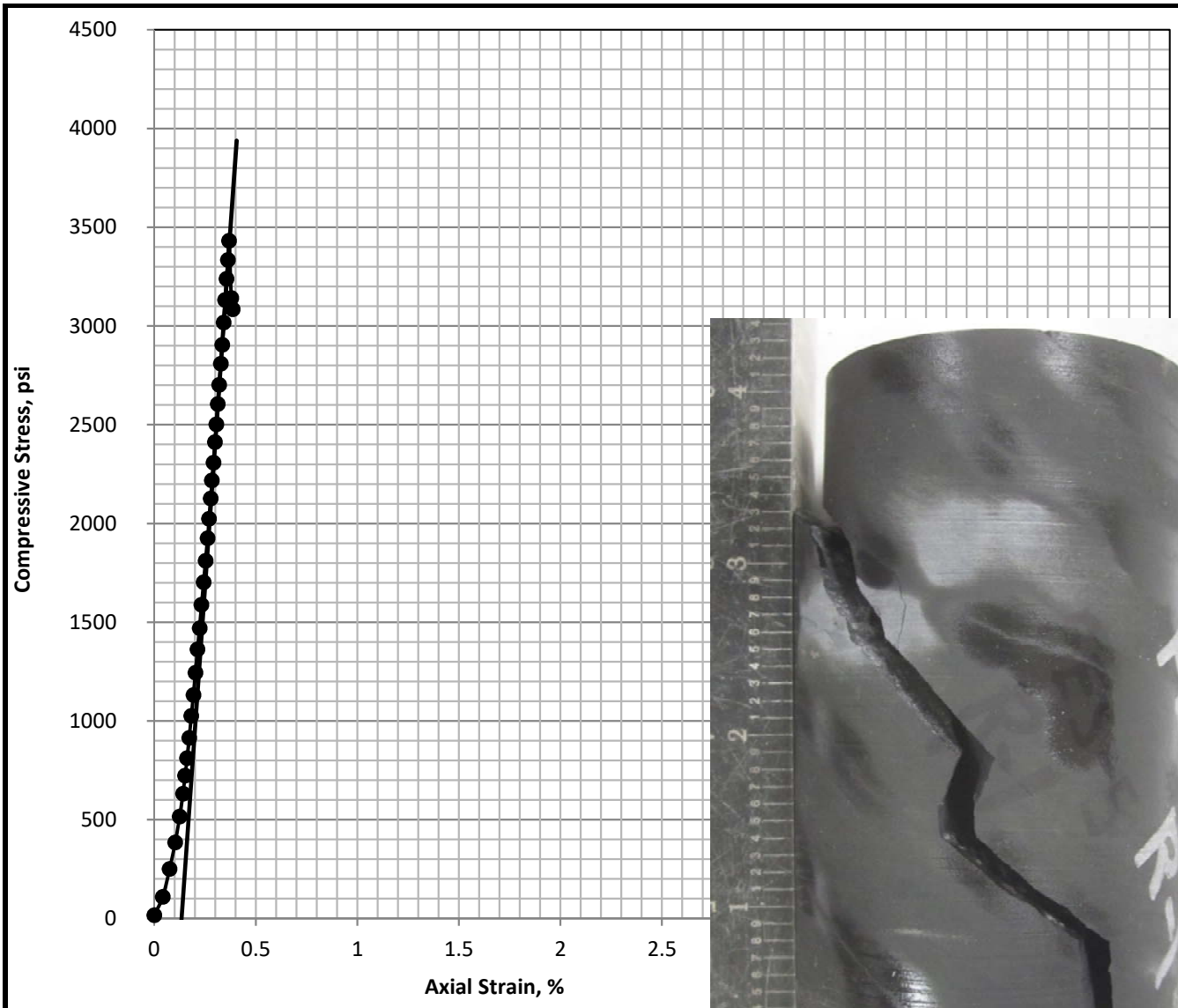
Sieve Size/ID #	Percent Finer Data		
6"	100	100	
4"	100	100	
3"	100	100	
1 1/2"	100	100	
1"	100	100	
3/4"	100	100	
1/2"	100	100	
3/8"	100	100	
#4	100	100	
#10	100	100	
#20	100	100	
#40	100	100	
#60	100	100	
#100	99	100	
#140	99	100	
#200	99	100	
5μ m	88	96	
2μ m	80	87	
1μ m	71	75	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Aquifer
CHPE - Ft. Edward - Saratoga Borings
SUMMARY OF ROCK TESTING

SAMPLE IDENTIFICATION			STATE PROPERTIES			ENGINEERING PROPERTY TESTS					REMARKS
Boring	Run	Depth	WATER CONTENT (1) (%)	TOTAL UNIT WGT. (pcf)	DRY UNIT WGT. (pcf)	TEST TYPE (2)	Mohs HARDNESS (-)	UNCONFINED COMPRESSION TESTS (ASTM D7012) COMPRESSIVE STRENGTH (psi)	AXIAL STRAIN @ FAILURE (%)	ESTIMATED (5) ELASTIC MODULUS (psi)	
FES-3	R-2	28.0-28.3				M	4.5				
FES-3	R-2	28.55-28.95	0.5	170	169	UC		4190	0.17	2E+06	
FES-3A	R-2	22.0-22.6				M	3.5				
FES-3A	R-2	22.7-23.1	0.6	170	169	UC		5690	0.22	3E+06	
FES-5	R-1	31.1-31.4				M	3				
FES-5	R-1	31.4-31.8	0.6	170	169	UC		3430	0.23	1E+06	

Notes: (1) Water contents determined after trimming and shearing.
(2) Test Type Abbreviations: M: Mohs Hardness, UC: UC Compression test with estimated elastic moduli
(5) Modulus estimated based on corrected gross deformations.





Specimen Information

Water Content (%)	Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Length (inch)	Diameter (inch)
0.62	170	169	4.069	1.964

Specimen meets ASTM D4543 shape tolerances

FAILURE PHOTO

Test Summary

Strain Rate (%/min)	Corrected Strain to Peak (%)	q_u (psi)	Estimated (shown) Elastic Modulus (psi)
0.14	0.23	3430	1E+06

Test by: DM
Test Date: Mar-31-21
Reviewed by: GET

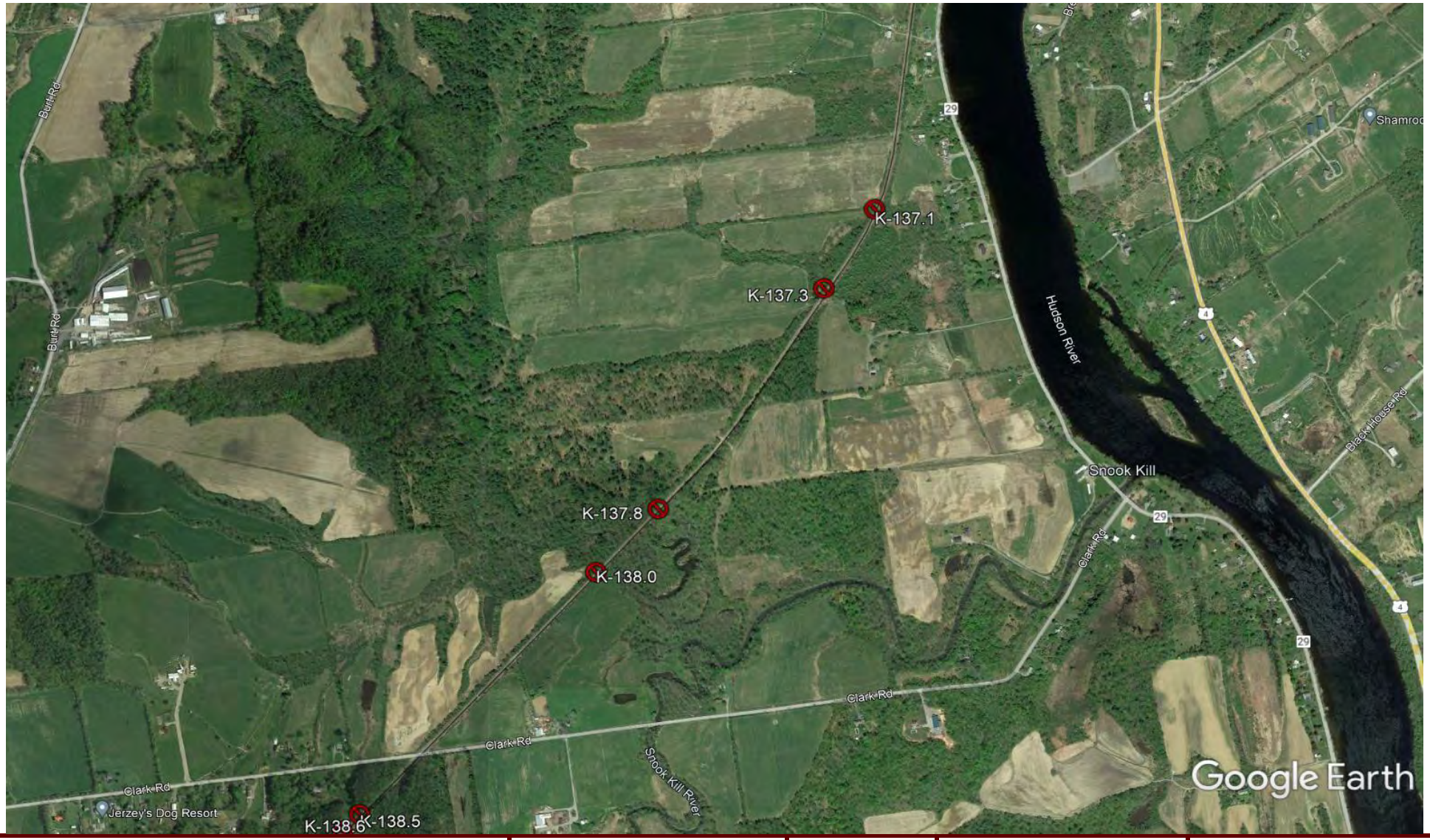
Aquifer

TerraSense, LLC
Project # 7853-21002

CHPE - Ft. Edward - Saratoga Borings

COMPRESSIVE STRESS VS STRAIN UNCONFINED COMPRESSIVE STRENGTH TEST

Boring: FES-5 Run: R-1
Depth 31.4-31.8 ft.



Boring Location Plans Page 4 of 18	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: April 2022

Champlain Hudson Power Express
Design Package 3
Glens Falls to Ballston Spa, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/10/2022** Finish Date: **2/11/2022**

Boring No.: **K-137.1** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/10/2022	**PM**	**DRY**	**OPEN**
2/11/2022	**AM**	***11.3'**	**9.0'**

Coordinates
Northing **1605867.7**
Easting **731644.3**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **145.7**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary/NX Core**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1	CASING	1	0.0	2.0	SS	13 11 6 8		Brownish-Black cmf SAND; little SILT; trace f GRAVEL; trace ORGANIC MATERIAL (leaves) (saturated, non-plastic) SM	12
2							2.0		
2	CASING	2	2.0	4.0	SS	3 5 5 2		Orangish-Brown cmf+ SAND; trace SILT (wet, non-plastic) SP	3
3									
4		3	4.0	6.0	SS	2 2 4 3		Orangish-Brown cmf+ SAND; some SILT (saturated, non-plastic) SM	10
5									
6							6.0		
6		4	6.0	8.0	SS	2 2 3 4		Orangish-Brown SILT; some cmf+ SAND; trace f GRAVEL (saturated, non-plastic) ML	7
7							8.0		
8		5	8.0	10.0	SS	1 2 3 3		Mottled Orangish-Brown CLAY; little SILT; trace f SAND (wet, plastic) w = 41.3%, LL = 77, PL = 26, PI = 51, % Fines = 93.8% CH	8
9	WET ROTARY								
10									
11								Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
12									
13									
14		6	14.0	16.0	SS	1 3 6 8		Mottled Light Brownish-Orangish-Brown CLAY; little SILT; trace f SAND (wet, plastic) CH	16
15									
16									
17									
18									
19		7	19.0	21.0	SS	5 6 7 10		Mottled Salmonish-Greenish-Blackish-Brown CLAY; little SILT; trace f SAND (wet, plastic) CH	20
20									
21									
22									
23		8	23.0	24.8	SS	38 43 48 50/3"	23.5		20
24							24.5	Brown mf GRAVEL; some cmf SAND; some SILT (saturated, non-plastic) w = 15.3%, % Fines = 24.0% GM	
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-137.1** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
							26.0	Encountered probable WEATHERED ROCK at 24.5 feet.	
26	NX CORE (WET)		26.0	31.0	NX	RUN 1		Advanced 3 7/8" tri-cone roller bit to 26.0 feet and began coring.	53
27								Greyish-Black SHALE	
28								53" or 88% Recovery	
29								11 Pieces (42") - 21% Chips and Fragments	
30								4 Pieces longer than 4" (29") - RQD = 48%	
31							31.0		
32			31.0	36.0	NX	RUN 2		Greyish-Black SHALE	60
33								60" or 100% Recovery	
34								15 Pieces (50") - 17% Chips and Fragments	
35								7 Pieces longer than 4" (34") - RQD = 57%	
36								Encountered loss of drilling water return at 33.5 feet.	
							36.0		
37			36.0	40.0	NX	RUN 3		Greyish-Black SHALE	48
38								48" or 100% Recovery	
39								13 Pieces (41") - 15% Chips and Fragments	
40								3 Pieces longer than 4" (17") - RQD = 35%	
							40.0		
41								Boring terminated at 40.0 feet.	
42									
43								Notes:	
44								1. Borehole backfilled with cement-bentonite grout.	
45								2. Soil classifications based on ATL Field Engineer's field classification.	
46								3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.	
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

f - fine
m - medium
c - course

and - 35-50%
some - 20-35%
little - 10-20%
trace - 0-10%

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/9/2022** Finish Date: **2/10/2022**

Boring No.: **K-137.3** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/10/2022	PM	*9.3'	10.0'

Coordinates
Northing **1605121.7**
Easting **731166.2**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **150.8**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary/NX Core**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	6 8 3 2	2.0	Blackish-Grey cmf SAND; and cmf GRAVEL; trace SILT (frozen, non-plastic) FILL SW	18
2	CASING	2	2.0	4.0	SS	1 3 3 4	4.0	Brown cmf SAND; some CLAY; little SILT (moist, moderately plastic) SC	16
4		3	4.0	6.0	SS	4 5 6 8		Brown CLAY; little mf SAND; trace SILT (moist, plastic) CL	14
6		4	6.0	8.0	SS	7 6 7 9		Brown CLAY; little SILT; trace f SAND (moist, plastic) w = 40.2% CL	22
8		5	8.0	10.0	SS	9 8 7 9		Brown CLAY; trace SILT (moist, plastic) CL	20
10	WET ROTARY							Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14		6	14.0	16.0	SS	3 2 4 5		Brownish-Grey CLAY; little SILT; trace f SAND (moist, plastic) w = 33.7%, LL = 38, PL = 18, PI = 20, % Fines = 96.0% CL	24
19		7	19.0	21.0	SS	1 1 1 3		Brownish-Grey CLAY; little SILT; trace f SAND (moist, plastic) CL	24
24		ST-1	24.0	26.0	SS	WH/12" 2 2		(3" Brass Lined Split Spoon) Brown CLAY; little SILT; trace f	24

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-137.3** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
26								SAND (moist, plastic) w = 35.5%, LL = 42, PL = 22, PI = 20 % Fines = 99.8% CL	
27									
28									
29							29.0	WEATHERED SHALE Fragments	
30		8	29.0	29.1	SS	50/1"		Encountered WEATHERED ROCK at 29.0 feet. Advanced 3 7/8" tri-cone roller bit to 31.0 feet and began coring.	1
31	NX CORE (WET)		31.0	35.0	NX	RUN 1	31.0	Greyish-Black SHALE 24" or 50% Recovery 3 Pieces (5") - 79% Chips and Fragments 0 Pieces longer than 4" (0") - RQD = 0%	24
35			35.0	40.0	NX	RUN 2	35.0	Greyish-Black SHALE 54" or 90% Recovery 11 Pieces (33") - 39% Chips and Fragments 4 Pieces longer than 4" (17") - RQD = 28%	54
40							40.0	Boring terminated at 40.0 feet. Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classification. 3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	

f - fine; m - medium; c - course

and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-137.1	S-5	8.0-10.0	Mottled Orangish-Brown CLAY; little SILT; trace f SAND	93.8	41.3	77	26	51	--	--	--	--	--	--	--	--
	S-8	23.0-24.8	Brown mf GRAVEL; some cmf SAND; some SILT	24.0	15.3	--	--	--	--	--	--	--	--	--	--	--
	RC-2	31.0-36.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	5,570	691	1.43
K-137.3	S-3	4.0-6.0	Brown CLAY; little mf SAND; trace SILT	--	--	--	--	--	--	300	35	7.65	15,480	--	--	--
	S-4	6.0-8.0	Brown CLAY; little SILT; trace f SAND	--	40.2	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brownish-Grey CLAY; little SILT; trace f SAND	96.0	33.7	38	18	20	--	--	--	--	--	--	--	--
	ST-1	24.0-26.0	Brown CLAY; little SILT; trace f SAND	99.8	35.5	42	22	20	--	--	--	--	--	--	--	--
	R-2	35.0-40.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	6,410	238	1.10
K-137.8	S-5	8.0-10.0	Brown mf SAND; little CLAY; trace SILT	--	23.5	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Brown mf+ SAND; some SILT	33.0	30.0	--	--	--	--	--	--	--	--	--	--	--
	ST-1C	44.0-46.0	Grey mf+ SAND; and SILT	40.0	32.6	NP	NP	NP	--	--	--	--	--	--	--	--
K-138.0	S-5	8.0-10.0	Mottled Light Greyish-Orangish-Brown CLAY; little SILT; trace f SAND	94.2	40.2	77	31	46	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.6	73.5	73	27	46	--	--	--	--	--	--	--	--
	S-11	38.0-40.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.8	61.1	73	29	44	--	--	--	--	--	--	--	--
K-138.5	S-5	8.0-10.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT; trace f SAND	97.9	50.2	70	25	45	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT, trace f SAND	99.8	80.8	75	25	50	--	--	--	--	--	--	--	--
	S-11	36.0-38.0	Grey CLAY; little SILT; trace f SAND	99.2	69.5	68	25	43	--	--	--	--	--	--	--	--
K-138.6	S-5	8.0-10.0	Blackish-Grey SILT; some mf SAND; trace CLAY; trace OM	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	75.9	73	23	50	--	--	--	--	--	--	--	--
	S-10	35.0-37.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	77.7	70	23	47	--	--	--	--	--	--	--	--
K-139.0	S-5	8.0-10.0	Grey mf+ SAND; little SILT	14.0	24.1	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; trace f SAND; trace SILT	99.1	62.3	61	22	39	--	--	--	--	--	--	--	--
	ST-1	33.0-35.0	Grey CLAY; little SILT; trace f SAND	99.5	77.7	65	24	41	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-04-03-22
Report Date: March 1, 2022
Date Received: February 18, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
[redacted]			
K-134.5	S-5 [1]	8-10	21.0
	S-8c [1]	27-29	15.3
	S-10 [1]	34-36	19.2
K-134.7	S-4 [1]	6-8	7.6
	S-6 [1]	14-16	16.9
	S-8	23-25	12.6
K-134.8	S-5	8-10	16.0
	S-7	19-21	29.9
	ST-1	37-39	17.1
K-137.3	S-4	6-8	40.2
	S-6	14-16	33.7
	ST-1	24-26	35.5

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-136.1	S-5	8-10	40.3
	S-8	23-25	34.8
	S-10	34-36	18.6
K-136.5	S-4	6-8	31.9
K-136.6	S-4	6-8	39.7
	S-6	14-16	22.8
K-137.1	S-5	8-10	41.3
	S-8 [1]	23-24.8	15.3
K-137.8	S-5	8-10	23.5
	S-8	24-26	30.0
	ST-1c	44-46	32.6
K-142.8	S-4	6-8	26.5
	S-7	19-21	22.0
	S-9	29-31	28.4
	ST-1c	37-39	22.8
K-142.9	S-5	8-10	45.7
	S-8	24-26	40.8
	ST-1c	37-39	25.8
K-144.3	S-5	8-10	25.5
	S-7	19-21	21.7
	ST-1c	34-36	26.7

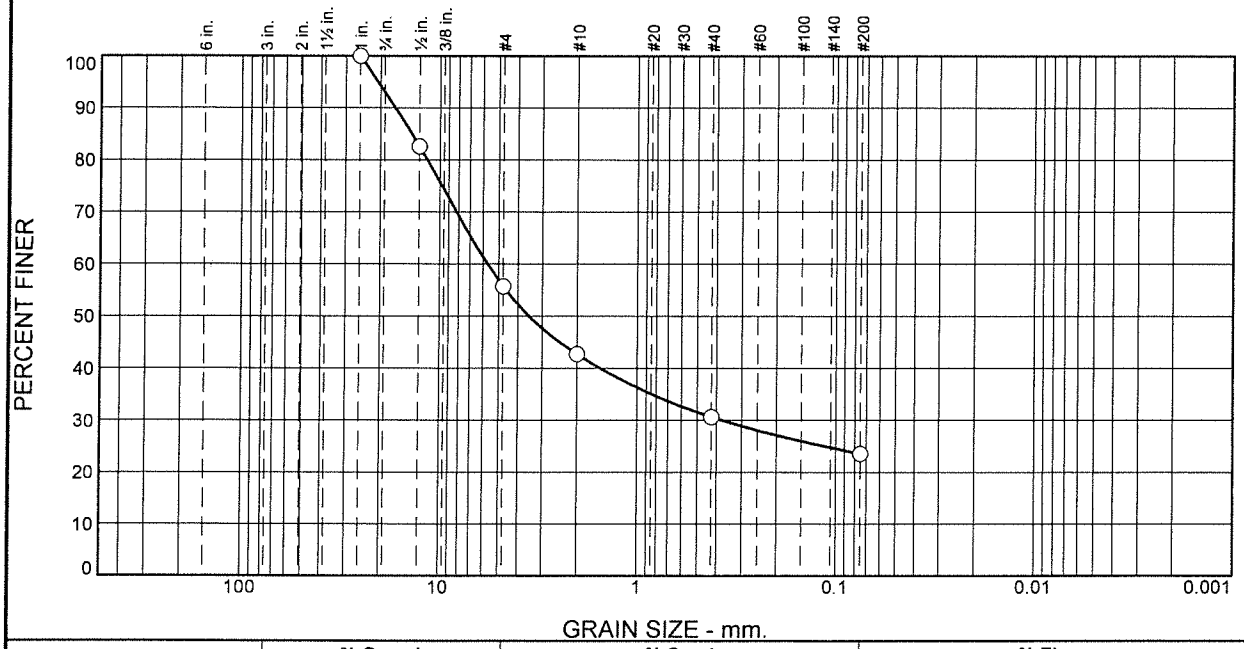
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-05-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/03/22

Sample No: K-137.1, S-8 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 23-24.8'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	37	13	12	7	24	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	83		
#4	56		
#10	43		
#40	31		
#200	24		

Soil Description

Brown mf GRAVEL; some cmf SAND; some SILT

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 13.9099 D_{60}= 5.6899 D_{50}= 3.5093
D_{30}= 0.3746 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 15.3%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-05-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 3, 2022
	United Cable Installation	**Test Date:**	February 18, 2022
	Various Locations, New York	**Performed By:**	A. Rivers

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-136.1	S-5	8-10	A	10	44.67	99.1
K-136.1	S-8	23-25	A	10	175.81	99.5
K-136.5	S-4	6-8	A	10	40.42	85.0
K-136.6	S-4	6-8	A	10	30.04	98.3
K-137.1	S-5	8-10	A	10	23.69	93.8
K-142.8	S-7	19-21	A	10	23.68	89.5
K-142.9	S-8	24-26	A	10	23.42	99.8

Reviewed By: _____ Date: March 3, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Test Date:**	February 18, 2022
	Various Locations, New York	**Performed By:**	A. Rivers

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-134.8	S-7	19-21	A	10	73.88	56.5
K-137.3	S-6	14-16	A	10	47.83	96
K-137.3	ST-1	24-26	A	10	145.26	99.8
K-138.0	S-5	8-10	A	10	47.83	94.2
K-138.0	S-8	24-26	A	10	32.88	99.6
K-138.0	S-11	38-40	A	10	81.67	99.8
K-138.5	S-5	8-10	A	10	56.95	97.9
K-138.5	S-8	24-26	A	10	25.91	99.8
K-138.5	S-11	36-38	A	10	85.84	99.2
K-138.6	S-8	24-26	A	10	36.43	99.7
K-138.6	S-10	35-37	A	10	90.96	99.7
K-139.0	S-7	19-21	A	10	37.57	99.1
K-139.0	ST-1	33-35	A	10	111.89	99.5
K-139.1	S-8	24-26	A	10	29.63	99.6
K-139.1	ST-1	38-40	A	10	97.68	99.2

Reviewed By: _____ Date: March 1, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client:	Kiewit Instrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Date Received:**	February 18, 2022
	Various Locations, New York		

TEST DATA

Boring No.	Sample No.	LL	PL	PI
[redacted]				
K-134.8	S-7	25	20	5
K-137.3	S-6	38	18	20
K-137.3	ST-1	42	22	20
K-138.0	S-5	77	31	46
K-138.0	S-8	73	27	46
K-138.0	S-11	73	29	44
K-138.5	S-5	70	25	45
K-138.5	S-8	75	25	50
K-138.5	S-11	68	25	43
K-138.6	S-8	73	23	50
K-138.6	S-10	70	23	47
K-139.0	S-7	61	22	39
K-139.0	ST-1	65	24	41
K-139.1	S-8	64	21	43
K-139.1	ST-1	66	20	46

SAMPLE INFORMATION

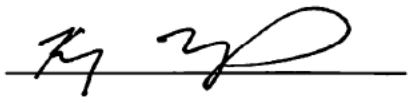
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
[redacted]				
K-134.8	S-7	2.38	1	29.9
K-137.3	S-6	4.76	1	33.7
K-137.3	ST-1	0.297	0	35.5
K-138.0	S-5	0.297	0	40.2
K-138.0	S-8	0.297	0	73.5
K-138.0	S-11	0.297	0	61.1
K-138.5	S-5	0.297	0	50.2
K-138.5	S-8	0.297	0	80.8
K-138.5	S-11	0.297	0	69.5
K-138.6	S-8	0.297	0	75.9
K-138.6	S-10	0.297	0	77.7
K-139.0	S-7	0.297	0	62.3
K-139.0	ST-1	0.297	0	77.7
K-139.1	S-8	0.297	0	79.2
K-139.1	ST-1	0.297	0	70.6

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
[redacted]			
K-134.8	S-7	Air Dry	Pulverizing and Screening
K-137.3	S-6	Air Dry	Pulverizing and Screening
K-137.3	ST-1	Air Dry	Not Necessary
K-138.0	S-5	Air Dry	Not Necessary
K-138.0	S-8	Air Dry	Not Necessary
K-138.0	S-11	Air Dry	Not Necessary
K-138.5	S-5	Air Dry	Not Necessary
K-138.5	S-8	Air Dry	Not Necessary
K-138.5	S-11	Air Dry	Not Necessary
K-138.6	S-8	Air Dry	Not Necessary
K-138.6	S-10	Air Dry	Not Necessary
K-139.0	S-7	Air Dry	Not Necessary
K-139.0	ST-1	Air Dry	Not Necessary
K-139.1	S-8	Air Dry	Not Necessary
K-139.1	ST-1	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: 

Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-136.1	S-5	62	23	39
K-136.1	S-8	34	18	16
K-136.5	S-4	29	14	15
K-136.6	S-4	30	19	11
K-137.1	S-5	77	26	51
K-137.8	ST-1c	NP	NP	NP
K-142.8	S-7	47	18	29
K-142.9	S-8	37	16	21

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-136.1	S-5	0.074	0	40.3
K-136.1	S-8	0.002	0	34.8
K-136.5	S-4	0.074	0	31.9
K-136.6	S-4	0.074	0	39.7
K-137.1	S-5	0.074	0	41.3
K-137.8	ST-1c	0.42	1	32.6
K-142.8	S-7	0.074	0	22.0
K-142.9	S-8	0.002	0	40.8

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-136.1	S-5	Air Dry	Not Necessary
K-136.1	S-8	Air Dry	Not Necessary
K-136.5	S-4	Air Dry	Not Necessary
K-136.6	S-4	Air Dry	Not Necessary
K-137.1	S-5	Air Dry	Not Necessary
K-137.8	ST-1c	Air Dry	Pulverizing and Screening
K-142.8	S-7	Air Dry	Not Necessary
K-142.9	S-8	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: _____ Date: 03/03/22

ATLANTIC TESTING LABORATORIES

CORROSION ANALYSIS SUITE

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Location: Various Locations, New York

ATL Report No. CD10279E-04-03-22
Report Date: March 1, 2022
Date Received: February 18, 2022

Sample: K-137.3, S-3 **Depth (ft):** 4-6

MEASURING pH OF SOIL FOR USE IN CORROSION TESTING
ASTM G 51

Type of Test	Soil Temperature (°C)	pH Readings			Average
Laboratory	20.0	7.63	7.65	7.66	7.65

pH of calibration standards used: 7.00

MEASUREMENT OF SOIL RESISITIVITY USING THE TWO-ELECTRODE SOIL BOX METHOD
ASTM G 187 (LABORATORY)

Test Date: 02/22/22 Performed by: A. Rivers
Meter Used: Miller 400A Soil Box Factor: 1.29

Date Collected	Temperature at Collection (°C)	Measured Resistance (Ω)	Calculated Resistivity (Ω/cm)
10/19/2021	Not Provided	12,000	15,480

WATER-SOLUBLE CHLORIDE ION CONTENT IN SOIL
AASHTO T 291, Method A

Chloride by Mass of Soil (mg/kg)
35

WATER-SOLUBLE SULFATE IN SOIL
ASTM C 1580

Sulfate by Mass of Sample (%)	Sulfate by Mass of Sample (mg/kg)
0.03	300

Reviewed By: Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

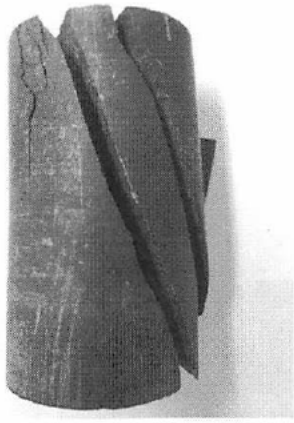
ATL Report No.: CD10279E-04-03-22
Report Date: March 1, 2022
Date Received: February 18, 2022

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS
ASTM D 7012, Method C

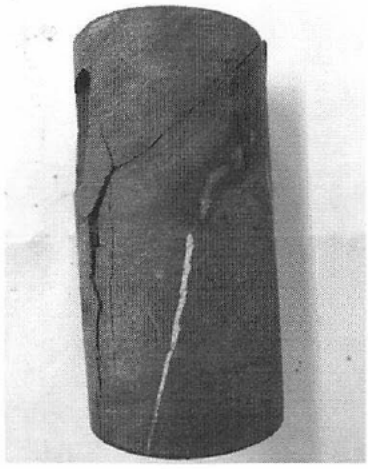
Boring No.	Sample No.	Depth (ft)	Diameter (in)	Length (in)	Load Rate (lbs/sec)	Total Load (lbs)	Area (in^2)	Compressive Strength (psi)
K-137.3	R-2	35.4-35.7	1.98	4.06	300	19,760	3.08	6,410

Failure Pictures

K-132.2, R-1, 33.0-33.3'



K-137.3, R-2, 35.4-35.7'



Reviewed By: _____ Date: March 1, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

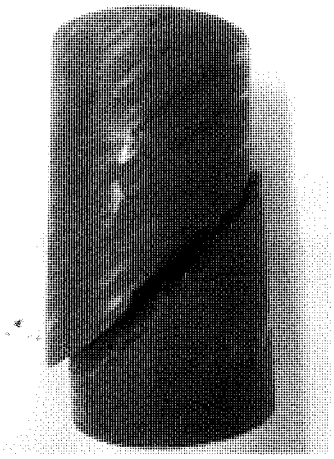
ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 18, 2022

UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS
ASTM D 7012, Method C

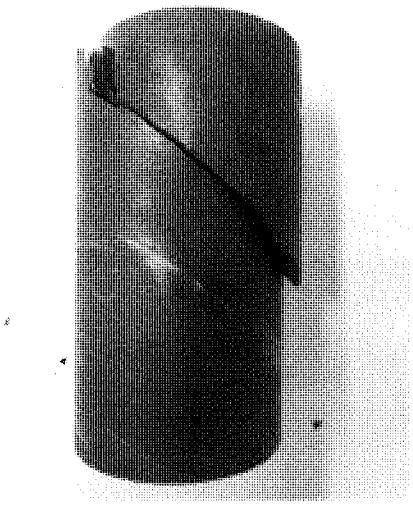
Boring No.	Sample No.	Depth (ft)	Diameter (in)	Length (in)	Load Rate (lbs/sec)	Total Load (lbs)	Area (in^2)	Compressive Strength (psi)
K-136.5	RC-2	20.5-20.8	1.98	4.03	300	11,240	3.08	3,650
K-136.6	RC-1	25.1-25.4	1.98	4.05	200	1,690	3.08	550
K-137.1	RC-2	33.5-33.8	1.98	4.04	300	17,170	3.08	5,570

Failure Pictures

K-136.5, RC-2, 20.5-20.8'



K-136.6, RC-1, 25.1-25.4'



Client:	Kiewit Intrastructure Co.	ATL Report No.:	CD10279E-05-03-22
Project:	Champlain Hudson Power Express United Cable Installation	Report Date:	March 3, 2022

Failure Pictures Continued

K-137.1, RC-1, 33.5-33.8'



Reviewed By: _____ Date: March 3, 2022

ADVANCED TERRA TESTING

Splitting Tensile Strength
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	JOB NO.	2161-014
PROJECT	Champlain Hudson Power Express	LOCATION	--
PROJECT NO.	CD10279		

BORING NO.					
DEPTH	23.6-24	26.1-26.6	35.1-35.5	[redacted]	38.8-39.4
SAMPLE NO.	K-136.5-RC2	K-136.6-RC1	K-137.1-RC2	[redacted]	K-137.3-R2
DATE SAMPLED					
DATE TESTED	03/14/22	03/14/22	03/14/22	[redacted]	03/18/22
TECHNICIAN	DL	DL	DL	[redacted]	DL
ROCK TYPE					
Diameter (in):	1.986	1.972	1.964	[redacted]	1.994
Height (in):	1.337	1.281	1.332	[redacted]	1.324
Mass of Wet Rock (g):	184.00	175.30	178.60	[redacted]	181.80
Wet Density (lbs/ft³):	169.2	170.7	168.6	[redacted]	167.5
Wet Density (g/cm³):	2.711	2.734	2.701	[redacted]	2.68
Peak Load (lbs):	2498	3792	2838	[redacted]	989
Splitting Tensile Strength (psi):	599	956	691	[redacted]	238
Splitting Tensile Strength (kPa):	4129	6588	4762	[redacted]	1644
Failure Type:	Single Plane	Multiple Plane	Single Plane	[redacted]	Multiple Plane

BORING NO.	
DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	
TECHNICIAN	
ROCK TYPE	
Diameter (in):	
Height (in):	
Mass of Wet Rock (g):	
Wet Density (lbs/ft³):	
Wet Density (g/cm³):	
Peak Load (lbs):	
Splitting Tensile Strength (psi):	
Splitting Tensile Strength (kPa):	
Failure Type:	

NOTES	

Data entry by:	DL		Date: 03/18/22
Checked by:	HN		Date: 03/18/22
File name:	2161014__Brazilian ASTM D3967_0.xlsm		

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	35.1-35.5
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.1-RC2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

Before Picture



NOTES

Picture File: 3.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	35.1-35.5
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.1-RC2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/14/22
		TECHNICIAN	DL
		ROCK TYPE	

After Picture



NOTES

Picture File: 3a.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	38.8-39.4
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.3-R2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/18/22
		TECHNICIAN	DL
		ROCK TYPE	

Before Picture



NOTES

Picture File: IMG_2919.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

Splitting Tensile
ASTM D3967

CLIENT	Atlantic Testing Labs LTD	BORING NO.	
JOB NO.	2161-014	DEPTH	38.8-39.4
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.3-R2
PROJECT NO.	CD10279	DATE SAMPLED	
LOCATION	--	DATE TESTED	03/18/22
		TECHNICIAN	DL
		ROCK TYPE	

After Picture



NOTES

Picture File: IMG_2925.JPG
File name: 2161014__Brazilian ASTM D3967_0.xlsm

ADVANCED TERRA TESTING

CERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	JOB NO.	2161-014
PROJECT	Champlain Hudson Power Express	LOCATION	--
PROJECT NO.	CD10279		

BORING NO.				CD10279
DEPTH	21.3-21.9	27.8-28.2	31.5-32.0	[redacted]
SAMPLE NO.	K-136.5-RC2	*K-136.6-RC1	K-137.1-RC2	[redacted]
DATE SAMPLED				
DATE TESTED	04/06/22	04/06/22	04/06/22	[redacted]
TECHNICIAN	HN	HN	HN	[redacted]
ROCK TYPE				
Surface Type:	Saw Cut	Saw Cut	Saw Cut	[redacted]
Moisture Condition	As Received	As Received	As Received	[redacted]
Reading A.1 (in):	0.00373	0.00651	0.00389	[redacted]
Reading A.2 (in):	0.00540	0.00913	0.00429	[redacted]
Reading A.3 (in):	0.00373	0.00778	0.00310	[redacted]
Reading A.4 (in):	0.00310	0.00484	0.00357	[redacted]
Reading A.5 (in):	0.00373	0.00381	0.00405	[redacted]
Reading B.1 (in):	0.00437	0.00754	0.00429	[redacted]
Reading B.2 (in):	0.00563	0.00881	0.00238	[redacted]
Reading B.3 (in):	0.00278	0.00810	0.00389	[redacted]
Reading B.4 (in):	0.00341	0.00611	0.00421	[redacted]
Reading B.5 (in):	0.00325	0.00421	0.00413	[redacted]
Average Reading (in):	0.00391	0.00668	0.00378	[redacted]
Average Reading (mm):	0.0994	0.1698	0.0960	[redacted]
Uncorrected CAI or CAI_s:	**0.99**	**1.70**	**0.96**	[redacted]
Corrected CAI:	**1.46**	**2.16**	**1.43**	[redacted]

NOTES

CAI_s is the CAI calculated on saw cut specimens.

Corrected CAI for saw cut specimens based on R. Plinger and H. Kasling
Suggested formula CAI = 0.99*CAIs + 0.48.

Applied pins had a Rockwell Hardness of 54-56.

* Last pin created a crack on surface of specimen.

Data entry by:	HN	Date: 4/7/22
Checked by:	CL	Date: 04/08/22
File name:	2161014__CHERCHAR ASTM D7625_0.xlsm	

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	31.5-32.0
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.1-RC2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

Before Picture



NOTES	* Last pin created a crack on surface of specimen.

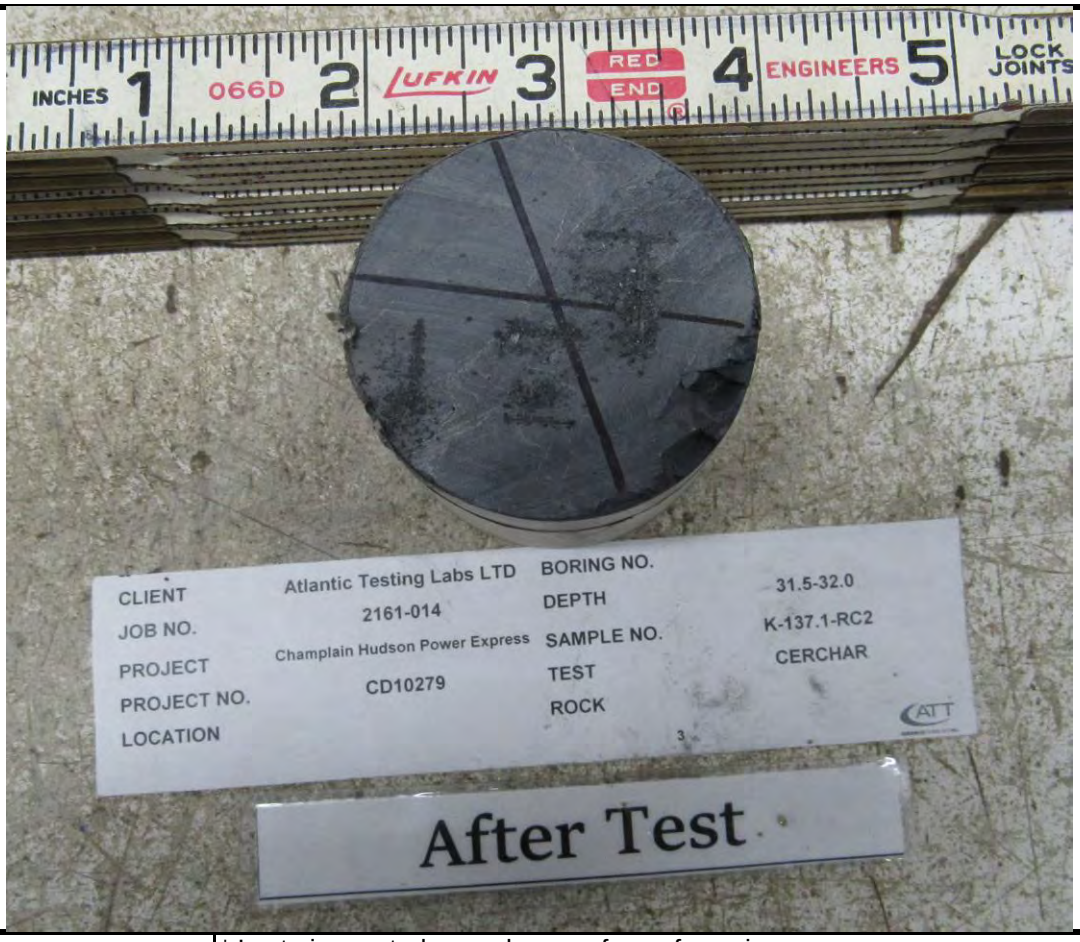
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ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	--
JOB NO.	2161-014	DEPTH	31.5-32.0
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.1-RC2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/06/22
		TECHNICIAN	HN
		ROCK TYPE	--

After Picture



NOTES	* Last pin created a crack on surface of specimen.

Picture File: 3a.JPG
File name: 2161014__CHERCHAR ASTM D7625_0.xlsm

ADVANCED TERRA TESTING

CERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	JOB NO.	2161-014
PROJECT	Champlain Hudson Power Express	LOCATION	--
PROJECT NO.	CD10279		

BORING NO.	CD10279
DEPTH	38.8-39.4
SAMPLE NO.	K-137.3-R2
DATE SAMPLED	
DATE TESTED	04/07/22
TECHNICIAN	HN
ROCK TYPE	
Surface Type:	Saw Cut
Moisture Condition	As Received
Reading A.1 (in):	0.00246
Reading A.2 (in):	0.00349
Reading A.3 (in):	0.00278
Reading A.4 (in):	0.00198
Reading A.5 (in):	0.00238
Reading B.1 (in):	0.00206
Reading B.2 (in):	0.00373
Reading B.3 (in):	0.00183
Reading B.4 (in):	0.00254
Reading B.5 (in):	0.00159
Average Reading (in):	0.00248
Average Reading (mm):	0.0631
Uncorrected CAI or CAI_s:	**0.63**
Corrected CAI:	**1.10**

NOTES

CAI_s is the CAI calculated on saw cut specimens.

Corrected CAI for saw cut specimens based on R. Plinger and H. Kasling
Suggested formula CAI = 0.99*CAIs + 0.48.
Applied pins had a Rockwell Hardness of 54-56.

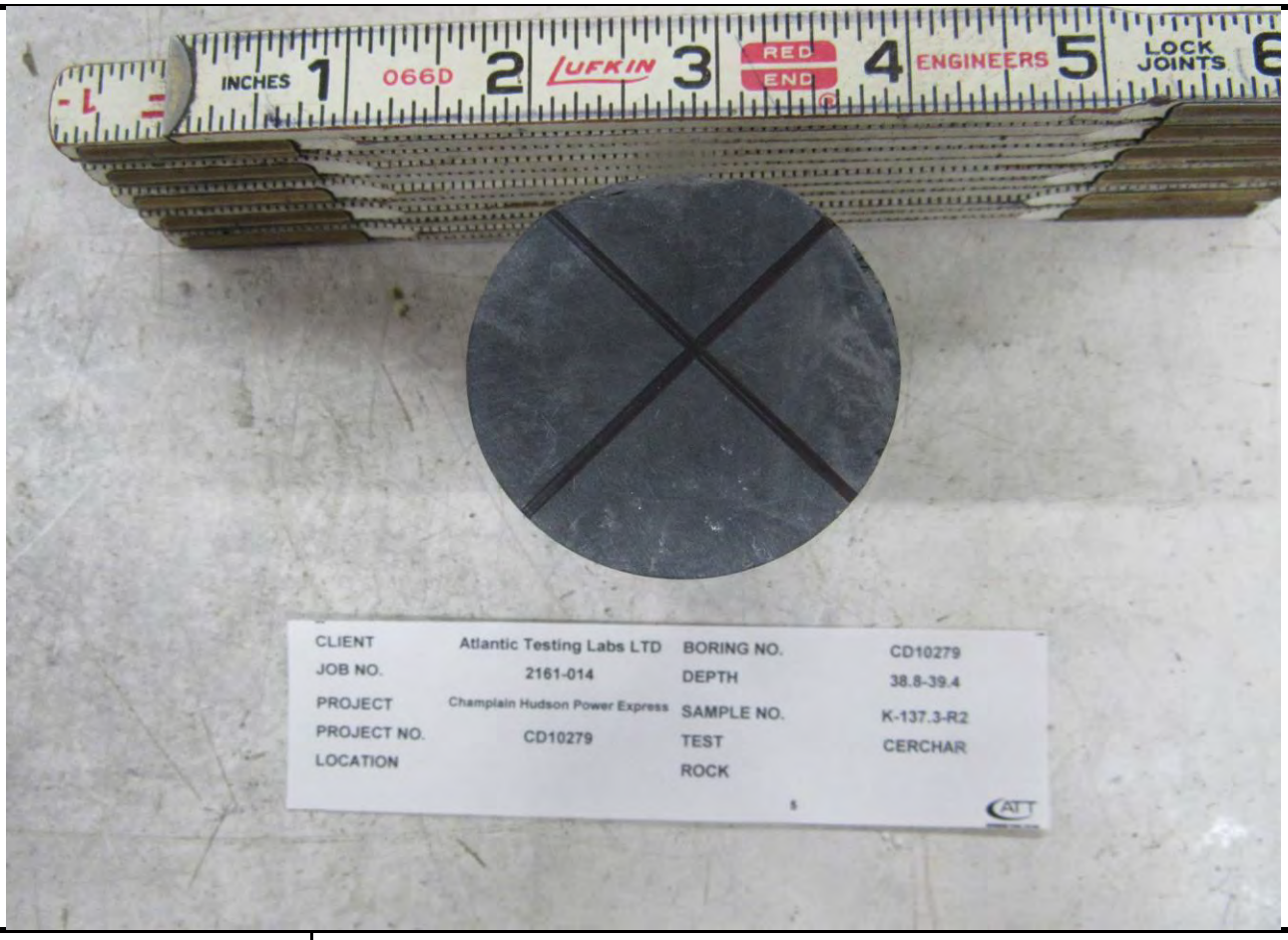
Data entry by:	HN	Date:	04/07/21
Checked by:	CL	Date:	04/08/22
File name:	2161014__CHERCHAR ASTM D7625_1.xlsm		

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	CD10279
JOB NO.	2161-014	DEPTH	38.8-39.4
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.3-R2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/07/22
		TECHNICIAN	HN
		ROCK TYPE	--

Before Picture



NOTES

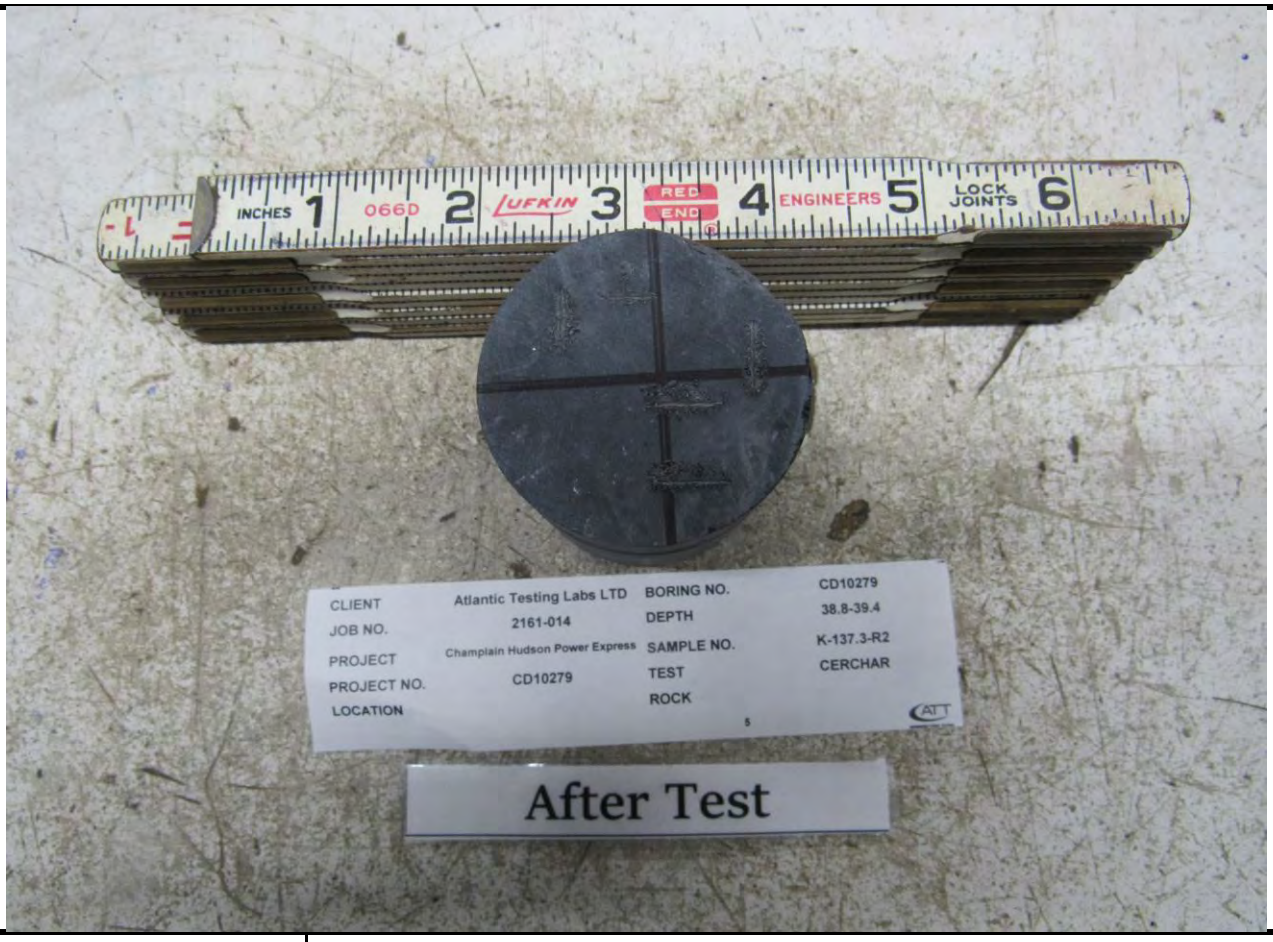
Picture File: 5.JPG
File name: 2161014__CHERCHAR ASTM D7625_1.xlsm

ADVANCED TERRA TESTING

CHERCHAR Abrasiveness
ASTM D7625

CLIENT	Atlantic Testing Labs LTD	BORING NO.	CD10279
JOB NO.	2161-014	DEPTH	38.8-39.4
PROJECT	Champlain Hudson Power Express	SAMPLE NO.	K-137.3-R2
PROJECT NO.	CD10279	DATE SAMPLED	--
LOCATION	--	DATE TESTED	04/07/22
		TECHNICIAN	HN
		ROCK TYPE	--

After Picture



NOTES

Picture File: 5a.JPG
File name: 2161014__CHERCHAR ASTM D7625_1.xlsm

Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-137.1 - Runs 1 through 3



K-137.3 - Runs 1 and 2



Kiewit

MEMORANDUM

DATE: December 6, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 4 – Package 3 – HDD Crossing 27 – Revision 1
Champlain Hudson Power Express Project
Glen Falls, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Glen Falls, New York. The approximate station for the start of HDD crossing Number 27 is STA 30281+00 (43.2306°N, 73.6080°W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by TRC and the recent investigation by Atlantic Testing Laboratories (ATL), referenced below.

- TRC, Geotechnical Data Report, Champlain Hudson Power Express, Canadian Pacific Railway Borings MP 113.1-177.1, dated March 29, 2013.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 3, Glens Falls to Ballston Spa, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 27
Borings K-137.8, A137.9-1, K-138.0
Segment 4 - Design Package 3

CHPE Segments 4 & 5 - Package 3
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A136.0-1	1611762.7	732951.9	146.6
	B134.5-1	1618254.8	737493.3	137.7
	B134.6-1	1617614.3	737160.7	140.2
	B135.1-1	1615942.5	735298.2	130.7
	B135.35-1	1615043.9	734326.1	147.7
	A137.9-1 / B137.9-1	1602848.9	729488.6	157.2
	B140.0-1	1594313.7	721767.2	205.0
	B144.2-1	1577578.6	707868.0	307.5
	B144.3-1	1577307.0	707733.5	307.4
	B144.5-1	1576380.0	707249.6	308.5
	B144.8-1	1574825.2	706447.7	310.8
	B145.0-1	1574014.3	706034.4	312.7
	B145.48	1571450.2	704693.3	320.4
	B146.1-1	1568896.3	703364.4	321.4
	B146.5-1	1566773.3	702083.1	323.6
	B148.4-1	1561976.4	694067.5	326.0
	B148.4-5	1561817.7	693531.9	327.4
	B149.87-1	1559610.1	686723.2	325.2
	B151.58-1	1553784.9	679646.1	336.4
	B152.6-0	1550004.2	676432.6	329.3
	B153.1-1	1547302.8	676031.8	322.5
	B154.3-1	1541375.5	674232.0	321.5
	B155.2-1	1536685.4	674403.7	313.7
	B155.7-1	1534202.1	674175.1	340.0
	B157.9-1	1524284.2	668932.6	246.0
	B158.1-1	1523474.2	668924.1	243.0
	B158.22-1	1522640.9	669168.4	279.1
AECOM**	BM-1A	1521184.8	669107.0	292.4
	FES-3	1616410.4	736040.4	143.9
	FES-3A	1616311.4	735904.6	139.3
	FES-3B	1611359.3	732784.5	142.5
	FES-4	1608699.4	732017.0	142.6
	FES-5	1605493.6	731399.7	147.1
	FES-6	1598212.9	725299.3	174.4
	FES-9	1583302.9	711497.9	271.6
	FES-10A	1563547.6	698025.3	321.4
	FES-12	1560130.5	687972.2	322.5
	SB-1A	1547803.7	676160.2	321.0
	SB-1B	1551257.2	677175.4	327.5
	SB-2	1545717.0	675698.7	316.3
	SB-3	1540348.5	674275.0	322.4

Notes:

- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

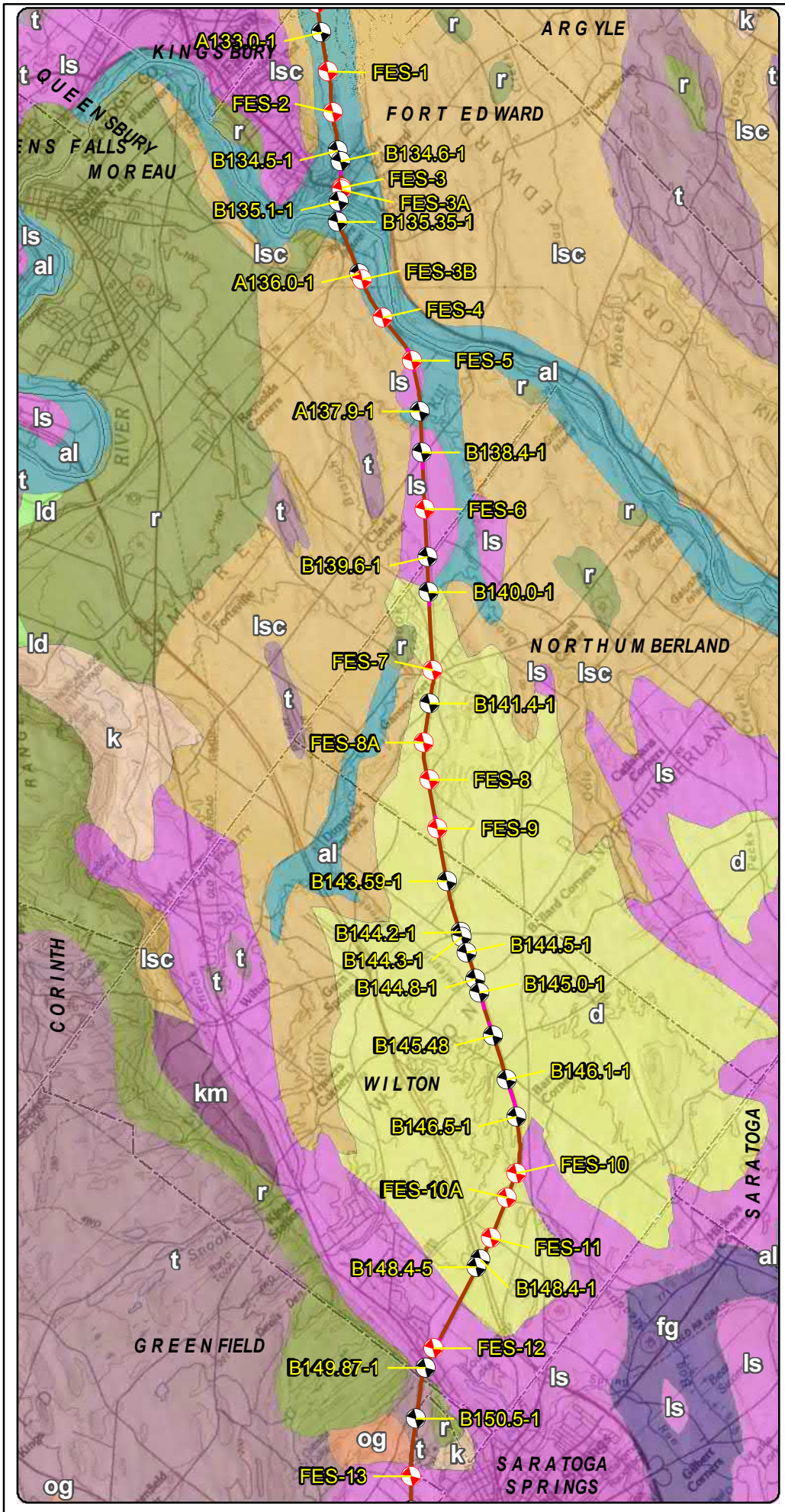
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

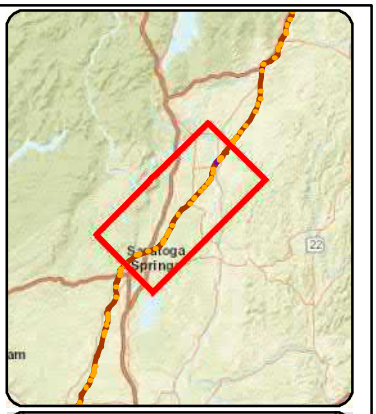
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- d - Dunes
- fg - Fluvial sand and/or gravel
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

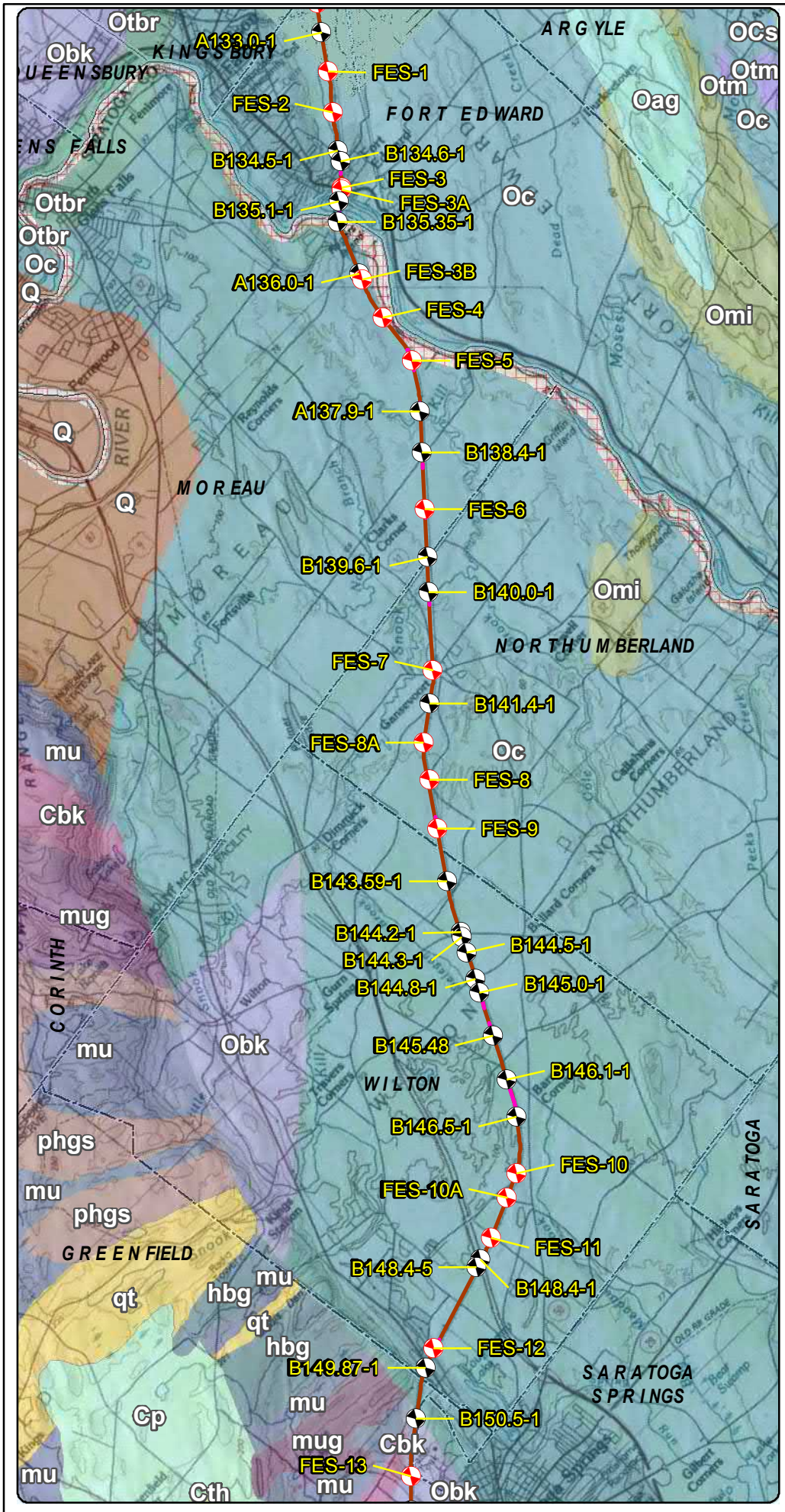
Champlain Hudson Power Express Inc.

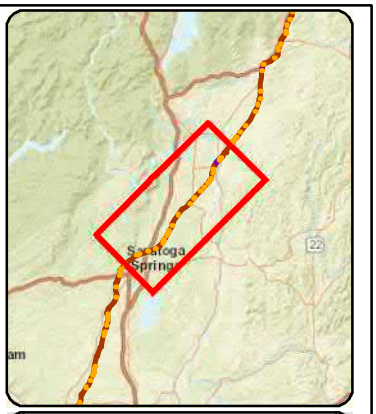
Surficial Geology and Geotechnical Borings
Fort Edward to Saratoga
Figure 3-4

Prepared on 4/29/2021
by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190908oring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Surficial_May_2021_Report.mxd





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Cth - Theresa (Galway) Formation
- No Label
- OCs - Cambrian thru Middle Ordovician
- Oag - Austin Glen Form (graywacke, shale)
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- hbg - Biotite/hornblende granite gneiss
- mu - Undivided metasedimentary rock
- mug - Interlayered metasedimentary rock
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Fort Edward to Saratoga Figure 4-4

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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LEGEND

- 111.8 Certified Milepost - Tenths
- 135 Certified Milepost
- 111.8 Preferred Alternative Milepost - Tenths
- 135 Preferred Alternative Milepost
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- 2021 Boring Location
- Previous (2013) Boring Location
- Streams/Ditches
- Railroad ROW
- Deviation Zone
- Deviation Zone Outside ROW
- Preferred Alternative Deviation Zone
- Preferred Alternative Deviation Zone Outside ROW
- Town Boundary
- Village Boundary
- State Park (OPRHP)

Parcel Ownership: TOWN NAME

Road Name: Village Name

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Fort Edward to Saratoga

Figure A-4

Sheet 4 of 15

Prepared by: AECOM 5/19/2021

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

BORING	**B137.9-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 3

Also referred to as A137.9-1

GROUNDWATER DATA			
FIRST ENCOUNTERED 35.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	80.0 '

DRILLER	G. SPIZZIRRI
HELPER	E. WARD
INSPECTOR	J. STAPLETON
DATE STARTED	01/24/2013
DATE COMPLETED	02/20/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	2 2 1 2		***ASH, CINDERS AND SLAG (FILL)***		
				2.0		
	S-2	2 1 1 2		***BROWN F/ SAND, SM SILT, TR TO SM CINDERS, TR CLAY (FILL)***		
5	S-3	2 2 2 2		6.0		
	S-4	3 3 4 3		7.0 ***OLIVE-BROWN CLAY, TR TO SM SILT***	7.8	
	S-5	1 2 3 3			10.4	
10						
15	S-6	2 2 3			10.5	
				LIGHT BROWN F/M SAND, TR TO SM SILT		
20	S-7	1 2 1			16.5	
25	S-8	1 2 2			20.3	
				28.5		
30	S-9	2 2 3			31.7	
				OLIVE-GREEN CLAY, SM SILT		
▽ 35	S-10	2 2 3				

DRN.	JPB
CKD.	PWK

NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

TEST BORING LOG

BORING	**B137.9-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	2 OF 3

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
				OLIVE-GREEN CLAY, SM SILT		
				38.5		
40				***GRAY SILT AND F/M SAND, SM CLAY, TR ORGANICS***		
				43.5		
45	S-12	WOH/1' 1				
50	S-13	WOH 1 1				
55	S-14	WOH/1.5'				
60	S-15	WOH/1.5'		***GRAY CLAY, TR SILT***		
65	S-16	WOH/1.5'				
70	S-17	WOH/1.5'				
75	S-18	WOH 1 1				

NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

TEST BORING LOG

BORING	**B137.9-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	3 OF 3

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

DEPTH		A	B	C	DESCRIPTION	Wn	REMARKS
					GRAY CLAY, TR SILT		
80		S-19	WOH/1' 1		80.0		
					END OF BORING AT 80'		
85							
90							
95							
100							
105							
110							
115							

NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CP
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-9	28.5-30.0	-	-	-	-	-	-	-	-	-	-	37.5	-	-	-
	S-11	38.5-40.0	CL-ML	-	-	-	-	26	19	7	2.5	-	36.3	-	-	-
	R-1	59.1-59.8	-	-	-	-	-	-	-	-	-	-	-	174.2	585	-
B136.0-1	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	41.8	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	47.2	-	-	-
B137.9-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	7.8	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	10.4	-	-	-
	S-6	13.5-15.0	SM	0.0	88.0	12.0		-	-	-	-	-	10.5	-	-	-
	S-7	18.5-20.0	SM	0.0	80.2	19.8		-	-	-	-	-	16.5	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	20.3	-	-	-
	S-9	28.5-30.0	-	-	-	-	-	-	-	-	-	-	31.7	-	-	-
	S-10	33.5-35.0	-	-	-	-	-	-	-	-	-	-	33.8	-	-	-
	S-11	38.5-40.0	-	0.1	40.7	59.2		-	-	-	-	-	33.7	-	-	-

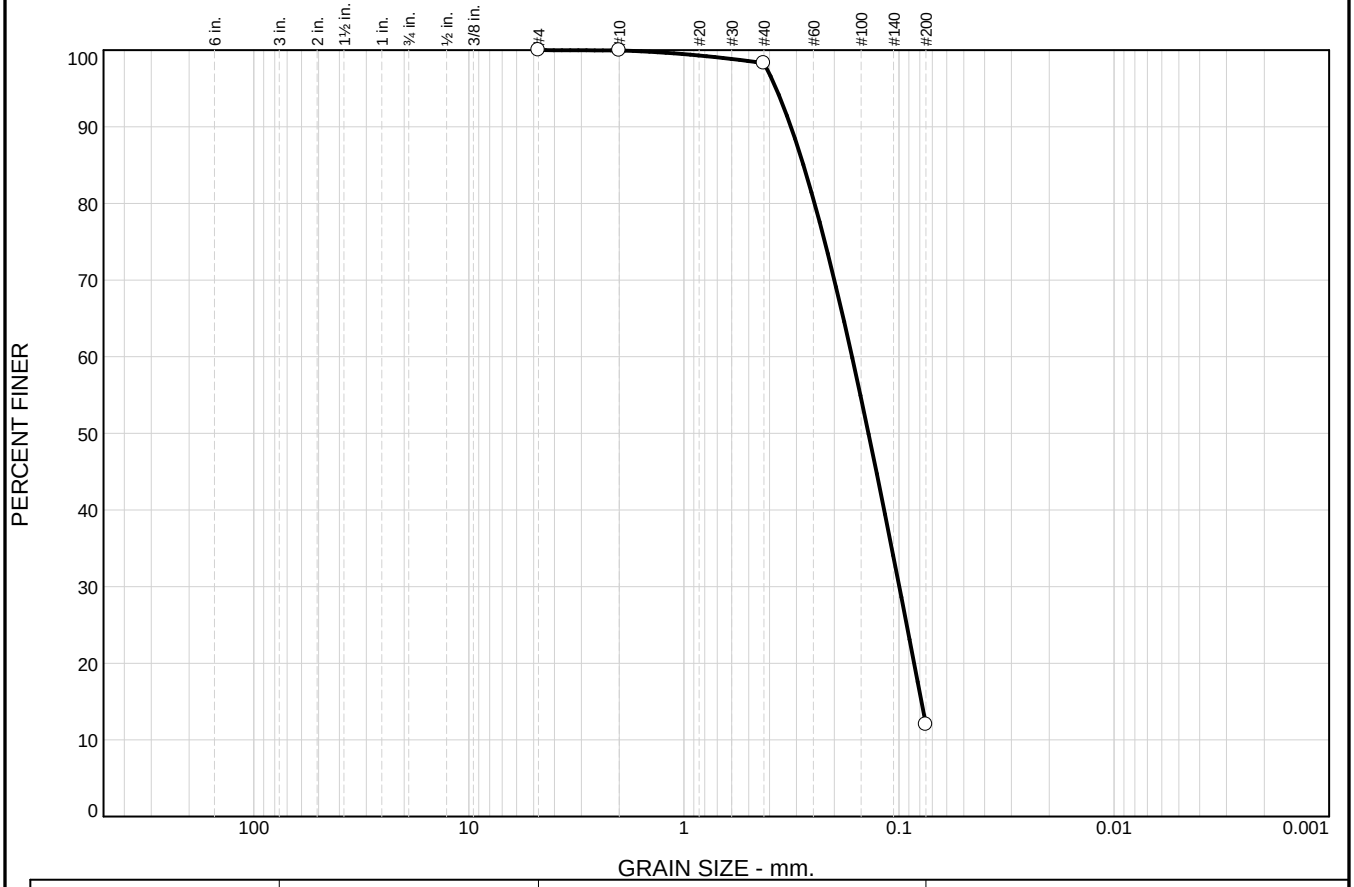
Also referred to as A137.9-1

SUMMARY OF LABORATORY TEST DATA

Project Name: TDI Champlain Hudson Power Express – CP
Client Name: Transmission Developers, Inc.
TRC Project #: 195651

SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-14	53.5-55.0	-	-	-	-	-	-	-	-	-	-	55.0	68.7	-	-
B138.4-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	37.8	84.8	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	40.0	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	38.8	-	-	-
	S-6	13.5-15.0	-	0.0	2.0	4.5	93.5	-	-	-	-	2.84	70.5	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	74.5	-	-	-
B139.6-1	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	42.1	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	30.8	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	37.1	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	39.8	-	-	-
B140.0-1	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	22.8	-	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	9.8	-	-	-
	S-7	18.5-20.0	SM	0.4	87.5	12.1		-	-	-	-	-	9.8	-	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	1.7	86.3	12.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○			0.2782	0.1654	0.1386	0.0997	0.0786			

Material Description	USCS	AASHTO
○ BROWN F/M SAND, TR TO SM SILT	SM	

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B137.9-1 **Depth:** 13.5-15.0 FT **Sample Number:** S-6

TRC Engineers, Inc.

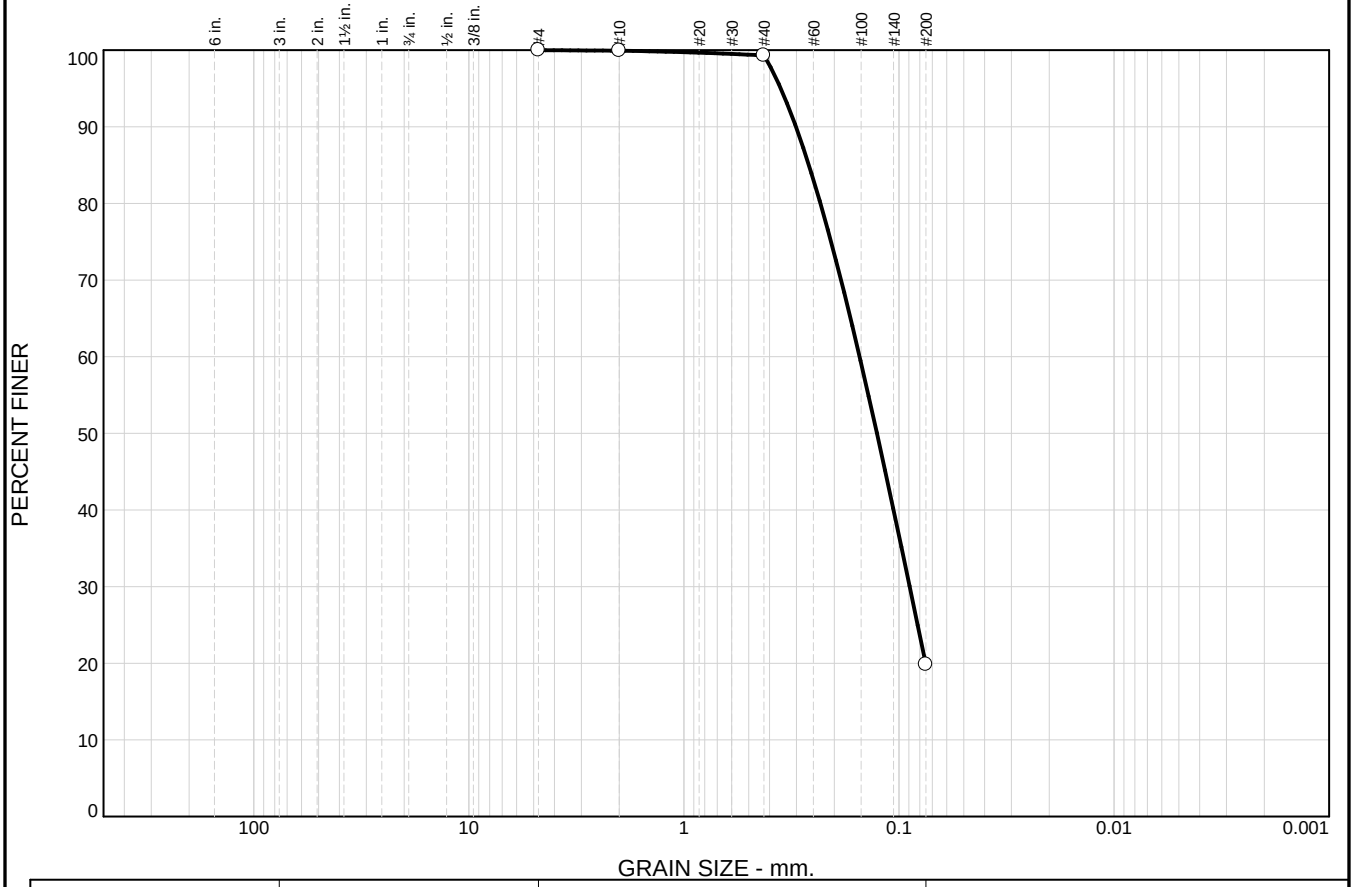
Mt. Laurel, NJ

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 38

Tested By: BMH 02/13/13 **Checked By:** _____

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	0.6	79.5	19.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○			0.2625	0.1525	0.1266	0.0892				

Material Description	USCS	AASHTO
○ BROWN-ORANGE TO BROWN F/ SAND, SM SILT	SM	

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B137.9-1 **Depth:** 18.5-20.0 FT **Sample Number:** S-7

TRC Engineers, Inc.

Mt. Laurel, NJ

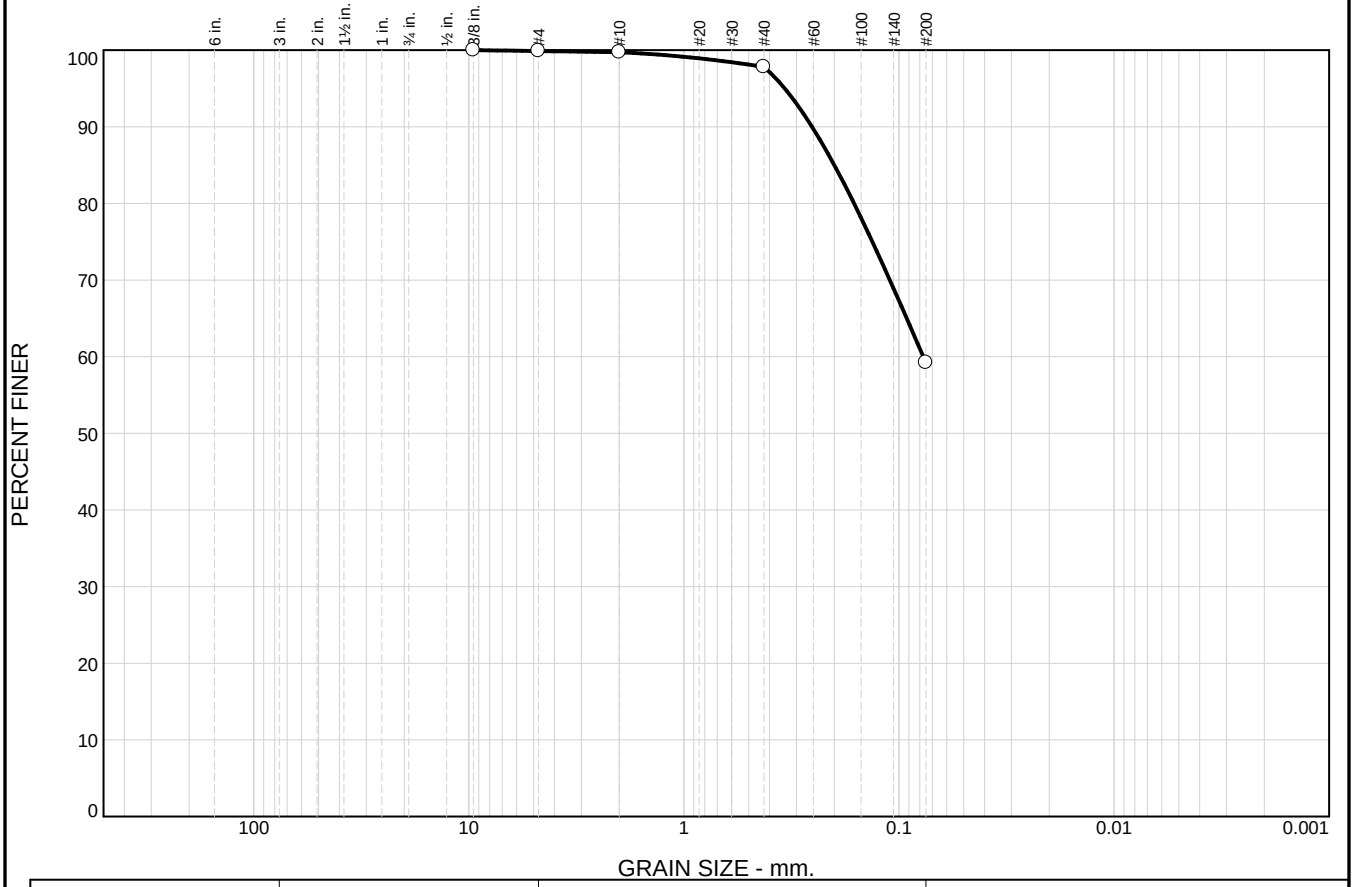
Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 39

Tested By: BMH 02/13/13 **Checked By:** _____

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	0.2	1.9	38.6	59.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.2000	0.0771						

Material Description	USCS	AASHTO
○ GRAY SILT AND F/M SAND, SM CLAY, TR ORGANICS		

Project No. 195651 **Client:** TDI CHAMPLAIN HUDSON POWER EXPRESS - CP

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B137.9-1 **Depth:** 38.5-40.0 FT **Sample Number:** S-11

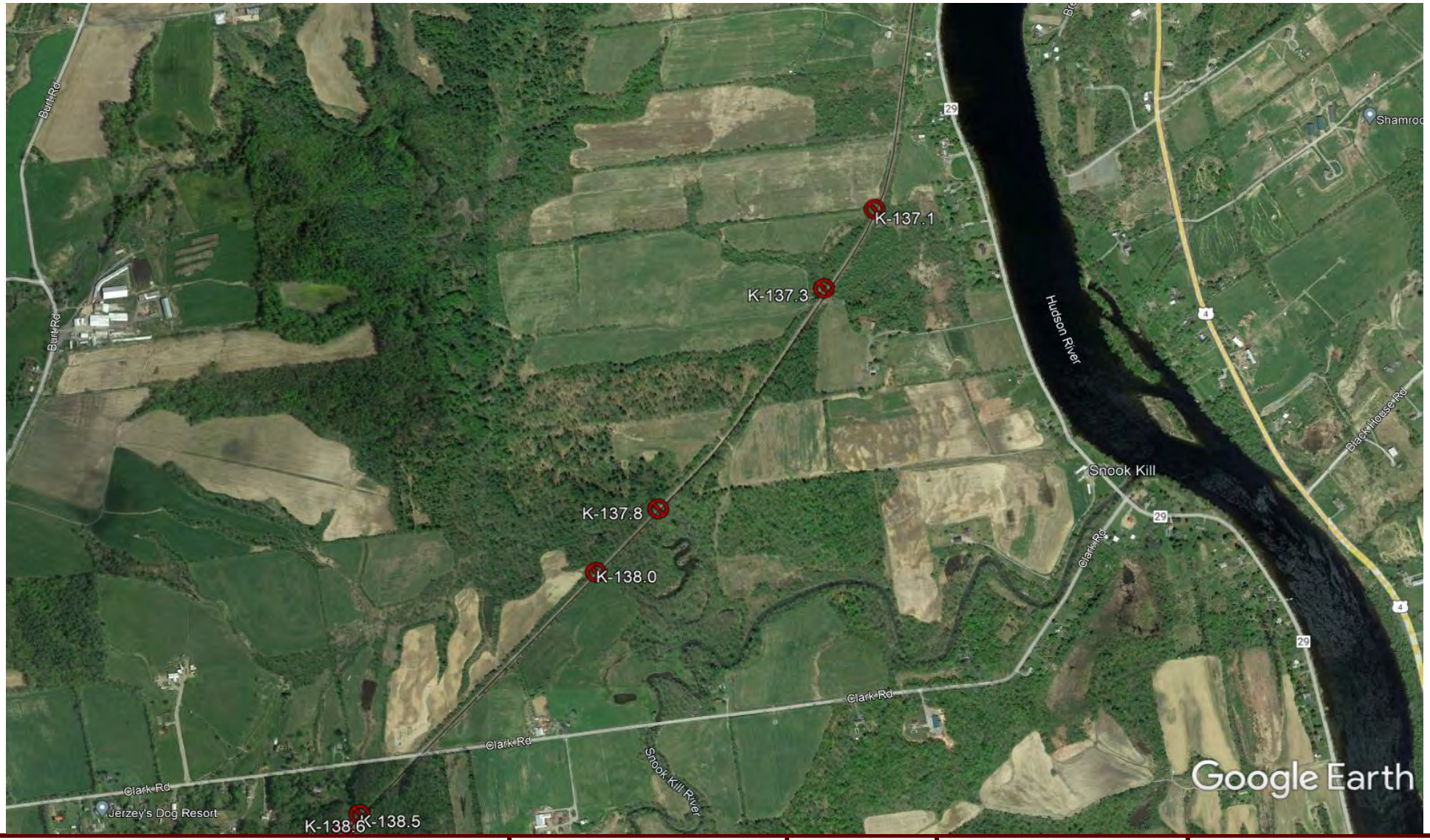
TRC Engineers, Inc.

Mt. Laurel, NJ

Remarks:
○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 40

Tested By: TBT 02/27/13 **Checked By:** _____



Boring Location Plans Page 4 of 18	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: April 2022

Champlain Hudson Power Express
Design Package 3
Glens Falls to Ballston Spa, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/10/2022** Finish Date: **2/10/2022**

Boring No.: **K-137.8** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/10/2022	PM	*25.1'	10.0'

Coordinates
Northing **1603119.2**
Easting **729739.8**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **157.4**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1	CASING	1	0.0	2.0	SS	21 8 4 2	2.0	Blackish-Grey cmf GRAVEL; and cmf SAND; trace SILT (frozen, non-plastic) FILL GW	5
2		2	2.0	4.0	SS	1 3 2 1	4.0	NO RECOVERY	0
4		3	4.0	6.0	SS	2 2 3 3		Brownish-Grey f SAND; some CLAY; trace SILT (moist, moderately plastic) SC	12
6		4	6.0	8.0	SS	2 3 2 3		Brown mf SAND; little SILT; trace CLAY (moist, very slightly plastic) SC	16
8		5	8.0	10.0	SS	1 3 3 3		Brown mf SAND; little CLAY; trace SILT (moist, slightly plastic) w = 23.5% SC	16
10	WET ROTARY							Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14		6	14.0	16.0	SS	1 1 2 2	17.0	Brownish-Grey f SAND; some CLAY; trace SILT (moist, moderately plastic) SC	12
19		7	19.0	21.0	SS	1 1 1 2	22.0	Brown SILT; little mf SAND; little CLAY (moist, slightly plastic) ML	8
24		8	24.0	26.0	SS	1 2 2 2		Brown mf+ SAND; some SILT (moist, non-plastic) w = 30.0%	12

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-137.8** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL f - fine; m - medium; c - course and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	RECOVERY (inches)
								% Fines = 33.0% SM	
29		9	29.0	31.0	SS	WH/18" 1		Grey mf SAND; some SILT (moist, non-plastic) SM	24
34		10	34.0	36.0	SS	WH/24"		Similar Soil (moist, non-plastic) SM	24
							37.0		
40		ST-1A	40.0	42.0	SS	2 3 5 3		(3" Brass Lined Split Spoon) Grey SILT; and f SAND; trace CLAY (wet, very slightly plastic) ML	18
42		ST-1B	42.0	44.0	SS	3 2 3 3		(3" Brass Lined Split Spoon) Similar Soil (wet, very slightly plastic) ML	24
							44.0		
44		ST-1C	44.0	46.0	SS	1 3 3 2		(3" Brass Lined Split Spoon) Grey mf+ SAND; and SILT (wet, non-plastic) w = 32.6%, LL = NP, PL = NP, PI = NP % Fines = 40.0% SM	24
48		12	48.0	50.0	SS	1 2 3 1		Similar Soil (wet, non-plastic) SM	24
							50.0		
50								Boring terminated at 50.0 feet. Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classification. 3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/9/2022** Finish Date: **2/10/2022**

Boring No.: **K-138.0** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/9/2022	PM	DRY	OPEN
2/9/2022	PM	*1.2'	9.0'
2/10/2022	AM	*7.6'	9.0'
2/10/2022	AM	*10.2'	9.0'

Coordinates
Northing **1602571.3**
Easting **729245.9**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **157.9**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	10 7 5 3		Brownish-Black cmf SAND; trace f GRAVEL; trace SILT (frozen, non-plastic) SW	10
2		2	2.0	4.0	SS	2 2 3 1	2.7		6
3							4.0	Blackish-Orangish-Brown f SAND; trace SILT (wet, non-plastic) SP	
4		3	4.0	6.0	SS	1/18" 1		Orangish-Brown SILT; little f SAND (saturated, non-plastic) ML	8
5							6.0		
6		4	6.0	8.0	SS	4 4 7 8	6.6	Orangish-Brown f SAND; little SILT (saturated, non-plastic) SM	12
7								Mottled Light Greenish-Brown CLAY; little SILT; trace f SAND (saturated, plastic) CH	
8		5	8.0	10.0	SS	3 3 4 3		Mottled Light Greyish-Orangish-Brown CLAY; little SILT; trace f SAND (saturated, plastic) w = 40.2%, LL = 77, PL = 31, PI = 46, % Fines = 94.2% CH	11
9	WET ROTARY								
10									
11								Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
12									
13									
14		6	14.0	16.0	SS	WH/24"		Greyish-Brown CLAY; little SILT; trace f SAND (saturated, plastic) CH	22
15									
16									
17									
18									
19		7	19.0	21.0	SS	WR/12" 1 1		Blackish-Grey CLAY; some SILT; trace f SAND (saturated, plastic) CH	24
20									
21									
22									
23									
24		8	24.0	26.0	SS	WH/24"		Blackish-Grey CLAY; little SILT; trace f SAND (saturated, plastic)	24
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-138.0** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
								w = 73.5%, LL = 73, PL = 27, PI = 46, % Fines = 99.6% CH	
29		9	29.0	31.0	SS	WR WH/18"		Similar Soil (saturated, plastic) CH	24
34		10	34.0	36.0	SS	WR WH/18"		Similar Soil (saturated, plastic) CH	24
38		11	38.0	40.0	SS	WR/12" WH/12"		(3" Brass Lined Split Spoon) Blackish-Grey CLAY; little SILT; trace f SAND (saturated, plastic) w = 61.1% LL = 73, PL = 29, PI = 44, % Fines = 99.8% CH	24
44		12	44.0	46.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH	24
49		13	49.0	51.0	SS	WR WH/18"		Similar Soil (saturated, plastic) CH	24
							51.0	Boring terminated at 51.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-137.1	S-5	8.0-10.0	Mottled Orangish-Brown CLAY; little SILT; trace f SAND	93.8	41.3	77	26	51	--	--	--	--	--	--	--	--
	S-8	23.0-24.8	Brown mf GRAVEL; some cmf SAND; some SILT	24.0	15.3	--	--	--	--	--	--	--	--	--	--	--
	RC-2	31.0-36.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	5,570	691	1.43
K-137.3	S-3	4.0-6.0	Brown CLAY; little mf SAND; trace SILT	--	--	--	--	--	--	300	35	7.65	15,480	--	--	--
	S-4	6.0-8.0	Brown CLAY; little SILT; trace f SAND	--	40.2	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brownish-Grey CLAY; little SILT; trace f SAND	96.0	33.7	38	18	20	--	--	--	--	--	--	--	--
	ST-1	24.0-26.0	Brown CLAY; little SILT; trace f SAND	99.8	35.5	42	22	20	--	--	--	--	--	--	--	--
	R-2	35.0-40.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	6,410	238	1.10
K-137.8	S-5	8.0-10.0	Brown mf SAND; little CLAY; trace SILT	--	23.5	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Brown mf+ SAND; some SILT	33.0	30.0	--	--	--	--	--	--	--	--	--	--	--
	ST-1C	44.0-46.0	Grey mf+ SAND; and SILT	40.0	32.6	NP	NP	NP	--	--	--	--	--	--	--	--
K-138.0	S-5	8.0-10.0	Mottled Light Greyish-Orangish-Brown CLAY; little SILT; trace f SAND	94.2	40.2	77	31	46	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.6	73.5	73	27	46	--	--	--	--	--	--	--	--
	S-11	38.0-40.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.8	61.1	73	29	44	--	--	--	--	--	--	--	--
K-138.5	S-5	8.0-10.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT; trace f SAND	97.9	50.2	70	25	45	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT, trace f SAND	99.8	80.8	75	25	50	--	--	--	--	--	--	--	--
	S-11	36.0-38.0	Grey CLAY; little SILT; trace f SAND	99.2	69.5	68	25	43	--	--	--	--	--	--	--	--
K-138.6	S-5	8.0-10.0	Blackish-Grey SILT; some mf SAND; trace CLAY; trace OM	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	75.9	73	23	50	--	--	--	--	--	--	--	--
	S-10	35.0-37.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	77.7	70	23	47	--	--	--	--	--	--	--	--
K-139.0	S-5	8.0-10.0	Grey mf+ SAND; little SILT	14.0	24.1	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; trace f SAND; trace SILT	99.1	62.3	61	22	39	--	--	--	--	--	--	--	--
	ST-1	33.0-35.0	Grey CLAY; little SILT; trace f SAND	99.5	77.7	65	24	41	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-138.0	S-5	8-10	40.2
	S-8	24-26	73.5
	S-11	38-40	61.1
K-138.5	S-5	8-10	50.2
	S-8	24-26	80.8
	S-11	36-38	69.5
K-138.6	S-5 [1]	8-10	30.3
	S-8	24-26	75.9
	S-10	35-37	77.7
K-139.0	S-5	8-10	24.1
	S-7	19-21	62.3
	ST-1	33-35	77.7
K-139.1	S-5	8-10	24.8
	S-8	24-26	79.2
	ST-1	38-40	70.6

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: _____ Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
ASTM D 2216

PROJECT INFORMATION

Client: Kiewit Intrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-136.1	S-5	8-10	40.3
	S-8	23-25	34.8
	S-10	34-36	18.6
K-136.5	S-4	6-8	31.9
K-136.6	S-4	6-8	39.7
	S-6	14-16	22.8
K-137.1	S-5	8-10	41.3
	S-8 [1]	23-24.8	15.3
K-137.8	S-5	8-10	23.5
	S-8	24-26	30.0
	ST-1c	44-46	32.6
K-142.8	S-4	6-8	26.5
	S-7	19-21	22.0
	S-9	29-31	28.4
	ST-1c	37-39	22.8
K-142.9	S-5	8-10	45.7
	S-8	24-26	40.8
	ST-1c	37-39	25.8
K-144.3	S-5	8-10	25.5
	S-7	19-21	21.7
	ST-1c	34-36	26.7

ATLANTIC TESTING LABORATORIES

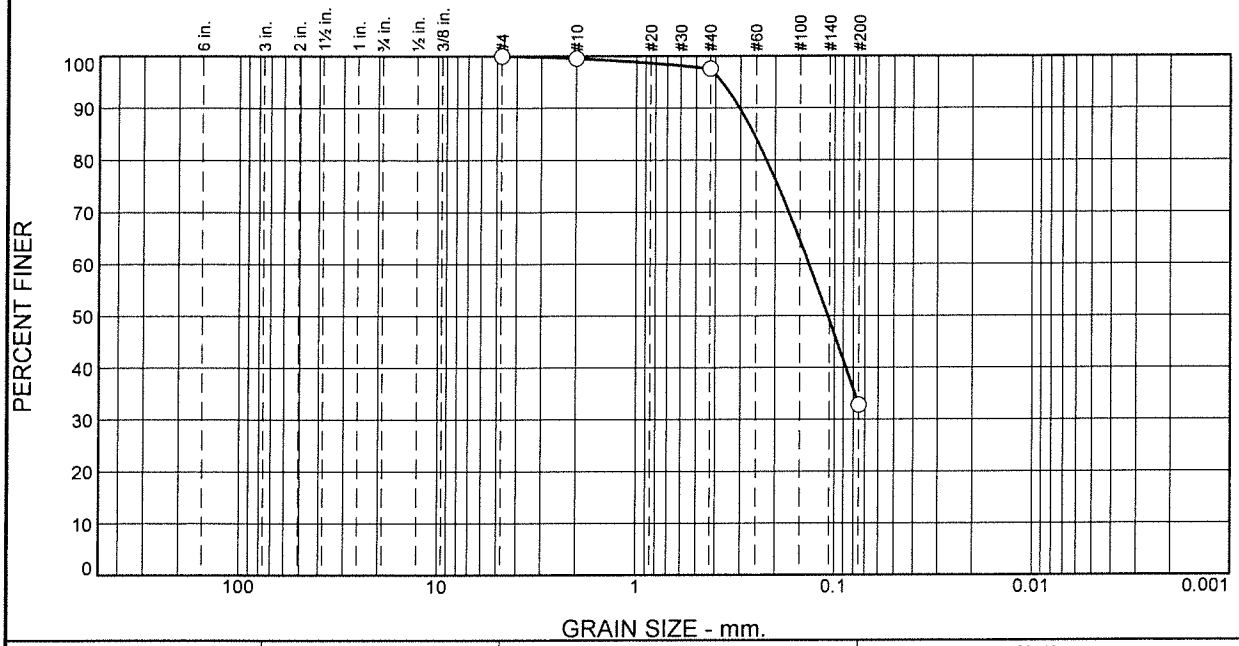
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-05-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/03/22

Sample No: K-137.8, S-8 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 24-26'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	65	33	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	98		
#200	33		

Soil Description

Brown mf+ SAND; some SILT

Atterberg Limits

PL= -- LL= -- PI= --

Coefficients

D_{85}= 0.2567 D_{60}= 0.1348 D_{50}= 0.1081

D_{30}= D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 30.0%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 03/09/22

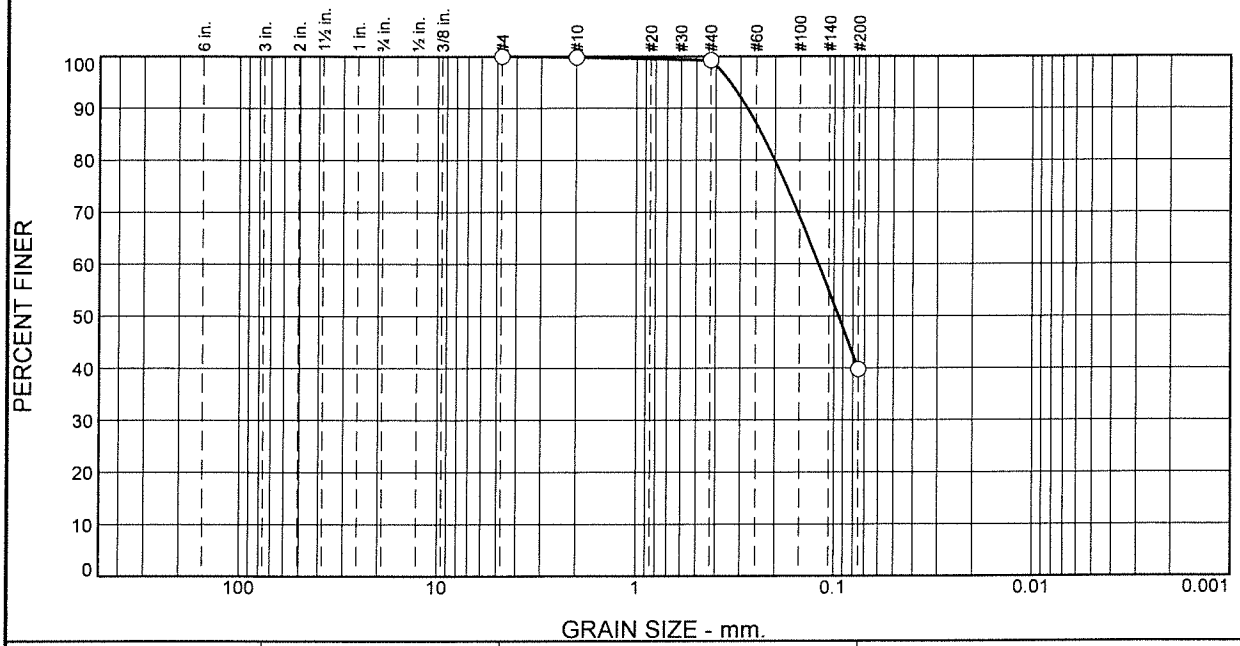
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-05-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/03/22

Sample No: K-137.8, ST-1c **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 44-46'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	59	40	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	99		
#200	40		

Soil Description

Grey mf+ SAND; and SILT

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.2337 D_{60}= 0.1197 D_{50}= 0.0947
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Moisture Content= 32.6%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 03/09/22

ATLANTIC TESTING LABORATORIES

WBE certified company

AMOUNT OF MATERIAL IN SOILS FINER THAN THE NO. 200 SIEVE
ASTM D 1140

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Test Date:**	February 18, 2022
	Various Locations, New York	**Performed By:**	A. Rivers

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-134.8	S-7	19-21	A	10	73.88	56.5
K-137.3	S-6	14-16	A	10	47.83	96
K-137.3	ST-1	24-26	A	10	145.26	99.8
K-138.0	S-5	8-10	A	10	47.83	94.2
K-138.0	S-8	24-26	A	10	32.88	99.6
K-138.0	S-11	38-40	A	10	81.67	99.8
K-138.5	S-5	8-10	A	10	56.95	97.9
K-138.5	S-8	24-26	A	10	25.91	99.8
K-138.5	S-11	36-38	A	10	85.84	99.2
K-138.6	S-8	24-26	A	10	36.43	99.7
K-138.6	S-10	35-37	A	10	90.96	99.7
K-139.0	S-7	19-21	A	10	37.57	99.1
K-139.0	ST-1	33-35	A	10	111.89	99.5
K-139.1	S-8	24-26	A	10	29.63	99.6
K-139.1	ST-1	38-40	A	10	97.68	99.2

Reviewed By: _____ Date: March 1, 2022

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client:	Kiewit Instrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Date Received:**	February 18, 2022
	Various Locations, New York		

TEST DATA

Boring No.	Sample No.	LL	PL	PI
[redacted]				
K-134.8	S-7	25	20	5
K-137.3	S-6	38	18	20
K-137.3	ST-1	42	22	20
K-138.0	S-5	77	31	46
K-138.0	S-8	73	27	46
K-138.0	S-11	73	29	44
K-138.5	S-5	70	25	45
K-138.5	S-8	75	25	50
K-138.5	S-11	68	25	43
K-138.6	S-8	73	23	50
K-138.6	S-10	70	23	47
K-139.0	S-7	61	22	39
K-139.0	ST-1	65	24	41
K-139.1	S-8	64	21	43
K-139.1	ST-1	66	20	46

SAMPLE INFORMATION

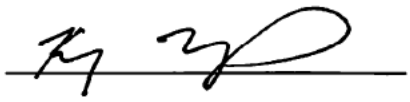
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
[redacted]				
K-134.8	S-7	2.38	1	29.9
K-137.3	S-6	4.76	1	33.7
K-137.3	ST-1	0.297	0	35.5
K-138.0	S-5	0.297	0	40.2
K-138.0	S-8	0.297	0	73.5
K-138.0	S-11	0.297	0	61.1
K-138.5	S-5	0.297	0	50.2
K-138.5	S-8	0.297	0	80.8
K-138.5	S-11	0.297	0	69.5
K-138.6	S-8	0.297	0	75.9
K-138.6	S-10	0.297	0	77.7
K-139.0	S-7	0.297	0	62.3
K-139.0	ST-1	0.297	0	77.7
K-139.1	S-8	0.297	0	79.2
K-139.1	ST-1	0.297	0	70.6

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
[redacted]			
K-134.8	S-7	Air Dry	Pulverizing and Screening
K-137.3	S-6	Air Dry	Pulverizing and Screening
K-137.3	ST-1	Air Dry	Not Necessary
K-138.0	S-5	Air Dry	Not Necessary
K-138.0	S-8	Air Dry	Not Necessary
K-138.0	S-11	Air Dry	Not Necessary
K-138.5	S-5	Air Dry	Not Necessary
K-138.5	S-8	Air Dry	Not Necessary
K-138.5	S-11	Air Dry	Not Necessary
K-138.6	S-8	Air Dry	Not Necessary
K-138.6	S-10	Air Dry	Not Necessary
K-139.0	S-7	Air Dry	Not Necessary
K-139.0	ST-1	Air Dry	Not Necessary
K-139.1	S-8	Air Dry	Not Necessary
K-139.1	ST-1	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: 

Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client: Kiewit Instrastructure Co.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-05-03-22
Report Date: March 3, 2022
Date Received: February 23, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-136.1	S-5	62	23	39
K-136.1	S-8	34	18	16
K-136.5	S-4	29	14	15
K-136.6	S-4	30	19	11
K-137.1	S-5	77	26	51
K-137.8	ST-1c	NP	NP	NP
K-142.8	S-7	47	18	29
K-142.9	S-8	37	16	21

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-136.1	S-5	0.074	0	40.3
K-136.1	S-8	0.002	0	34.8
K-136.5	S-4	0.074	0	31.9
K-136.6	S-4	0.074	0	39.7
K-137.1	S-5	0.074	0	41.3
K-137.8	ST-1c	0.42	1	32.6
K-142.8	S-7	0.074	0	22.0
K-142.9	S-8	0.002	0	40.8

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-136.1	S-5	Air Dry	Not Necessary
K-136.1	S-8	Air Dry	Not Necessary
K-136.5	S-4	Air Dry	Not Necessary
K-136.6	S-4	Air Dry	Not Necessary
K-137.1	S-5	Air Dry	Not Necessary
K-137.8	ST-1c	Air Dry	Pulverizing and Screening
K-142.8	S-7	Air Dry	Not Necessary
K-142.9	S-8	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: _____ Date: 03/03/22

Kiewit

MEMORANDUM

DATE: December 6, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 4 – Package 3 – HDD Crossing 28 – Revision 1
Champlain Hudson Power Express Project
Glen Falls, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Glen Falls, New York. The approximate station for the start of HDD crossing Number 28 is STA 30319+00 (43.2229°N, 73.6177°W).

The geotechnical data at this HDD crossing was collected by Atlantic Testing Laboratories and is attached to this memorandum. The data was compiled and issued in the following report:

- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 3, Glens Falls to Ballston Spa, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 28
Borings K-138.5, K-138.6
Segment 4 - Design Package 3

CHPE Segments 4 & 5 - Package 3
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A136.0-1	1611762.7	732951.9	146.6
	B134.5-1	1618254.8	737493.3	137.7
	B134.6-1	1617614.3	737160.7	140.2
	B135.1-1	1615942.5	735298.2	130.7
	B135.35-1	1615043.9	734326.1	147.7
	B137.9-1	1602848.9	729488.6	157.2
	B140.0-1	1594313.7	721767.2	205.0
	B144.2-1	1577578.6	707868.0	307.5
	B144.3-1	1577307.0	707733.5	307.4
	B144.5-1	1576380.0	707249.6	308.5
	B144.8-1	1574825.2	706447.7	310.8
	B145.0-1	1574014.3	706034.4	312.7
	B145.48	1571450.2	704693.3	320.4
	B146.1-1	1568896.3	703364.4	321.4
	B146.5-1	1566773.3	702083.1	323.6
	B148.4-1	1561976.4	694067.5	326.0
	B148.4-5	1561817.7	693531.9	327.4
	B149.87-1	1559610.1	686723.2	325.2
	B151.58-1	1553784.9	679646.1	336.4
	B152.6-0	1550004.2	676432.6	329.3
	B153.1-1	1547302.8	676031.8	322.5
	B154.3-1	1541375.5	674232.0	321.5
	B155.2-1	1536685.4	674403.7	313.7
	B155.7-1	1534202.1	674175.1	340.0
	B157.9-1	1524284.2	668932.6	246.0
	B158.1-1	1523474.2	668924.1	243.0
	B158.22-1	1522640.9	669168.4	279.1
AECOM**	BM-1A	1521184.8	669107.0	292.4
	FES-3	1616410.4	736040.4	143.9
	FES-3A	1616311.4	735904.6	139.3
	FES-3B	1611359.3	732784.5	142.5
	FES-4	1608699.4	732017.0	142.6
	FES-5	1605493.6	731399.7	147.1
	FES-6	1598212.9	725299.3	174.4
	FES-9	1583302.9	711497.9	271.6
	FES-10A	1563547.6	698025.3	321.4
	FES-12	1560130.5	687972.2	322.5
	SB-1A	1547803.7	676160.2	321.0
	SB-1B	1551257.2	677175.4	327.5
	SB-2	1545717.0	675698.7	316.3
	SB-3	1540348.5	674275.0	322.4

Notes:

- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

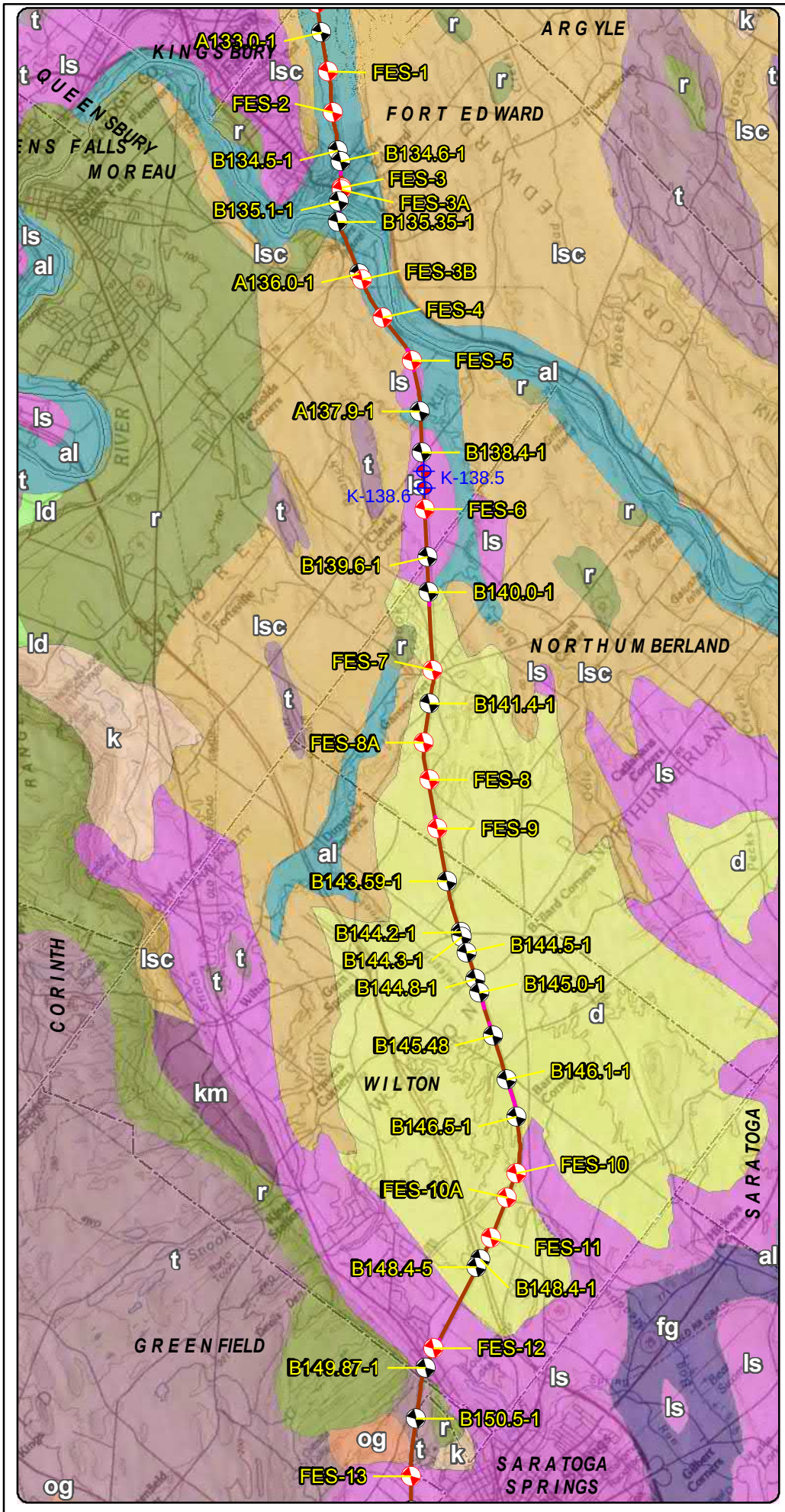
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

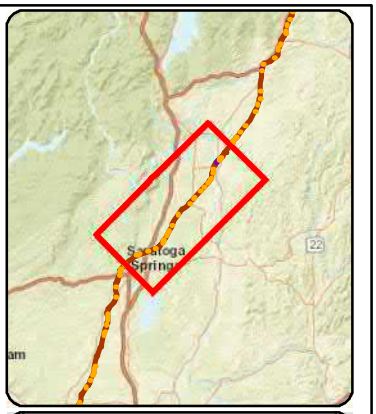
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- d - Dunes
- fg - Fluvial sand and/or gravel
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

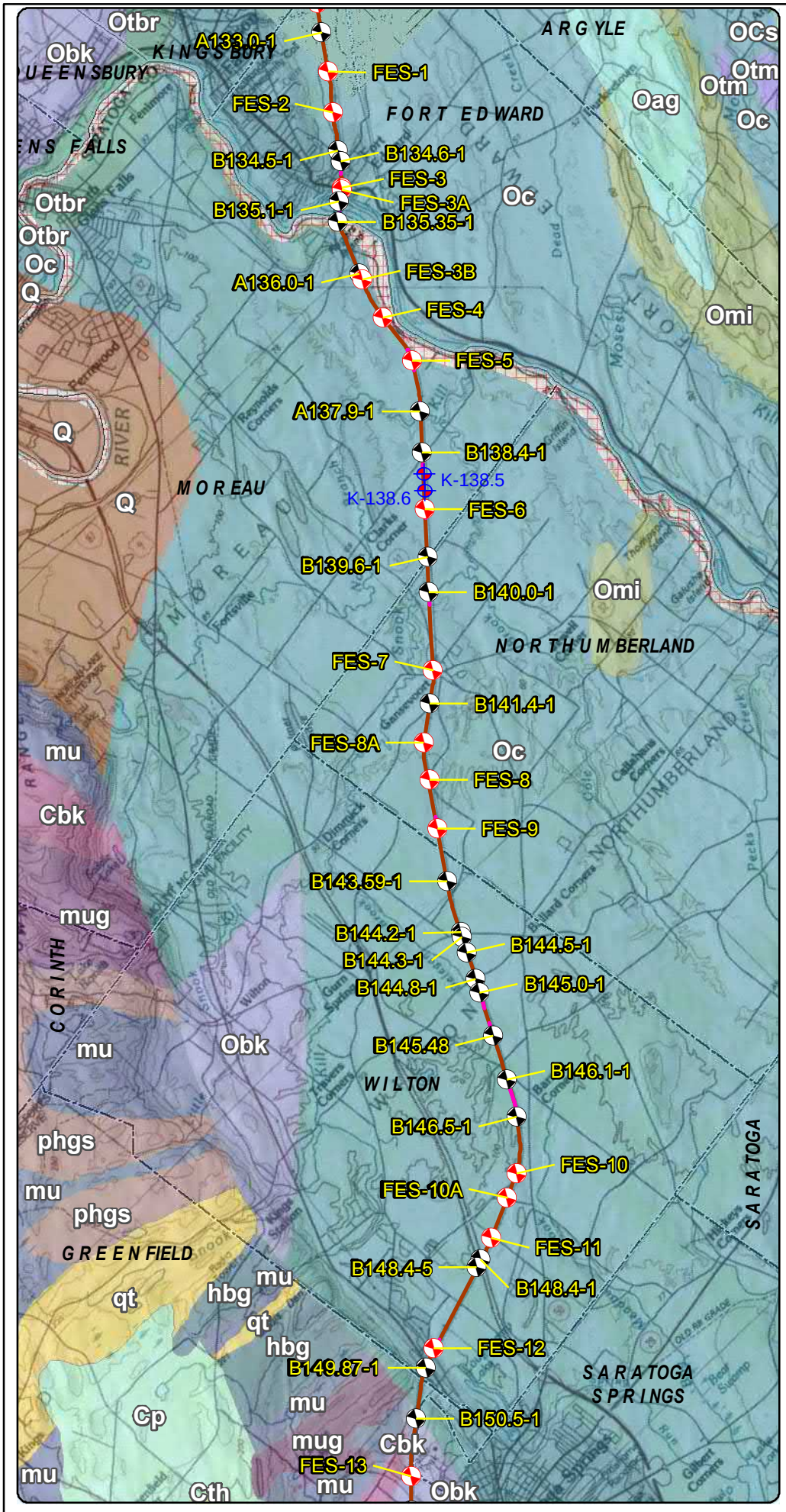
Champlain Hudson Power Express Inc.

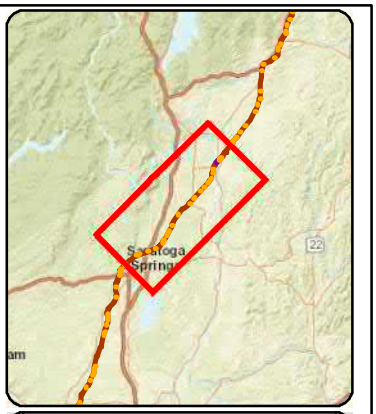
Surficial Geology and Geotechnical Borings
Fort Edward to Saratoga
Figure 3-4

Prepared on 4/29/2021
by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Cth - Theresa (Galway) Formation
- No Label
- OCs - Cambrian thru Middle Ordovician
- Oag - Austin Glen Form (graywacke, shale)
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- hbg - Biotite/hornblende granite gneiss
- mu - Undivided metasedimentary rock
- mug - Interlayered metasedimentary rock
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Fort Edward to Saratoga Figure 4-4

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_20190909Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Bedrock_May_2021_Report.mxd



Boring Location Plans Page 5 of 18	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: April 2022

Champlain Hudson Power Express
Design Package 3
Glens Falls to Ballston Spa, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/8/2022** Finish Date: **2/9/2022**

Boring No.: **K-138.5** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/8/2022	PM	DRY	OPEN
2/9/2022	AM	DRY	4.0'
2/9/2022	AM	*7.4'	14.0'
2/9/2022	AM	*6.5'	14.0'

Coordinates
Northing **1600303**
Easting **727188.7**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **161.5**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	10 8 4 3	2.0	Blackish-Brown mf+ SAND; little SILT (frozen, non-plastic) SM	18
2		2	2.0	4.0	SS	4 4 3 3	4.0	Orangish-Brown SILT; some mf+ SAND (wet, non-plastic) ML	12
4		3	4.0	6.0	SS	5 6 5 4	6.0	NO RECOVERY	0
6		4	6.0	8.0	SS	4 4 7 8		Mottled Orangish-Reddish-Brown CLAY; trace SILT (wet, plastic) CH	21
8		5	8.0	10.0	SS	2 2 3 4		Mottled Orangish-Greyish-Brown CLAY; trace SILT; trace f SAND (wet, plastic) w = 50.2%, LL = 70, PL = 25, PI = 45 % Fines = 97.9% CH	23
13								Advanced casing to 14.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14	WET ROTARY	6	14.0	16.0	SS	WH/12" 1 1		Blackish-Grey CLAY; little SILT; trace f SAND (saturated, plastic) CH	24
19		7	19.0	21.0	SS	WR WH/18"		Similar Soil (saturated, plastic) CH	24
24		8	24.0	26.0	SS	WR/18" WH		Similar Soil (saturated, plastic) w = 80.8%	24

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-138.5** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - course; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%)	RECOVERY (inches)
								LL = 75, PL = 25, PI = 50, %Fines = 99.8% CH	
29		9	29.0	31.0	SS	WR/24"		Similar Soil (saturated, plastic) CH	24
34		10	34.0	36.0	SS	WR/18" WH		Similar Soil (saturated, plastic) CH	24
36		11	36.0	38.0	SS	WR/12" WH/12"		(3" Brass Lined Split Spoon) Grey CLAY; little SILT; trace f SAND (saturated, plastic) w = 69.5%, LL = 68, PL = 25, PI = 43 % Fines = 99.2% CH	23
43		12	43.0	45.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH	24
							45.0	Boring terminated at 45.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/9/2022** Finish Date: **2/9/2022**

Boring No.: **K-138.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/9/2022	AM	DRY	OPEN
2/9/2022	AM	*9.3'	14.0'
2/9/2022	PM	*10.2'	14.0'
2/9/2022	PM	*8.7'	14.0'

Coordinates
Northing **1600132.7**
Easting **727038.6**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **162.6**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
								f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
1	CASING	1	0.0	2.0	SS	21 14 8 5		Black cmf SAND; little SILT (frozen, non-plastic) SM	21
							1.6		
2							2.0	Blackish-Brown cmf SAND; little SILT (wet, non-plastic) SM	
3		2	2.0	4.0	SS	5 6 7 2		Orangish-Brown f SAND; trace SILT (wet, non-plastic) SP	11
4		3	4.0	6.0	SS	2 2 1 2		Orangish-Brown f SAND; some SILT (saturated, non-plastic) SM	7
6		4	6.0	8.0	SS	1 1 1 2		Similar Soil (saturated, non-plastic) SM	5
8		5	8.0	10.0	SS	1/24"		Similar Soil (saturated, non-plastic) w = 30.3% SM	12
							9.2		
10								Blackish-Grey SILT; some mf SAND; trace CLAY; trace ORGANIC MATERIAL (vegetation, roots) (saturated, very slightly plastic) w = 30.3% ML	
							12.0		
14	WET ROTARY	6	14.0	16.0	SS	1 3 4 4		Brownish-Grey CLAY; little SILT; trace f SAND (wet, plastic) CH	19
16								Advanced casing to 14.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
19		7	19.0	21.0	SS	WR/18" WH		Blackish-Grey CLAY; some SILT; trace f SAND (saturated, plastic) CH	24
24		8	24.0	26.0	SS	WR/18" WH		Similar Soil (saturated, plastic) w = 75.9%	24

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Brad Perry; Ian Ross**

Inspector: **Tom Hunter (ATL); Tom Kimmins (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-138.6** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
								LL = 73, PL = 23, PI = 50, % Fines = 99.7% CH	
29		9	29.0	31.0	SS	WR/18" WH		Similar Soil (saturated, plastic) CH	24
35		10	35.0	37.0	SS	WR/12" WH/12"		(3" Brass Lined Split Spoon) Blackish-Grey CLAY; some SILT; trace f SAND (saturated, plastic) w = 77.7%, LL = 70, PL = 23, PI = 47, % Fines = 99.7% CH	24
42		11	42.0	44.0	SS	WR/18" WH		Similar Soil (saturated, plastic) CH	24
							44.0	Boring terminated at 44.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-137.1	S-5	8.0-10.0	Mottled Orangish-Brown CLAY; little SILT; trace f SAND	93.8	41.3	77	26	51	--	--	--	--	--	--	--	--
	S-8	23.0-24.8	Brown mf GRAVEL; some cmf SAND; some SILT	24.0	15.3	--	--	--	--	--	--	--	--	--	--	--
	RC-2	31.0-36.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	5,570	691	1.43
K-137.3	S-3	4.0-6.0	Brown CLAY; little mf SAND; trace SILT	--	--	--	--	--	--	300	35	7.65	15,480	--	--	--
	S-4	6.0-8.0	Brown CLAY; little SILT; trace f SAND	--	40.2	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brownish-Grey CLAY; little SILT; trace f SAND	96.0	33.7	38	18	20	--	--	--	--	--	--	--	--
	ST-1	24.0-26.0	Brown CLAY; little SILT; trace f SAND	99.8	35.5	42	22	20	--	--	--	--	--	--	--	--
	R-2	35.0-40.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	6,410	238	1.10
K-137.8	S-5	8.0-10.0	Brown mf SAND; little CLAY; trace SILT	--	23.5	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Brown mf+ SAND; some SILT	33.0	30.0	--	--	--	--	--	--	--	--	--	--	--
	ST-1C	44.0-46.0	Grey mf+ SAND; and SILT	40.0	32.6	NP	NP	NP	--	--	--	--	--	--	--	--
K-138.0	S-5	8.0-10.0	Mottled Light Greyish-Orangish-Brown CLAY; little SILT; trace f SAND	94.2	40.2	77	31	46	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.6	73.5	73	27	46	--	--	--	--	--	--	--	--
	S-11	38.0-40.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.8	61.1	73	29	44	--	--	--	--	--	--	--	--
K-138.5	S-5	8.0-10.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT; trace f SAND	97.9	50.2	70	25	45	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT, trace f SAND	99.8	80.8	75	25	50	--	--	--	--	--	--	--	--
	S-11	36.0-38.0	Grey CLAY; little SILT; trace f SAND	99.2	69.5	68	25	43	--	--	--	--	--	--	--	--
K-138.6	S-5	8.0-10.0	Blackish-Grey SILT; some mf SAND; trace CLAY; trace OM	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	75.9	73	23	50	--	--	--	--	--	--	--	--
	S-10	35.0-37.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	77.7	70	23	47	--	--	--	--	--	--	--	--
K-139.0	S-5	8.0-10.0	Grey mf+ SAND; little SILT	14.0	24.1	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; trace f SAND; trace SILT	99.1	62.3	61	22	39	--	--	--	--	--	--	--	--
	ST-1	33.0-35.0	Grey CLAY; little SILT; trace f SAND	99.5	77.7	65	24	41	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-138.0	S-5	8-10	40.2
	S-8	24-26	73.5
	S-11	38-40	61.1
K-138.5	S-5	8-10	50.2
	S-8	24-26	80.8
	S-11	36-38	69.5
K-138.6	S-5 [1]	8-10	30.3
	S-8	24-26	75.9
	S-10	35-37	77.7
K-139.0	S-5	8-10	24.1
	S-7	19-21	62.3
	ST-1	33-35	77.7
K-139.1	S-5	8-10	24.8
	S-8	24-26	79.2
	ST-1	38-40	70.6

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: _____ Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL
ASTM D 4318

PROJECT INFORMATION

Client:	Kiewit Instrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Date Received:**	February 18, 2022
	Various Locations, New York		

TEST DATA

Boring No.	Sample No.	LL	PL	PI
[redacted]				
K-134.8	S-7	25	20	5
K-137.3	S-6	38	18	20
K-137.3	ST-1	42	22	20
K-138.0	S-5	77	31	46
K-138.0	S-8	73	27	46
K-138.0	S-11	73	29	44
K-138.5	S-5	70	25	45
K-138.5	S-8	75	25	50
K-138.5	S-11	68	25	43
K-138.6	S-8	73	23	50
K-138.6	S-10	70	23	47
K-139.0	S-7	61	22	39
K-139.0	ST-1	65	24	41
K-139.1	S-8	64	21	43
K-139.1	ST-1	66	20	46

SAMPLE INFORMATION

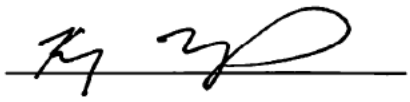
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
[redacted]				
K-134.8	S-7	2.38	1	29.9
K-137.3	S-6	4.76	1	33.7
K-137.3	ST-1	0.297	0	35.5
K-138.0	S-5	0.297	0	40.2
K-138.0	S-8	0.297	0	73.5
K-138.0	S-11	0.297	0	61.1
K-138.5	S-5	0.297	0	50.2
K-138.5	S-8	0.297	0	80.8
K-138.5	S-11	0.297	0	69.5
K-138.6	S-8	0.297	0	75.9
K-138.6	S-10	0.297	0	77.7
K-139.0	S-7	0.297	0	62.3
K-139.0	ST-1	0.297	0	77.7
K-139.1	S-8	0.297	0	79.2
K-139.1	ST-1	0.297	0	70.6

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
[redacted]			
K-134.8	S-7	Air Dry	Pulverizing and Screening
K-137.3	S-6	Air Dry	Pulverizing and Screening
K-137.3	ST-1	Air Dry	Not Necessary
K-138.0	S-5	Air Dry	Not Necessary
K-138.0	S-8	Air Dry	Not Necessary
K-138.0	S-11	Air Dry	Not Necessary
K-138.5	S-5	Air Dry	Not Necessary
K-138.5	S-8	Air Dry	Not Necessary
K-138.5	S-11	Air Dry	Not Necessary
K-138.6	S-8	Air Dry	Not Necessary
K-138.6	S-10	Air Dry	Not Necessary
K-139.0	S-7	Air Dry	Not Necessary
K-139.0	ST-1	Air Dry	Not Necessary
K-139.1	S-8	Air Dry	Not Necessary
K-139.1	ST-1	Air Dry	Not Necessary

EQUIPMENT INFORMATION

Liquid Limit Procedure:	Multipoint - Method A	X	Single Point - Method B	
Liquid Limit Apparatus:	Manual	X	Motor Driven	
Liquid Limit Grooving Tool Material:	Plastic	X	Metal	
Liquid Limit Grooving Tool Shape:	Flat	X	Curved (AASHTO Only)	
Plastic Limit:	Hand Rolled	X	Mechanical Rolling Device	

Reviewed By: 

Date: 03/01/22

Kiewit

MEMORANDUM

DATE: December 6, 2022

TO: Antonio Marruso, P.E.; CHA Consulting, Inc.

FROM: Matthew Hawley, P.E.; Kiewit Engineering (NY) Corp. MKH
Jaren Knighton; Kiewit Engineering (NY) Corp.

SUBJECT: Geotechnical Data: Segment 4 – Package 3 – HDD Crossing 29 – Revision 1
Champlain Hudson Power Express Project
Glen Falls, New York

Kiewit Engineering is providing the attached geotechnical data for use in the horizontal direction drill (HDD) design for the Champlain Hudson Power Express project in Upstate New York. This HDD crossing is located south of Glen Falls, New York. The approximate station for the start of HDD crossing Number 29 is STA 30345+00 (43.2177°N, 73.6243°W).

The geotechnical data at this HDD crossing is attached. The available data is taken from the previous investigation by AECOM and from a recent investigation by Atlantic Testing Laboratories (ATL), referenced below.

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 3, Glens Falls to Ballston Spa, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 29
Borings FES-6, K-139.0, K-139.1
Segment 4 - Design Package 3

CHPE Segments 4 & 5 - Package 3
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	A136.0-1	1611762.7	732951.9	146.6
	B134.5-1	1618254.8	737493.3	137.7
	B134.6-1	1617614.3	737160.7	140.2
	B135.1-1	1615942.5	735298.2	130.7
	B135.35-1	1615043.9	734326.1	147.7
	B137.9-1	1602848.9	729488.6	157.2
	B140.0-1	1594313.7	721767.2	205.0
	B144.2-1	1577578.6	707868.0	307.5
	B144.3-1	1577307.0	707733.5	307.4
	B144.5-1	1576380.0	707249.6	308.5
	B144.8-1	1574825.2	706447.7	310.8
	B145.0-1	1574014.3	706034.4	312.7
	B145.48	1571450.2	704693.3	320.4
	B146.1-1	1568896.3	703364.4	321.4
	B146.5-1	1566773.3	702083.1	323.6
	B148.4-1	1561976.4	694067.5	326.0
	B148.4-5	1561817.7	693531.9	327.4
	B149.87-1	1559610.1	686723.2	325.2
	B151.58-1	1553784.9	679646.1	336.4
	B152.6-0	1550004.2	676432.6	329.3
	B153.1-1	1547302.8	676031.8	322.5
	B154.3-1	1541375.5	674232.0	321.5
	B155.2-1	1536685.4	674403.7	313.7
	B155.7-1	1534202.1	674175.1	340.0
	B157.9-1	1524284.2	668932.6	246.0
	B158.1-1	1523474.2	668924.1	243.0
	B158.22-1	1522640.9	669168.4	279.1
AECOM**	BM-1A	1521184.8	669107.0	292.4
	FES-3	1616410.4	736040.4	143.9
	FES-3A	1616311.4	735904.6	139.3
	FES-3B	1611359.3	732784.5	142.5
	FES-4	1608699.4	732017.0	142.6
	FES-5	1605493.6	731399.7	147.1
	FES-6	1598212.9	725299.3	174.4
	FES-9	1583302.9	711497.9	271.6
	FES-10A	1563547.6	698025.3	321.4
	FES-12	1560130.5	687972.2	322.5
	SB-1A	1547803.7	676160.2	321.0
	SB-1B	1551257.2	677175.4	327.5
	SB-2	1545717.0	675698.7	316.3
	SB-3	1540348.5	674275.0	322.4

Notes:

- Northings and Eastings are provided in NAD83 New York State Plane East Zone.
- Elevations are referenced to the NAVD88 datum.

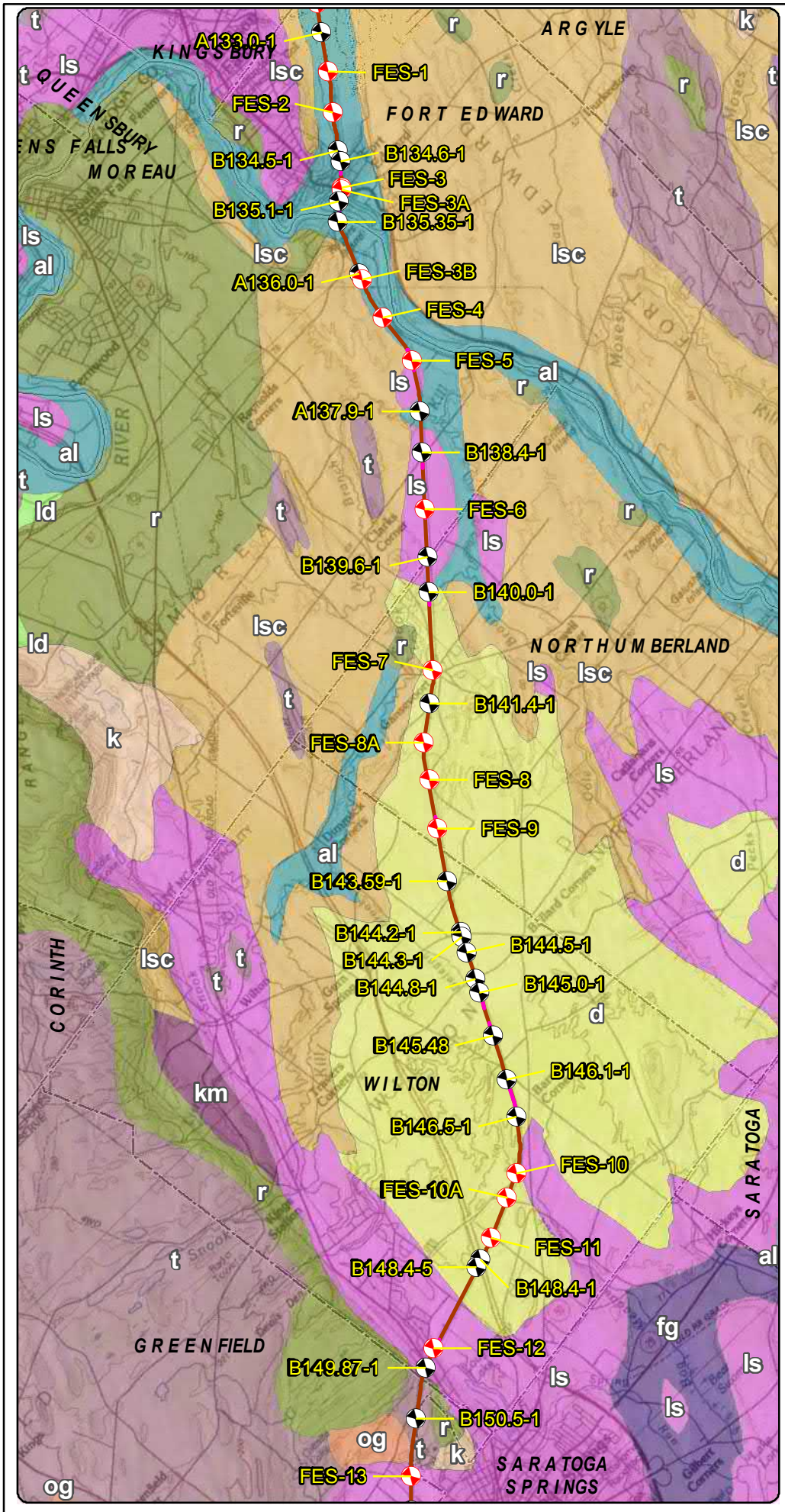
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

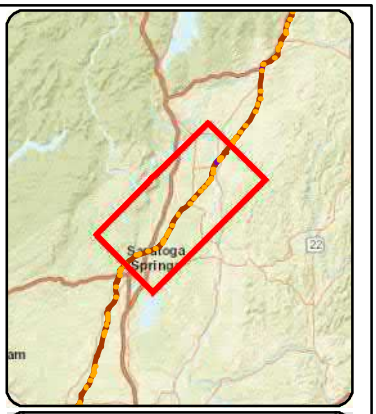
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** Kiewit boring coordinates and elevations are noted on the boring logs.

Reference:

AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.





LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Surficial Geology

- al - Recent alluvium
- d - Dunes
- fg - Fluvial sand and/or gravel
- k - Kame deposits
- km - Kame moraine
- ld - Lacustrine delta
- ls - Lacustrine sand
- lsc - Lacustrine silt and clay
- og - Outwash sand and gravel
- pm - Swamp deposits
- r - Bedrock
- t - Till

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

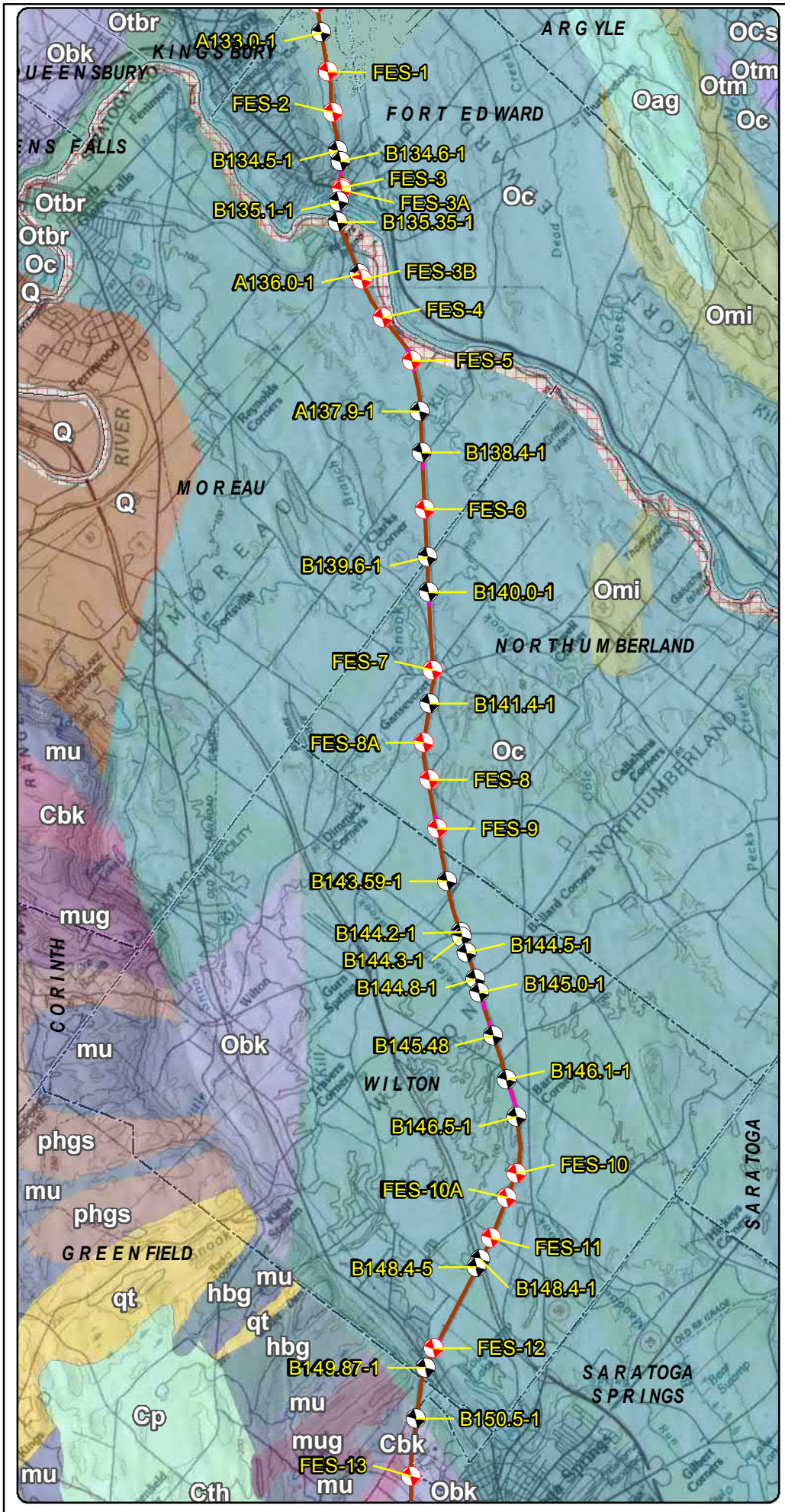
Champlain Hudson Power Express Inc.

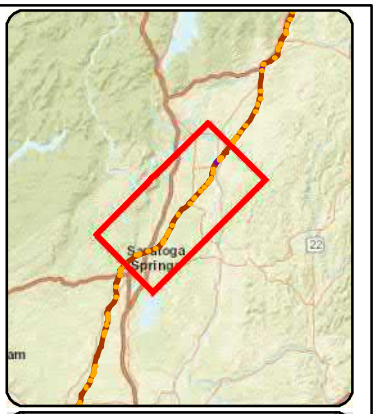
Surficial Geology and Geotechnical Borings
Fort Edward to Saratoga
Figure 3-4

Prepared on 4/29/2021
by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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LEGEND

- 2021 Boring Location
- Previous (2013) Boring Location
- Terrestrial Route HVDC
- Submarine Route HVDC
- Terrestrial Route HVAC
- Preliminary HDD Locations
- Preliminary Pipe Bridge Location
- Town Boundary
- County Boundary

Bedrock Geology

- Cbk - Beekmantown Group
- Cp - Potsdam Sandstone
- Cth - Theresa (Galway) Formation
- No Label
- OCs - Cambrian thru Middle Ordovician
- Oag - Austin Glen Form (graywacke, shale)
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- hbg - Biotite/hornblende granite gneiss
- mu - Undivided metasedimentary rock
- mug - Interlayered metasedimentary rock
- phgs - Charnockite, granitic, quartz syenite
- qt - Quartzite

N

1 0.5 0 1 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

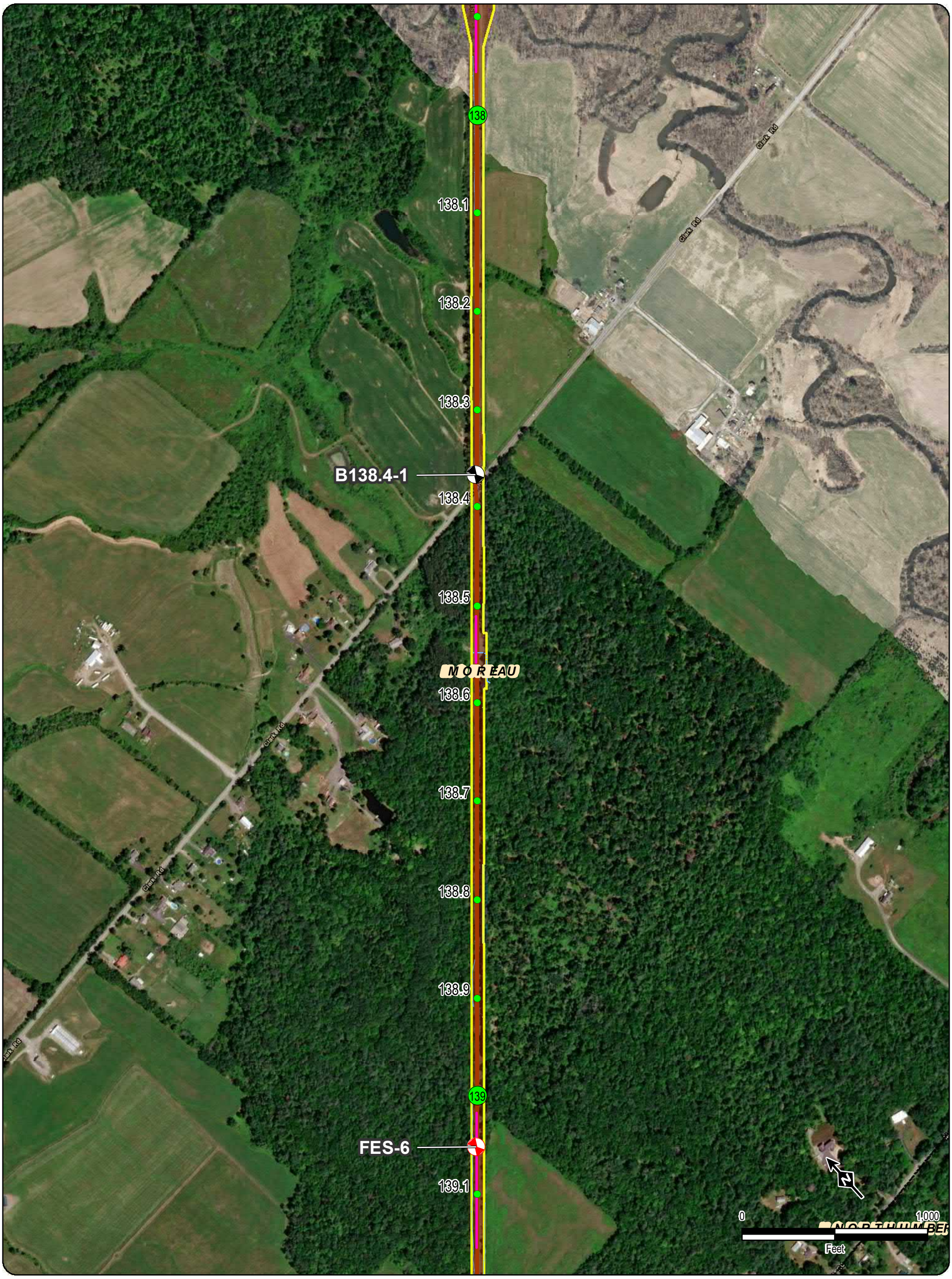
Bedrock Geology and Geotechnical Borings Fort Edward to Saratoga Figure 4-4

Prepared on 5/18/2021

by: AECOM

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

Y:\Projects\CHPE\IRoute\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190909Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Bedrock_May_2021_Report.mxd





111.8 Certified Milepost - Tenths

135 Certified Milepost

111.8 Preferred Alternative Milepost - Tenths

135 Preferred Alternative Milepost

Terrestrial Route HVDC

Submarine Route HVDC

Terrestrial Route HVAC

Preliminary HDD Locations

Preliminary Pipe Bridge Location

2021 Boring Location

Previous (2013) Boring Location

LEGEND

Streams/Ditches

Railroad ROW

Deviation Zone

Deviation Zone Outside ROW

Preferred Alternative Deviation Zone

Preferred Alternative Deviation Zone Outside ROW

Town Boundary

Village Boundary

State Park (OPRHP)

Parcel Ownership

TOWN NAME

Road Name

Village Name

DATA SOURCES: ESRI, NETWORK MAPPING 2010, NYSDOT, OPRHP, TDI, TRC

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Fort Edward to Saratoga

Figure A-4

Sheet 5 of 15

Prepared by: AECOM 5/19/2021

Y:\Projects\CHPEI\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Ft_Edward_to_Saratoga_Boring_Locations_Mapset_May_2021_Report.mxd

BORING CONTRACTOR: ADT			AECOM									SHEET 1 OF 2	
DRILLER: Chris Chaillou												PROJECT NAME: CHPE -	
SOILS ENGINEER/GEOLOGIST: Chris French			**BORING LOG**									PROJECT NO.: 60323056	
LOCATION: Moreau, NY (CP Rail) MP - 139.06												HOLE NO.: **FES-6**	
												START DATE: 1/19/21	
												FINISH DATE: 1/20/21	
												OFFSET: N/A	
GROUND WATER OBSERVATIONS				CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55					
Water at 9' (inferred)			TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit		BORING TYPE: SPT					
			SIZE I.D.	4"	2.5"	- -		BORING O.D.: 4.5"					
			SIZE O.D.	4.5"	3"	3 7/8"		SURFACE ELEV.:					
			HAMMER WT.	140 lbs	140 lbs			LONGITUDE:					
			HAMMER FALL	30"	30"			LATITUDE:					

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	SAMPLE TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.(2)	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		0'-5'				Hand Cleared					SM	SAND and GRAVEL	Black fine-coarse SAND, little angular gravel, little silt; frozen
1.0											SW		0.7': Black fine-coarse SAND, trace angular-subangular gravel, trace silt; loose, moist
2.0													TR-1; (3.0'-5.0')
3.0											SP		2.5': Brown fine SAND, trace silt; loose, moist
		3'-5'	S-1										
4.0											ML		4.0': Brown SILT, trace clay, trace fine sand; medium stiff, moist
5.0													
		5'-7'	S-2	24"	15"	5	17	27	29	29	SP		Light Brown fine SAND, trace silt; dense, moist
6.0													
7.0													
		7'-9'	S-3	24"	18"	19	19	17	18	23	SP		Brown fine SAND, trace silt; medium dense, moist
8.0													TR-2; (8.0'-8.5')
9.0													
		9'-11'	S-4	24"	18"	9	13	12	11	16	SP		Gray fine SAND, trace silt; loose, saturated
10.0													
11.0													
		11'-'13'	S-5	24"	24"	13	17	19	20	23	SM		Gray fine SAND, little silt; medium dense, saturated
12.0													TR-3; (12.0'-12.5')
13.0													
		13'-15'	S-6	24"	16"	12	17	20	14	24	SM		Gray fine SAND and silt; medium dense, saturated
14.0													
15.0													
		15'-17'	S-7	24"	8"	4	9	8	7	11	SM/ML		Gray fine SAND and silt, saturated
16.0											CH	SILT and CLAY	15.5': Gray SILT, some fine sand; medium stiff, saturated.
17.0													
18.0													
19.0													
20.0													

NOTES:

(1) Thick-wall ring lined drive sampler (California sampler) used for SPT samples. Rings dimensions = 2-1/2" O.D. by 2-7/16" I.D. by 6" length.

(2) Correction factor: $Ncorr=N*(2.0^2-1.375^2)in./(3.0^2-2.4^2)in. = N*0.65$.

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER: Chris French

LOCATION: Moreau, NY (CP Rail) MP - 139.06

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **FES-6**

START DATE: 1/19/21

FINISH DATE: 1/20/21

OFFSET: N/A

DEPTH	CORING RATE MIN/FT	DEPTHS FROM - TO (FEET)	TYPE AND NO.	PEN. in	REC. in	BLOWS PER 6 in ON SAMPLER (ROCK QUALITY DESIGNATION)				N Corr.	USCS CLASS.	STRAT. CHNG. DEPTH	FIELD IDENTIFICATION OF SOILS
		20'-22'	S-8	24"	24"	WOR	WOR	WOH	2	0	CH		Gray silty CLAY; very soft, wet
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	24"	WOR	WOR	WOR	2	0	CH		SAA
26.0													TR-4; (26.0'-26.5)
27.0													
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOR	WOR	1	2	1	CH	SILT and CLAY	SAA
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	WOR	WOR	1	2	1	CH		SAA
36.0													TR-5; (36.0'-36.5')
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOR	WOR	WOH	1	0	CH		SAA
39.0													
40.0													
													FES-6 terminated at 40', grouted to surface
41.0													
42.0													
43.0													
44.0													
45.0													

NOTES:

Soil description represents a field identification after D.M. Burmister unless otherwise noted.

The information contained on this log is not warranted to show the actual subsurface condition. The contractor agrees that he will make no claims against AECOM if he finds that the actual conditions do not conform to those indicated by this log.

SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%



Boring Location Plans Page 5 of 18	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: April 2022

Champlain Hudson Power Express
Design Package 3
Glens Falls to Ballston Spa, New York

***ATLANTIC TESTING LABORATORIES*, Limited**

Albany, NY	Binghamton, NY	Canton, NY	Elmira, NY	Plattsburgh, NY
Poughkeepsie, NY	Syracuse, NY	Rochester, NY	Utica, NY	Watertown, NY

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/9/2022** Finish Date: **2/9/2022**

Boring No.: **K-139.0** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/9/2022	AM	*9.3'	10.0'

Coordinates
Northing **1598467.2**
Easting **725531.3**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **173.0**

Boring Advance By:
HW (4") Casing/3 7/8" Wet Rotary

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	6 2 2 1		Black cmf GRAVEL; and cmf SAND; trace SILT (frozen, non-plastic) FILL GW	12
2							2.0		
3		2	2.0	4.0	SS	2 2 2 2		Brown cmf SAND; trace SILT; trace CLAY (moist, very slightly plastic) SW	10
4									
5		3	4.0	6.0	SS	3 2 2 2		Brown cmf SAND; little CLAY; trace SILT (moist, slightly plastic) SC	10
6									
7		4	6.0	8.0	SS	2 2 7 6		Brown mf SAND; little SILT; trace CLAY (moist, very slightly plastic) SM	20
8							8.0		
9		5	8.0	10.0	SS	7 4 6 7		Grey mf+ SAND; little SILT (wet, non-plastic) w = 24.1%, % Fines = 14.0% SM	22
10	WET ROTARY							Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
11									
12									
13									
14		6	14.0	16.0	SS	6 5 6 7		Grey mf SAND; little SILT (wet, non-plastic) SM	14
15									
16									
17							17.0		
18									
19		7	19.0	21.0	SS	WH/24"		Grey CLAY; trace f SAND; trace SILT (wet, plastic) w = 62.3%, LL = 61, PL = 22, PI = 39, % Fines = 99.1% CH	24
20									
21									
22									
23									
24		8	24.0	26.0	SS	WH/24"		Grey CLAY; little SILT (wet, plastic) CH	24
25									

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-139.0** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL f - fine; m - medium; c - course and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	RECOVERY (inches)
29		9	29.0	31.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
33		ST-1	33.0	35.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; little SILT; trace f SAND (wet, plastic) w = 77.7%, LL = 65, PL = 24, PI = 41, % Fines = 99.5% CH	24
39		10	39.0	41.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
43		11	43.0	45.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
45							45.0	Boring terminated at 45.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classification.
3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-04-22**

Client: **Kiewit Engineering (NY) Corp.**

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 3
Various Locations, New York

Start Date: **2/9/2022** Finish Date: **2/9/2022**

Boring No.: **K-139.1** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/9/2022	**PM**	***8.9'**	**10.0'**

Coordinates
Northing **1597879**
Easting **724995**

Sampler Hammer
Weight: **140** lbs.
Fall: **30** in.
Hammer Type: **Automatic**

Ground Elev.: **176.5**

Boring Advance By: **HW (4") Casing/3 7/8" Wet Rotary**

***May be affected by water utilized to advance the borehole.**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL (f - fine; m - medium; c - coarse; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%)	Recovery (Inches)
1	CASING	1	0.0	2.0	SS	3 3 2 1	2.0	Black cmf SAND; and cmf GRAVEL; trace SILT (frozen, non-plastic) COBBLE Fragment in split spoon shoe; FILL SW	1
3	CASING	2	2.0	4.0	SS	1 1 2 1		Brown cmf SAND; little SILT; trace CLAY (moist, very slightly plastic) SM	12
5		3	4.0	6.0	SS	2 4 6 8		Brown mf SAND; some SILT; trace CLAY (moist, very slightly plastic) SM	18
7		4	6.0	8.0	SS	7 9 8 9		Similar Soil (moist, very slightly plastic) SM	12
9		5	8.0	10.0	SS	7 7 6 7		Grey mf SAND; some SILT; trace CLAY (wet, very slightly plastic) w = 24.8% SM	24
11	WET ROTARY						12.0	Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
15		6	14.0	16.0	SS	WH/24"		Grey CLAY; some SILT (wet, plastic) CH	24
19		7	19.0	21.0	SS	WH/24"		Grey CLAY; little SILT (wet, plastic) CH	24
24		8	24.0	26.0	SS	WH/24"		Grey CLAY; little SILT; trace f SAND (wet, plastic) w = 79.2%,	24

SS Split Spoon Sample
NX Rock Core
SH Undisturbed Sample (Shelby Tube)
Estimated Groundwater

Drillers: **Jeffrey Donovan; John Trathen**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 3).GPJ ATL4-08.GDT 6/9/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-139.1** Report No.: **CD10279D-01-04-22** Sheet **2** of **2**

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
26								LL = 64, PL = 21, PI = 43, % Fines = 99.6% CH	
27									
28									
29		9	29.0	31.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
30									
31									
32									
33									
34		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
35									
36									
37									
38		ST-1	38.0	40.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; little SILT; trace f SAND	24
39								(wet, plastic) w = 70.6%, LL = 66, PL = 20, PI = 46,	
40								% Fines = 99.2% CH	
41									
42									
43		11	43.0	45.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
44									
45							45.0	Boring terminated at 45.0 feet.	
46									
47								Notes:	
48								1. Borehole backfilled with cement-bentonite grout.	
49								2. Soil classifications based on ATL Field Engineer's field classification.	
50								3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-137.1	S-5	8.0-10.0	Mottled Orangish-Brown CLAY; little SILT; trace f SAND	93.8	41.3	77	26	51	--	--	--	--	--	--	--	--
	S-8	23.0-24.8	Brown mf GRAVEL; some cmf SAND; some SILT	24.0	15.3	--	--	--	--	--	--	--	--	--	--	--
	RC-2	31.0-36.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	5,570	691	1.43
K-137.3	S-3	4.0-6.0	Brown CLAY; little mf SAND; trace SILT	--	--	--	--	--	--	300	35	7.65	15,480	--	--	--
	S-4	6.0-8.0	Brown CLAY; little SILT; trace f SAND	--	40.2	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0-16.0	Brownish-Grey CLAY; little SILT; trace f SAND	96.0	33.7	38	18	20	--	--	--	--	--	--	--	--
	ST-1	24.0-26.0	Brown CLAY; little SILT; trace f SAND	99.8	35.5	42	22	20	--	--	--	--	--	--	--	--
	R-2	35.0-40.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	6,410	238	1.10
K-137.8	S-5	8.0-10.0	Brown mf SAND; little CLAY; trace SILT	--	23.5	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Brown mf+ SAND; some SILT	33.0	30.0	--	--	--	--	--	--	--	--	--	--	--
	ST-1C	44.0-46.0	Grey mf+ SAND; and SILT	40.0	32.6	NP	NP	NP	--	--	--	--	--	--	--	--
K-138.0	S-5	8.0-10.0	Mottled Light Greyish-Orangish-Brown CLAY; little SILT; trace f SAND	94.2	40.2	77	31	46	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.6	73.5	73	27	46	--	--	--	--	--	--	--	--
	S-11	38.0-40.0	Blackish-Grey CLAY; little SILT; trace f SAND	99.8	61.1	73	29	44	--	--	--	--	--	--	--	--
K-138.5	S-5	8.0-10.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT; trace f SAND	97.9	50.2	70	25	45	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; little SILT, trace f SAND	99.8	80.8	75	25	50	--	--	--	--	--	--	--	--
	S-11	36.0-38.0	Grey CLAY; little SILT; trace f SAND	99.2	69.5	68	25	43	--	--	--	--	--	--	--	--
K-138.6	S-5	8.0-10.0	Blackish-Grey SILT; some mf SAND; trace CLAY; trace OM	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	75.9	73	23	50	--	--	--	--	--	--	--	--
	S-10	35.0-37.0	Blackish-Grey CLAY; some SILT; trace f SAND	99.7	77.7	70	23	47	--	--	--	--	--	--	--	--
K-139.0	S-5	8.0-10.0	Grey mf+ SAND; little SILT	14.0	24.1	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; trace f SAND; trace SILT	99.1	62.3	61	22	39	--	--	--	--	--	--	--	--
	ST-1	33.0-35.0	Grey CLAY; little SILT; trace f SAND	99.5	77.7	65	24	41	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express - Design Package 3

Boring ID	Sample No.	Sample Depth (ft.)	Soil/Rock Description	Percent Finer No. 200 Sieve	Moisture Content (%)	Atterburg Limits			Organic Content (%)	Water-Soluble Sulfate (ppm)	Water-Soluble Chloride (ppm)	pH	Resistivity (ohm-cm)	Rock Unconfined Compressive Strength (psi)	Rock Splitting Tensile Strength (psi)	Rock CERCHAR Abrasiveness Corrected CAI
						LL	PL	PI								
K-139.1	S-5	8.0-10.0	Grey mf SAND; some SILT; trace CLAY	--	24.8	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Grey CLAY; little SILT; trace f SAND	99.6	79.2	64	21	43	--	--	--	--	--	--	--	--
	ST-1	38.0-40.0	Grey CLAY; little SILT; trace f SAND	99.2	70.6	66	20	46	--	--	--	--	--	--	--	--
K-140.0	S-6	14.0-16.0	Mottled Greenish-Tannish-Brown CLAY; trace SILT; trace f SAND	--	31.5	--	--	--	--	--	--	--	--	--	--	--
	S-9	29.0-31.0	Mottled Orangish-Tannish-Brown CLAY; little SILT; trace f SAND	94.3	32.1	42	19	23	--	--	--	--	--	--	--	--
	S-13	46.0-48.0	Mottled Reddish-Grey CLAY; little SILT; trace f SAND	99.8	31.8	47	21	26	--	--	--	--	--	--	--	--
	RC-3	74.0-79.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	15,720	2,074	1.69
K-140.1	S-7	19.0-21.0	Orangish-Brown mf+ SAND; little SILT	11.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0-36.0	Mottled Reddish-Greyish-Brown CLAY; some f SAND; little SILT	78.4	44.3	60	23	37	--	--	--	--	--	--	--	--
	S-13	48.0-50.0	Reddish-Brownish-Grey CLAY; some f SAND; little SILT	68.8	27.2	35	21	14	--	--	--	--	--	--	--	--
	RC-1	64.0-69.0	Greyish-Black SHALE	--	--	--	--	--	--	--	--	--	--	6,470	743	1.49
K-140.2	S-2	2.0-4.0	Grey SILT; and mf SAND; trace CLAY	52.3	25.6	38	16	22	--	--	--	--	--	--	--	--
	S-5	8.0-10.0	Brown f SAND; little SILT	12.0	9.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Grey CLAY; and f SAND; little SILT	57.1	39.4	47	17	30	--	--	--	--	--	--	--	--
	TR-1	46.0-48.0	Greyish-Brown CLAY; little f SAND; trace SILT	84.5	40.7	52	20	32	--	--	--	--	--	--	--	--
K-142.8	S-3	4.0-6.0	Brown mf SAND; little SILT	--	--	--	--	--	--	200	20	5.79	121,260	--	--	--
	S-4	6.0-8.0	Grey cmf SAND; trace SILT	--	26.5	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; little f SAND; trace SILT	89.5	22.0	47	18	29	--	--	--	--	--	--	--	--
	S-9	29.0-31.0	Grey mf SAND; some SILT; trace CLAY	--	28.4	--	--	--	--	--	--	--	--	--	--	--
	ST-1C	37.0-39.0	Grey SILT; and mf+ SAND	58.0	22.8	--	--	--	--	--	--	--	--	--	--	--
K-142.9	S-4	6.0-8.0	Brown cmf SAND; little SILT; trace CLAY; trace OM	--	--	--	--	--	8.7	--	--	--	--	--	--	--
	S-5	8.0-10.0	Grey cmf+ SAND; little SILT; trace f GRAVEL	17.0	45.7	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Grey CLAY; trace f SAND; trace SILT	99.8	40.8	37	16	21	--	--	--	--	--	--	--	--
	ST-1C	37.0-39.0	Grey f SAND; some SILT	29.0	25.8	--	--	--	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-138.0	S-5	8-10	40.2
	S-8	24-26	73.5
	S-11	38-40	61.1
K-138.5	S-5	8-10	50.2
	S-8	24-26	80.8
	S-11	36-38	69.5
K-138.6	S-5 [1]	8-10	30.3
	S-8	24-26	75.9
	S-10	35-37	77.7
K-139.0	S-5	8-10	24.1
	S-7	19-21	62.3
	ST-1	33-35	77.7
K-139.1	S-5	8-10	24.8
	S-8	24-26	79.2
	ST-1	38-40	70.6

1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: _____ Date: 03/01/22