Boring Location Plans Page 5 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/13/2022** Finish Date: **1/13/2022**

Boring No.: **K-123.2** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/13/2022	PM	*6.2'	14.0'
1/13/2022	PM	*9.3'	14.0'

Coordinates
Northing **761528.799**
Easting **1670196.072**

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

Ground Elev.: **135.342**

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)
0	CASING	1	0.0	2.0	SS	44 19 11 8	0.5	6" CRUSHED STONE	18
1								Black cmf SAND; trace SILT; trace f GRAVEL (moist, non-plastic) SW Possible FILL	
2		2	2.0	4.0	SS	11 15 11 6		Grey cmf SAND; some mf GRAVEL; trace SILT (moist, non-plastic) SW Possible FILL	14
3							4.0		
4		3	4.0	6.0	SS	5 4 2 1		Brown SILT; little mf SAND; trace CLAY (wet, very slightly plastic) ML w = 22.3%	8
5							6.0		
6		4	6.0	8.0	SS	1 1 2 1		Brown f SAND; some SILT (saturated, non-plastic) SM w = 31.3%	12
7									
8		5	8.0	10.0	SS	3 1 1 1		Greyish-Brown mf SAND; some SILT; trace CLAY (wet, very slightly plastic) SM	1
9							10.0		
10		6	10.0	12.0	SS	3 3 3 4		Grey CLAY; little SILT; trace f SAND lenses throughout sample (wet, plastic) CL w = 28.4%, LL = 48, PL = 20, PI = 28	12
11									
12									
13							13.0		
14	WET ROTARY	7	14.0	16.0	SS	WH/12" 2 2		Grey f SAND; little SILT; little CLAY (wet, slightly plastic) SM-SC	24
15								Advanced casing to 14.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
16									
17							17.0		
18									
19		8	19.0	21.0	SS	2 1 1 1		Grey c-m+f SAND; trace SILT (saturated, non-plastic) SP-SM w = 29.8% % Fines = 10.0%	24
20									
21									
22									
23									
24		9	24.0	26.0	SS	6 5 4 5		Similar Soil (wet, non-plastic) SP-SM	12
25									

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

Drillers: **Mark Childs; Ian Ross**

Inspector: **Aaron Woods (ATL); Rae Kim (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-123.2** Report No.: **CD10279D-01-03-22** 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									
27							27.0		
28		10	28.0	30.0	SS	WH/12" 3 2		(3" Brass Lined Split Spoon) Grey CLAY; little SILT; trace f SAND (wet, plastic) CH w = 65.5%, LL = 67, PL = 21, PI = 46	24
29								% Fines = 97.0%	
30		ST-1	30.0	32.0	SH	SHELBY TUBE		Similar Soil (wet, plastic) CH	22
31									
32									
33							33.0		
34		11	34.0	36.0	SS	3 3 5 3		Grey SILT; little CLAY; trace f SAND (wet, slightly plastic) ML	24
35									
36							36.0		
37								Boring terminated at 36.0 feet.	
38									
39								Notes:	
40								1. Borehole backfilled with cement-bentonite grout.	
41								2. Soil classifications based on ATL Field Engineer's field classifications.	
42								3. Borehole was advanced with ATL's CME 45 Trailer (Rig Unit No. CDGV429) drill rig.	
43									
44									
45									
46									
47									
48									
49									
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57									
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60									
61									
62									

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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								
	S-12	39.0 - 41.0	Black c-m+f SAND; trace SILT; trace f GRAVEL	4.8	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-15	54.0 - 56.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	9.4	27.2	NP	NP	NP	--	--	--	--	--	--	--	--
K-122.4	S-5	8.0 - 10.0	Brown SILT; and mf- SAND	57.0	24.8	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey mf+ SAND; trace SILT	--	17.5	--	--	--	--	--	--	--	--	--	--	--
	S-13	49.0 - 51.0	Greyish-Black c-mf SAND; little SILT; trace mf GRAVEL	19.0	21.7	--	--	--	--	--	--	--	--	--	--	--
	S-16	58.0 - 60.0	Greyish-Black cm+f SAND; trace SILT	1.7	9.9	--	--	--	--	--	--	--	--	--	--	--
K-123.2	S-3	4.0 - 6.0	Brown SILT; little mf SAND; trace CLAY	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown f SAND; some SILT	--	31.3	--	--	--	--	--	--	--	--	--	--	--
	S-6	10.0 - 12.0	Grey CLAY; little SILT; trace f SAND	--	28.4	48	20	28	--	--	--	--	--	--	--	--
	S-8	19.0 - 21.0	Grey c-m+f SAND; trace SILT	10.0	29.8	--	--	--	--	--	--	--	--	--	--	--
	S-10	28.0 - 30.0	Grey CLAY; little SILT; trace f SAND	97.0	65.5	67	21	46	--	--	--	--	--	--	--	--
	ST-1	30.0 - 32.0	Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	1,400	15	8.24	5,418	--	--	--
K-123.7	S-3	4.0 - 6.0	Mottled Blackish-Grey CLAY; trace SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	41.4	--	--	--	7.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Orangish-Grey CLAY; trace SILT	100.0	25.9	79	23	56	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT	100.0	48.4	73	20	53	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Grey CLAY; trace SILT	--	37.3	--	--	--	--	--	--	--	--	--	--	--
K-123.8	S-3	4.0 - 6.0	Orangish-Brown cmf+ SAND; little SILT	16.0	18.1	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	--	66.5	54	23	31	6.9	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT	100.0	37.2	67	18	49	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Bluish-Grey CLAY; trace SILT	--	33.5	--	--	--	--	--	--	--	--	--	--	--
K-125.5	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	21.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Grey CLAY; trace SILT	--	27.5	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Black mf+ SAND; trace SILT	7.7	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	51.5	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace mf SAND	94.0	38.0	70	21	49	--	--	--	--	--	--	--	--

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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

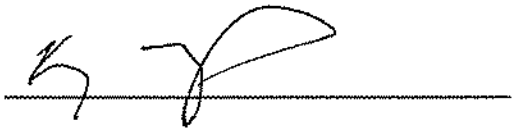
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-122.35	S-3	4-6	23.5
	S-8	24-26	23.8
	S-12	39-41	17.8
	S-15	54-56	27.2
K-123.2	S-3 [1]	4-6	22.3
	S-4	6-8	31.3
	S-6	10-12	28.4
	S-8	19-21	29.8
	S-10	28-30	65.5
K-123.7	S-3	4-6	41.4
	S-6	14-16	25.9
	S-9	28-30	48.4
	S-11	40-42	37.3
K-123.8	S-3	4-6	18.1
	S-6	14-16	66.5
	S-9	28-30	37.2
	S-11	40-42	33.5

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-125.5	S-3	4-6	21.4
	S-5	8-10	27.5
	S-7	19-21	51.5
	S-9	28-30	38.0
K-127.0	S-3	4-6	32.8
	S-4	6-8	31.2
	S-6	14-16	22.8
	S-9	30-32	81.7
	S-11	39-41	63.9
K-127.1	S-3	4-6	30.7
	S-7	19-21	71.7
	S-9	30-32	58.0

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

Reviewed By:  Date: 01/31/22

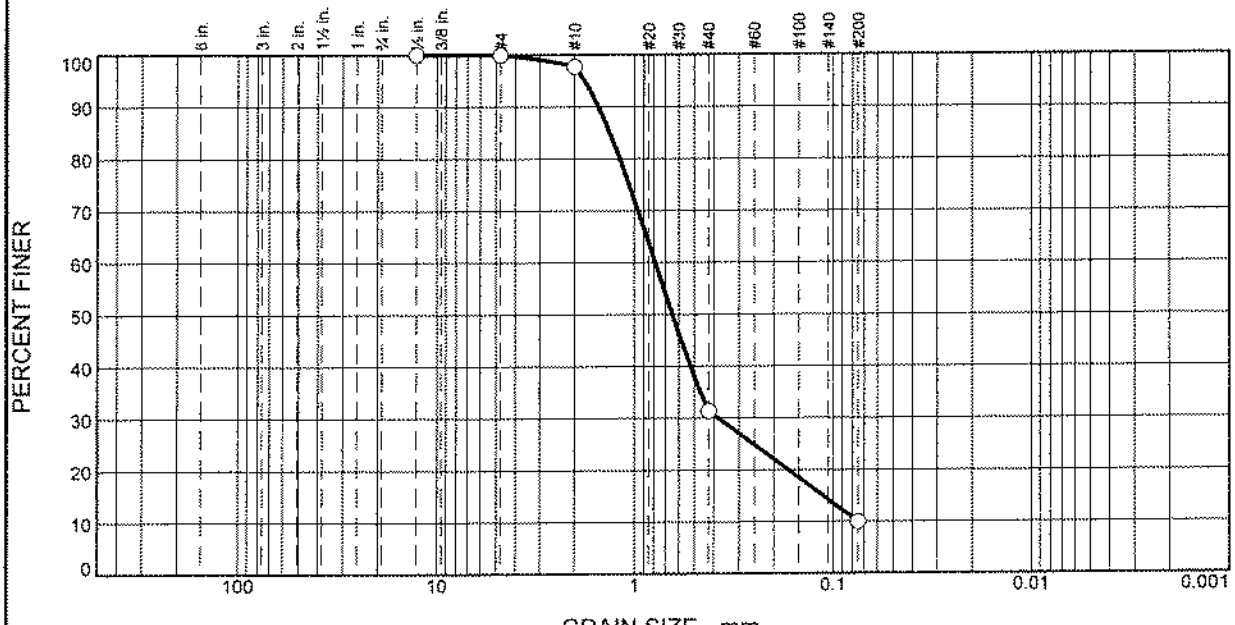
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-123.2, S-8 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 19-21'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	67	21	10	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	100		
#10	98		
#40	31		
#200	10.0		

* (no specification provided)

Soil Description

Grey c-m+f SAND; trace SILT

Atterberg Limits

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

Coefficients

D_{85}= 1.3334 D_{60}= 0.7878 D_{50}= 0.6459
D_{30}= 0.3800 D_{15}= 0.1127 D_{10}= 0.0752
C_u= 10.48 C_c= 2.44

Classification

USCS= AASHTO=

Remarks

Moisture Content= 29.8%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 01/31/22

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-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Test Date:**	January 25, 2022
	Various Locations, New York	**Performed By:**	R. Parrow

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-123.2	S-10	28-30	A	10	107.62	97
K-123.7	S-6	14-16	A	10	78.62	100
K-123.7	S-9	28-30	A	10	120.67	100
K-123.8	S-9	28-30	A	10	219.15	100
K-125.5	S-9	28-30	A	10	219.28	94
K-127.0	S-9	30-32	A	10	119.17	96
K-127.1	S-9	30-32	A	10	124.57	100

Reviewed By: _____ Date: January 31, 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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-122.35	S-3	NP	NP	NP
K-122.35	S-15	NP	NP	NP
K-123.2	S-6	48	20	28
K-123.2	S-10	67	21	46
K-123.7	S-6	79	23	56
K-123.7	S-9	73	20	53
K-123.8	S-6	54	23	31
K-123.8	S-9	67	18	49
K-125.5	S-3	NP	NP	NP
K-125.5	S-9	70	21	49
K-127.0	S-4	51	22	29
K-127.0	S-9	72	20	52
K-127.1	S-3	34	22	12
K-127.1	S-9	68	19	49

SAMPLE INFORMATION

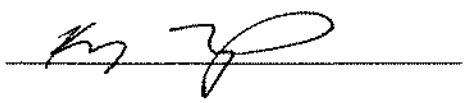
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-122.35	S-3	2	5	23.5
K-122.35	S-15	4.76	52	27.2
K-123.2	S-6	2	1	28.4
K-123.2	S-10	6.35	1	65.5
K-123.7	S-6	0.297	0	25.9
K-123.7	S-9	0.297	0	48.4
K-123.8	S-6	2	7	66.5
K-123.8	S-9	0.297	0	37.2
K-125.5	S-3	2	5	21.4
K-125.5	S-9	9.51	2	38.0
K-127.0	S-4	2	2	31.2
K-127.0	S-9	9.51	2	81.7
K-127.1	S-3	6.35	24	30.7
K-127.1	S-9	2	1	58.0

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-122.35	S-3	Air Dry	Pulverizing and Screening
K-122.35	S-15	Air Dry	Pulverizing and Screening
K-123.2	S-6	Air Dry	Pulverizing and Screening
K-123.2	S-10	Air Dry	Pulverizing and Screening
K-123.7	S-6	Air Dry	Not Necessary
K-123.7	S-9	Air Dry	Not Necessary
K-123.8	S-6	Air Dry	Pulverizing and Screening
K-123.8	S-9	Air Dry	Not Necessary
K-125.5	S-3	Air Dry	Pulverizing and Screening
K-125.5	S-9	Air Dry	Pulverizing and Screening
K-127.0	S-4	Air Dry	Pulverizing and Screening
K-127.0	S-9	Air Dry	Pulverizing and Screening
K-127.1	S-3	Air Dry	Pulverizing and Screening
K-127.1	S-9	Air Dry	Pulverizing and Screening

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: 01/31/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - HDD Crossing 14.A – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 14.A is STA 20331+00 (43.405228° N, 73.485808° W).

The geotechnical data at this HDD crossing is attached. The available data is from the recent investigation by Atlantic Testing Laboratories, referenced below.

- Atlantic Testing Laboratories, Geotechnical Data Report, Champlain Hudson Power Express, dated April 12, 2022.

Contact us if you have questions or require additional information.

HDD 14.A
Borings K-123.7, K123.8
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

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.

Boring Location Plans Page 6 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/20/2022** Finish Date: **1/20/2022**

Boring No.: **K-123.7** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/20/2022	AM	DRY	OPEN
1/20/2022	AM	3.5'	9.0'
1/20/2022	AM	*13.0'	9.0'
1/20/2022	AM	*14.4'	9.0'

Coordinates
Northing **761644.556**
Easting **1667254.963**

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

Ground Elev.: **135.778**

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%	
0	CASING	1	0.0	2.0	SS	8 4 5 4	0.2	2" TOPSOIL & ORGANIC MATERIAL	19
1							0.8	Brownish-Black mf SAND; little SILT (frozen, non-plastic) SM FILL	
2		2	2.0	4.0	SS	6 6 5 5	1.0 2.0		15
3							3.4	Black DEBRIS (cinders) FILL	
4		3	4.0	6.0	SS	2 1 2 2		Brown f GRAVEL; and cmf SAND; trace SILT (wet, non-plastic) GP Possible FILL	10
5								Orangish-Brown mf SAND; and SILT (wet, non-plastic) SM Possible FILL	
6		4	6.0	8.0	SS	3 6 4 5			11
7								Grey CLAY; trace SILT (wet, plastic) CH	
8		5	8.0	10.0	SS	1 4 5 7		Mottled Blackish-Grey CLAY; trace SILT; trace f SAND; trace ORGANIC MATERIAL (roots) (saturated, plastic) CH	20
9	WET ROTARY							w = 41.4%, OC = 7.5%	
10								Bluish-Grey CLAY; trace SILT (saturated, plastic) CH	
11								Mottled Orangish-Grey CLAY; trace SILT (saturated, plastic) CH	
12								Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	3 3 4 5		Mottled Orangish-Grey CLAY; trace SILT (saturated, plastic)	22
15								CH w = 25.9%, LL = 79, PL = 23, PI = 56 % Fines = 100.0%	
16									
17									
18									
19		7	19.0	21.0	SS	1 2 4 4		Grey Similar Soil (saturated, plastic) CH	23
20									
21									
22									
23									
24		8	24.0	26.0	SS	2 2 4 4		Mottled Orangish-Brownish-Grey CLAY; trace SILT (saturated,	24
25									

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

Drillers: **Mark Childs; John Trathen**

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

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-123.7** Report No.: **CD10279D-01-03-22** 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)
								plastic) CH	
28		9	28.0	30.0	SS	4 5 6 8		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT (saturated, plastic) CH w = 48.4%, LL = 73, PL = 20, PI = 53 % Fines = 100.0%	24
34		10	34.0	36.0	SS	2 3 3 5		Grey CLAY; trace SILT (saturated, plastic) CH	24
40		11	40.0	42.0	SS	WH/12" 2 4		Similar Soil (saturated, plastic) CH w = 37.3%	24
							42.0		
								Boring terminated at 42.0 feet. Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classifications. 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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/20/2022** Finish Date: **1/20/2022**

Boring No.: **K-123.8** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/20/2022	PM	DRY	OPEN
1/20/2022	PM	7.3'	9.0'
1/20/2022	PM	*8.9'	9.0'
1/20/2022	PM	*13.1'	9.0'

Coordinates
Northing **761589.137**
Easting **1666853.935**

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

Ground Elev.: **135.861**

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	15 8 2 1	0.2	2" TOPSOIL & ORGANIC MATERIAL	11
							2.0	Brownish-Black cmf SAND; little mf GRAVEL; trace DEBRIS (cinders); trace SILT (frozen, non-plastic) SW FILL	
2		2	2.0	4.0	SS	3 1 1 1		Orangish-Brown f SAND; trace SILT (saturated, non-plastic) SP	14
3									
4		3	4.0	6.0	SS	1 1 2 2		Orangish-Brown cmf+ SAND; little SILT (saturated, non-plastic) SM w = 18.1% % Fines = 16.0%	7
5									
6		4	6.0	8.0	SS	10 6 2 1		Orangish-Brown cmf+ SAND; little SILT (saturated, non-plastic)	6
7							7.4	SM	
							8.0		
8		5	8.0	10.0	SS	1 1 2 1		Blackish-Brown cmf SAND; some cmf GRAVEL; trace SILT (saturated, non-plastic) SW COBBLE Fragments	10
9	WET ROTARY							Orangish-Greyish-Brown CLAY; trace SILT (saturated, plastic) CH	
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/18" 1		Blackish-Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments) (saturated, plastic) CH w = 66.5%, LL = 54, PL = 23, PI = 31, OC = 6.9%	17
15									
16									
17									
18									
19		7	19.0	21.0	SS	1 3 4 5		Mottled Orangish-Greyish-Brown CLAY; trace SILT (saturated, plastic) CH	22
20									
21									
22									
23									
24		8	24.0	26.0	SS	1 3 3 4		Similar Soil (saturated, plastic) CH	24
25									

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

Drillers: **Mark Childs; John Trathen**

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

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-123.8** Report No.: **CD10279D-01-03-22** 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)
28		9	28.0	30.0	SS	4 5 7 8		(3" Brass Lined Split Spoon) Similar Soil (saturated, plastic) CH w = 37.2%, LL = 67, PL = 18, PI = 49 % Fines = 100.0%	24
34		10	34.0	36.0	SS	1 3 3 5		Bluish-Grey CLAY; trace SILT (saturated, plastic) CH	24
40		11	40.0	42.0	SS	1 1 3 3		Similar Soil (saturated, plastic) CH w = 33.5%	24
							42.0		
								Boring terminated at 42.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classifications.
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

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								
	S-12	39.0 - 41.0	Black c-m+f SAND; trace SILT; trace f GRAVEL	4.8	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-15	54.0 - 56.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	9.4	27.2	NP	NP	NP	--	--	--	--	--	--	--	--
K-122.4	S-5	8.0 - 10.0	Brown SILT; and mf- SAND	57.0	24.8	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey mf+ SAND; trace SILT	--	17.5	--	--	--	--	--	--	--	--	--	--	--
	S-13	49.0 - 51.0	Greyish-Black c-mf SAND; little SILT; trace mf GRAVEL	19.0	21.7	--	--	--	--	--	--	--	--	--	--	--
	S-16	58.0 - 60.0	Greyish-Black cm+f SAND; trace SILT	1.7	9.9	--	--	--	--	--	--	--	--	--	--	--
K-123.2	S-3	4.0 - 6.0	Brown SILT; little mf SAND; trace CLAY	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown f SAND; some SILT	--	31.3	--	--	--	--	--	--	--	--	--	--	--
	S-6	10.0 - 12.0	Grey CLAY; little SILT; trace f SAND	--	28.4	48	20	28	--	--	--	--	--	--	--	--
	S-8	19.0 - 21.0	Grey c-m+f SAND; trace SILT	10.0	29.8	--	--	--	--	--	--	--	--	--	--	--
	S-10	28.0 - 30.0	Grey CLAY; little SILT; trace f SAND	97.0	65.5	67	21	46	--	--	--	--	--	--	--	--
	ST-1	30.0 - 32.0	Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	1,400	15	8.24	5,418	--	--	--
K-123.7	S-3	4.0 - 6.0	Mottled Blackish-Grey CLAY; trace SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	41.4	--	--	--	7.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Orangish-Grey CLAY; trace SILT	100.0	25.9	79	23	56	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT	100.0	48.4	73	20	53	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Grey CLAY; trace SILT	--	37.3	--	--	--	--	--	--	--	--	--	--	--
K-123.8	S-3	4.0 - 6.0	Orangish-Brown cmf+ SAND; little SILT	16.0	18.1	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	--	66.5	54	23	31	6.9	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT	100.0	37.2	67	18	49	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Bluish-Grey CLAY; trace SILT	--	33.5	--	--	--	--	--	--	--	--	--	--	--
K-125.5	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	21.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Grey CLAY; trace SILT	--	27.5	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Black mf+ SAND; trace SILT	7.7	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	51.5	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace mf SAND	94.0	38.0	70	21	49	--	--	--	--	--	--	--	--

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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

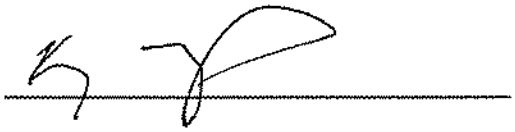
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-122.35	S-3	4-6	23.5
	S-8	24-26	23.8
	S-12	39-41	17.8
	S-15	54-56	27.2
K-123.2	S-3 [1]	4-6	22.3
	S-4	6-8	31.3
	S-6	10-12	28.4
	S-8	19-21	29.8
	S-10	28-30	65.5
K-123.7	S-3	4-6	41.4
	S-6	14-16	25.9
	S-9	28-30	48.4
	S-11	40-42	37.3
K-123.8	S-3	4-6	18.1
	S-6	14-16	66.5
	S-9	28-30	37.2
	S-11	40-42	33.5

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-125.5	S-3	4-6	21.4
	S-5	8-10	27.5
	S-7	19-21	51.5
	S-9	28-30	38.0
K-127.0	S-3	4-6	32.8
	S-4	6-8	31.2
	S-6	14-16	22.8
	S-9	30-32	81.7
	S-11	39-41	63.9
K-127.1	S-3	4-6	30.7
	S-7	19-21	71.7
	S-9	30-32	58.0

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

Reviewed By:  Date: 01/31/22

ATLANTIC TESTING LABORATORIES

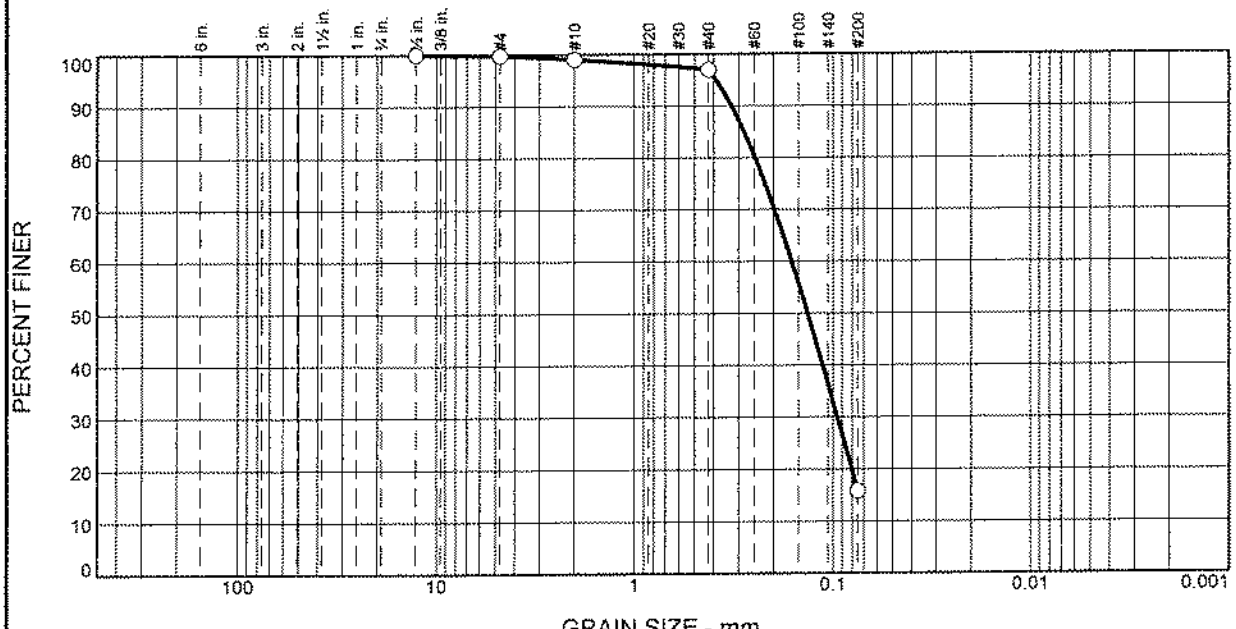
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-123.8, S-3 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 4-6'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	2	81	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	100		
#10	99		
#40	97		
#200	16		

Soil Description

Orangish Brown cmf+ SAND; little SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.2819 D_{60}= 0.1622 D_{50}= 0.1347

D_{30}= 0.0951 D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 18.1%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 01/31/22

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-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Test Date:**	January 25, 2022
	Various Locations, New York	**Performed By:**	R. Parrow

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-123.2	S-10	28-30	A	10	107.62	97
K-123.7	S-6	14-16	A	10	78.62	100
K-123.7	S-9	28-30	A	10	120.67	100
K-123.8	S-9	28-30	A	10	219.15	100
K-125.5	S-9	28-30	A	10	219.28	94
K-127.0	S-9	30-32	A	10	119.17	96
K-127.1	S-9	30-32	A	10	124.57	100

Reviewed By: _____ Date: January 31, 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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-122.35	S-3	NP	NP	NP
K-122.35	S-15	NP	NP	NP
K-123.2	S-6	48	20	28
K-123.2	S-10	67	21	46
K-123.7	S-6	79	23	56
K-123.7	S-9	73	20	53
K-123.8	S-6	54	23	31
K-123.8	S-9	67	18	49
K-125.5	S-3	NP	NP	NP
K-125.5	S-9	70	21	49
K-127.0	S-4	51	22	29
K-127.0	S-9	72	20	52
K-127.1	S-3	34	22	12
K-127.1	S-9	68	19	49

SAMPLE INFORMATION

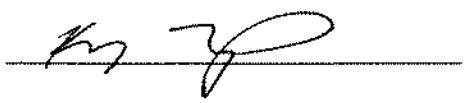
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-122.35	S-3	2	5	23.5
K-122.35	S-15	4.76	52	27.2
K-123.2	S-6	2	1	28.4
K-123.2	S-10	6.35	1	65.5
K-123.7	S-6	0.297	0	25.9
K-123.7	S-9	0.297	0	48.4
K-123.8	S-6	2	7	66.5
K-123.8	S-9	0.297	0	37.2
K-125.5	S-3	2	5	21.4
K-125.5	S-9	9.51	2	38.0
K-127.0	S-4	2	2	31.2
K-127.0	S-9	9.51	2	81.7
K-127.1	S-3	6.35	24	30.7
K-127.1	S-9	2	1	58.0

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-122.35	S-3	Air Dry	Pulverizing and Screening
K-122.35	S-15	Air Dry	Pulverizing and Screening
K-123.2	S-6	Air Dry	Pulverizing and Screening
K-123.2	S-10	Air Dry	Pulverizing and Screening
K-123.7	S-6	Air Dry	Not Necessary
K-123.7	S-9	Air Dry	Not Necessary
K-123.8	S-6	Air Dry	Pulverizing and Screening
K-123.8	S-9	Air Dry	Not Necessary
K-125.5	S-3	Air Dry	Pulverizing and Screening
K-125.5	S-9	Air Dry	Pulverizing and Screening
K-127.0	S-4	Air Dry	Pulverizing and Screening
K-127.0	S-9	Air Dry	Pulverizing and Screening
K-127.1	S-3	Air Dry	Pulverizing and Screening
K-127.1	S-9	Air Dry	Pulverizing and Screening

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: 01/31/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Date Received:**	January 25, 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-122.35	S-4	4.5	95.5	22.8	A	440
K-123.7	S-3	7.5	92.5	41.4	A	440
K-123.8	S-6	6.9	93.1	66.5	A	440
K-127.1	S-3	4.5	95.5	30.7	A	440

Reviewed By: _____ Date: 01/31/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 15 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 15 is STA 20418+00 (43.380563° N, 73.489523° 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, 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 14B
Borings WFE-12, K-125.5, K-125.6
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

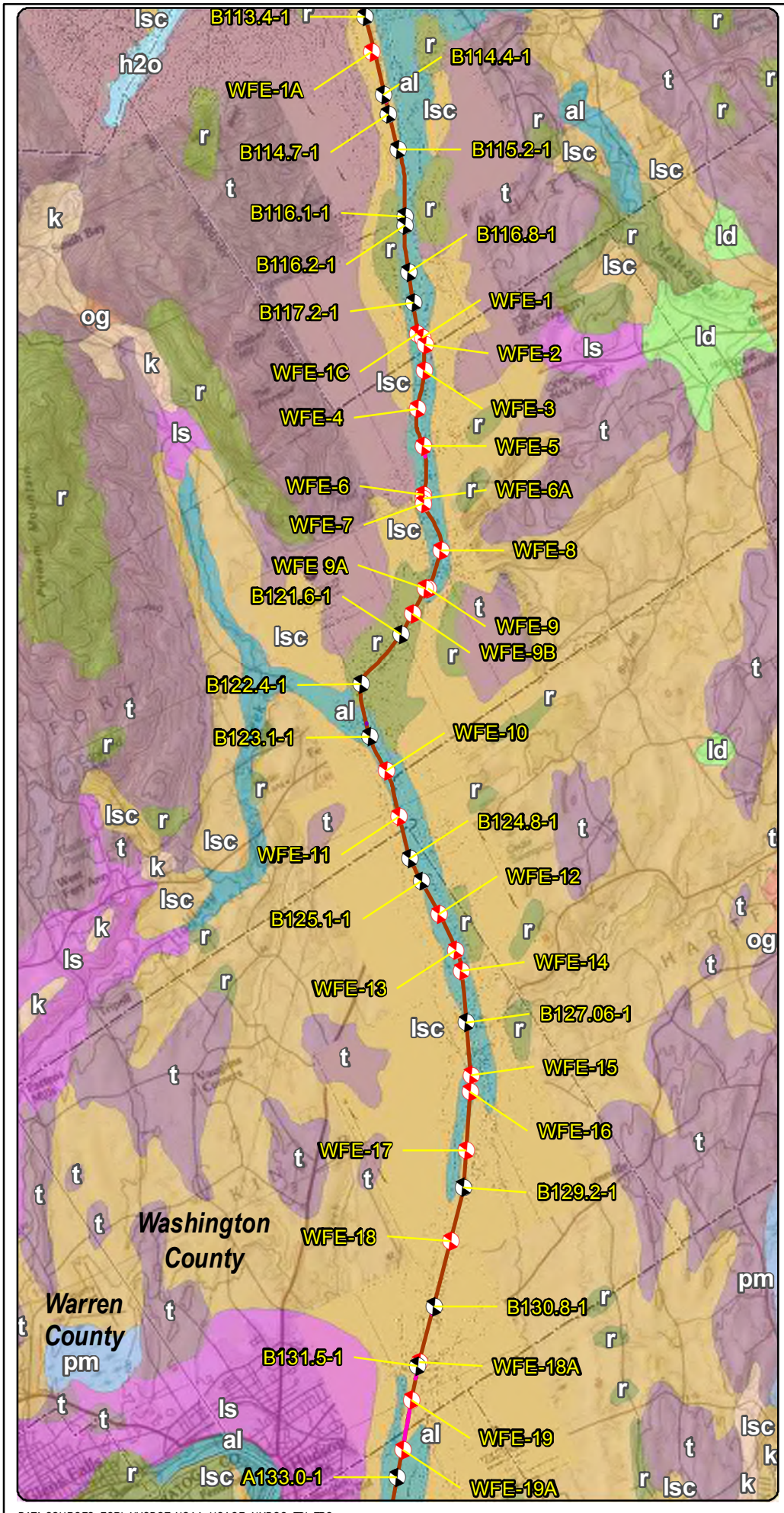
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

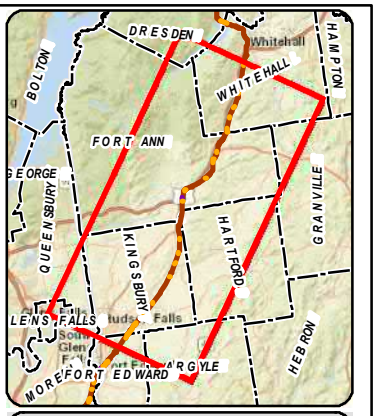
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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 Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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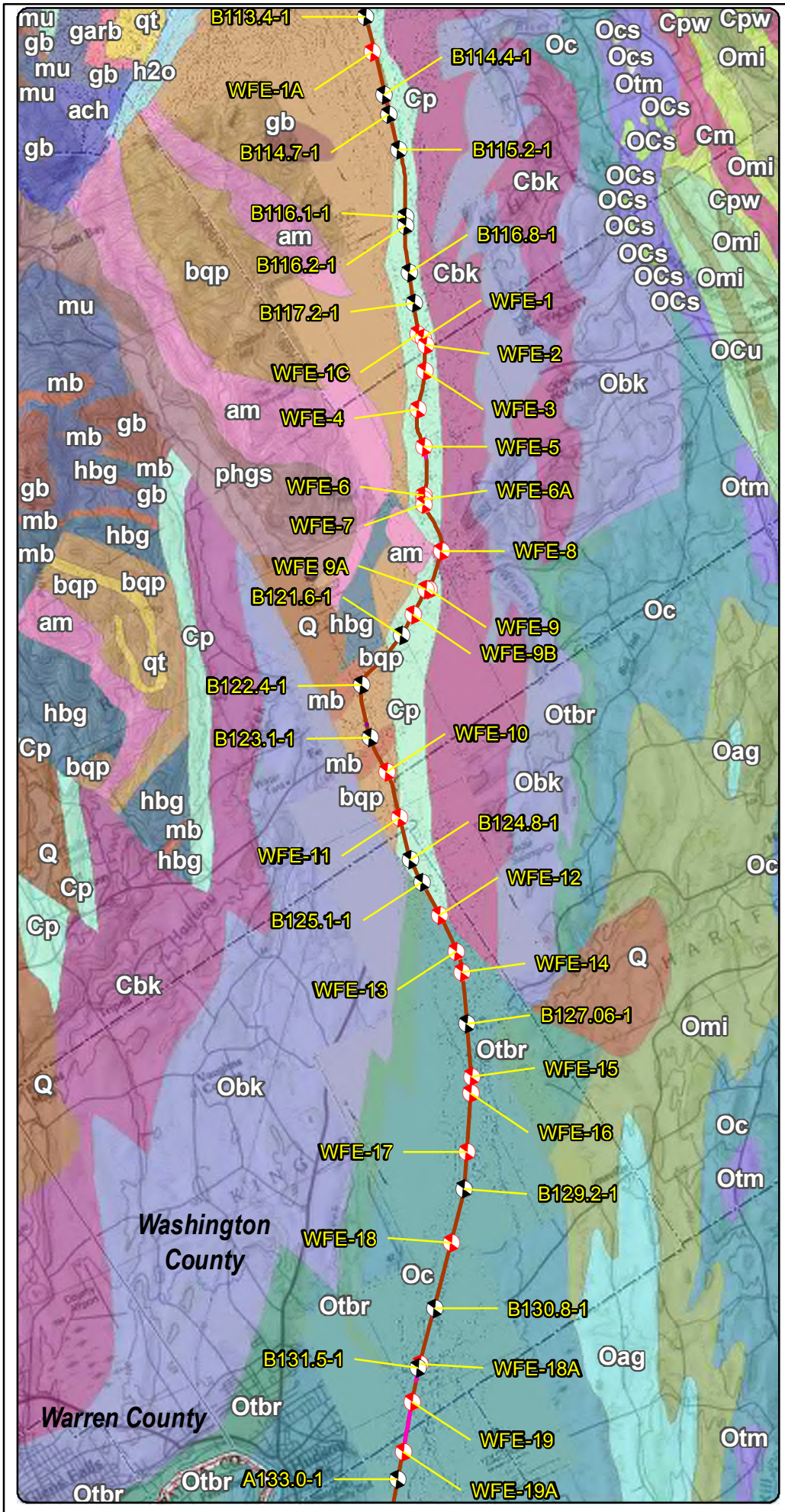

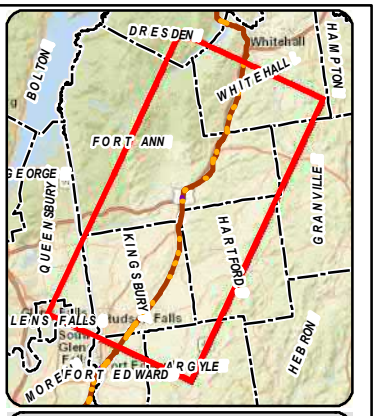

LEGEND

- 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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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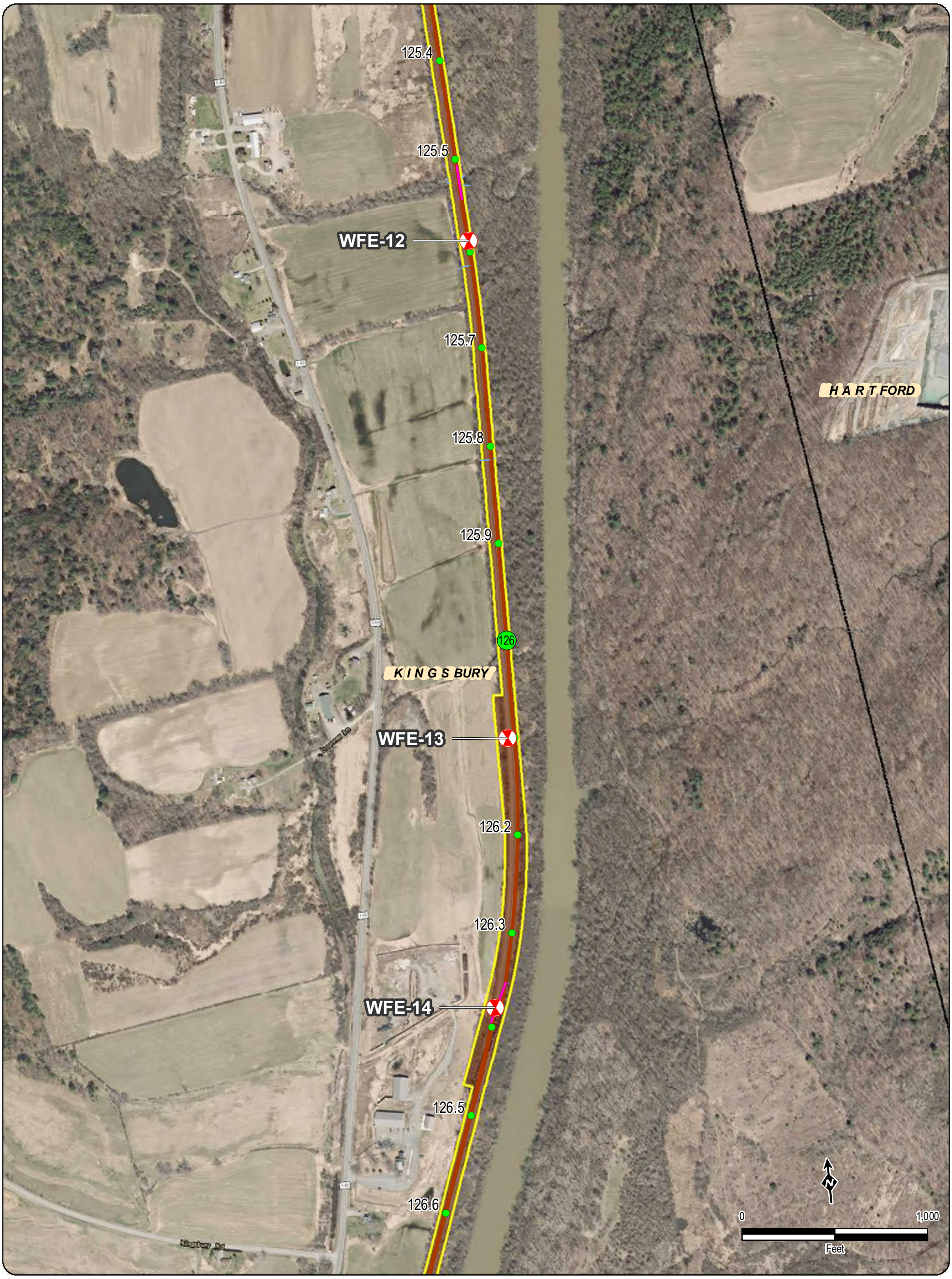

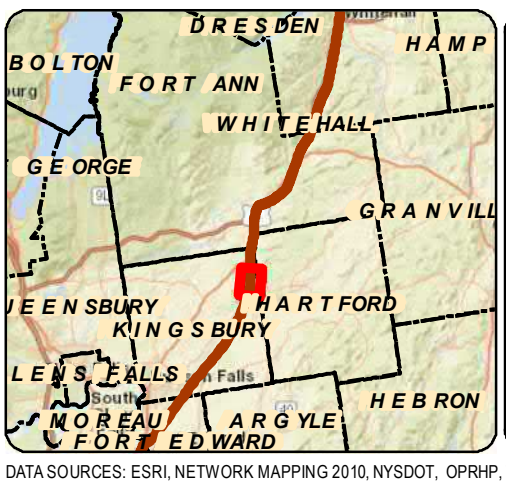

LEGEND

- 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

Whitehall to Fort Edward

Figure A-3

Sheet 11 of 16

Prepared by: AECOM 5/19/2021

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AECOM

BORING LOG

BORING CONTRACTOR: ADT	SHEET 1 OF 1
DRILLER: Chris Chaillou	PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Chris French	PROJECT NO.: 60323056
LOCATION: MP - 125.6 (CP Rail)	HOLE NO.: **WFE-12**
	START DATE: 1/7/21
	FINISH DATE: 1/7/21
	OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
Water at 11' (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						SAND	0'-0.5'; Brown fine-coarse SAND, some angular gravel, little silt; loose, moist
1.0											SW		0.5'-5.0'; Brown fine-medium SAND, little coarse sand, trace silt
2.0													
3.0		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0		5'-7'	S-2	24"	8"	4	4	5	7	6	ML	CLAYEY SILT	Brown clayey SILT; medium stiff, moist
6.0													
7.0		7'-9'	S-3	24"	24"	8	9	10	8	7	ML/SM		Brown and Gray SILT, little clay, little fine sand; stiff, moist
8.0													TR-2; (8.0'-8.5')
9.0		9'-11'	S-4	24"	24"	10	9	10	23	12	ML/SM		SAA
10.0													
11.0											SP/SM	SAND	10.7'-11.0'; Brown fine SAND, little silt, medium dense; moist
		11'-13'	S-5	24"	16"	11	9	7	7	10	SP		Brown medium SAND, little fine sand, trace silt; loose, saturated
12.0													TR-3; (12.0'-12.5')
13.0		13'-15'	S-6	24"	18"	6	7	7	8	9	SP		SAA
14.0													
15.0		15'-17'	S-7	24"	18"	3	8	8	10	10	SP		Gray medium SAND, little fine sand, trace silt; very loose, saturated
16.0													TR-4; (16.0'-16.5')
17.0													WFE-12 terminated at 17' then 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: 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.

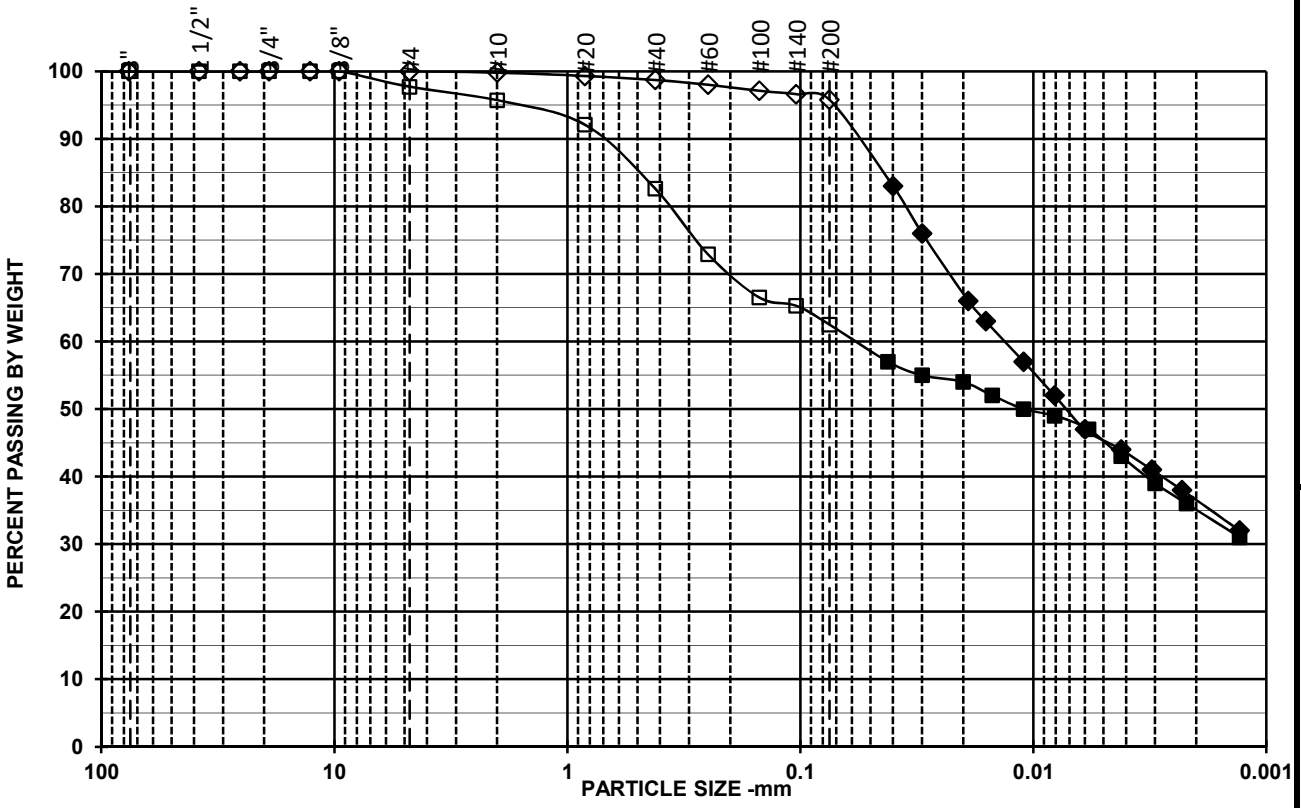
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

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

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	23.5	49	20	29	CL		Brown, Sandy lean clay	04/22/21
◇	28.3				CL		Brown, Lean clay	04/26/21
○								

Symbol	□	◇	○
Boring	WFE-12	WFE-12	
Sample	S-2	S-4	
Depth	5-7	9-11	
% +3"	0	0	
% Gravel	2.3	0	
% SAND	35.2	4.2	
%C SAND	2	0.2	
%M SAND	13.1	1.1	
%F SAND	20.1	2.9	
% FINES	62.5	95.8	
D_{100} (mm)	9.53	4.75	
D_{60} (mm)	0.058	0.013	
D_{30} (mm)			
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	
4"	100.0	100.0	
3"	100.0	100.0	
1 1/2"	100.0	100.0	
1"	100.0	100.0	
3/4"	100.0	100.0	
1/2"	100.0	100.0	
3/8"	100.0	100.0	
#4	97.7	100.0	
#10	95.7	99.8	
#20	92.1	99.3	
#40	82.6	98.7	
#60	72.9	98.0	
#100	66.5	97.1	
#140	65.3	96.6	
#200	62.5	95.8	
5μ m	45	46	
2μ m	35	37	
1μ m	29	29	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Boring Location Plans Page 7 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/21/2022** Finish Date: **1/21/2022**

Boring No.: **K-125.5** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/21/2022	AM	DRY	OPEN
1/21/2022	AM	*13.3'	9.0'
1/21/2022	PM	*17.8'	9.0'

Coordinates
Northing **760754.315**
Easting **1658219.899**

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

Ground Elev.: **137.002**

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	17 4 4 3	0.2	2" TOPSOIL & ORGANIC MATERIAL	9
2								Greyish-Black cmf SAND; some DEBRIS (cinders); trace SILT (frozen, non-plastic) SW FILL	
3		2	2.0	4.0	SS	4 7 7 6		Black cmf SAND; and DEBRIS (cinders); trace m GRAVEL; trace SILT (wet, non-plastic) SW FILL	8
4							4.0		
5		3	4.0	6.0	SS	5 4 4 4		Orangish-Brown SILT; trace f SAND (saturated, non-plastic) ML w = 21.4%, LL = NP, PL = NP, PI = NP	10
6							6.0		
7		4	6.0	8.0	SS	3 2 4 4		NO RECOVERY	0
8							8.0		
9		5	8.0	10.0	SS	1 2 2 2		Grey CLAY; trace SILT (wet, plastic) CH w = 27.5%	16
10	WET ROTARY								
11							11.0		
12								Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	4 9 14 12		Greyish-Black mf+ SAND; trace SILT (saturated, non-plastic) SP-SM % Fines = 7.7%	12
15									
16									
17							17.0		
18									
19		7	19.0	21.0	SS	WR WH/18"		Grey CLAY; trace SILT (saturated, plastic) CH w = 51.5%	24
20									
21									
22									
23									
24		8	24.0	26.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH	20
25									

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

Drillers: **Mark Childs; John Trathen**

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

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-125.5** Report No.: **CD10279D-01-03-22** 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)
28		9	28.0	30.0	SS	1 1 2 2		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace mf SAND (saturated, plastic) CH w = 38.0%, LL = 70, PL = 21, PI = 49 % Fines = 94.0%	24
34		10	34.0	36.0	SS	WR WH/18"		Grey CLAY; trace SILT (saturated, plastic) CH	22
							37.0		
39		11	39.0	41.0	SS	WH/24"		Orangish-Brown SILT; trace f SAND; trace ORGANIC MATERIAL (roots) (saturated, non-plastic) ML	14
							41.0		
								Boring terminated at 41.0 feet. Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classifications. 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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/24/2022** Finish Date: **1/25/2022**

Boring No.: **K-125.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/25/2022	PM	*7.9'	10.0'

Coordinates
Northing **760776.207**
Easting **1657836.86**

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

Ground Elev.: **136.928**

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	7 8 4 9		Whitish-Grey cmf SAND; trace f GRAVEL; trace SILT (moist, non-plastic) SW FILL	6
2									
3		2	2.0	4.0	SS	5 8 8 9		Brownish-Black mf SAND; trace SILT (moist, non-plastic) SP FILL	6
4							4.0		
5		3	4.0	6.0	SS	6 8 8 5		Brown mf+ SAND; and SILT (moist, non-plastic) SM w = 17.8% % Fines = 48.0%	12
6							6.0		
7		4	6.0	8.0	SS	9 6 5 4		Greyish-Brown f SAND; little SILT; little CLAY (wet, slightly plastic) SM-SC	16
8							8.0		
9		5	8.0	10.0	SS	5 5 6 9		Brownish-Grey CLAY; trace mf SAND; trace SILT (moist, plastic) CL w = 24.7%, LL = 50, PL = 22, PI = 28	8
10	WET ROTARY								
11							11.0		
12								Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	8 7 6 8		Grey mf SAND; trace SILT (wet, non-plastic) SP	10
15									
16									
17							17.0		
18									
19		7	19.0	21.0	SS	WH/24"		Grey CLAY; little SILT; trace mf SAND (wet, plastic) CH w = 49.2%	24
20									
21									
22									
23									
24		8	24.0	26.0	SS	WH/24"		Grey CLAY; little SILT (saturated, plastic) CH	20
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-125.6** Report No.: **CD10279D-01-03-22** 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%	
28		ST-1	28.0	30.0	SS	WH/24"		(3" Brass Lined Split Spoon) Similar Soil (saturated, plastic) CH w = 49.4%, LL = 60, PL = 20, PI = 40 % Fines = 100.0%	24
34		9	34.0	36.0	SS	WH/24"		Similar Soil (saturated, plastic) CH	24
38		10	38.0	40.0	SS	WH/24"		Similar Soil (saturated, plastic) CH	24
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 classifications.
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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								
	S-12	39.0 - 41.0	Black c-m+f SAND; trace SILT; trace f GRAVEL	4.8	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-15	54.0 - 56.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	9.4	27.2	NP	NP	NP	--	--	--	--	--	--	--	--
K-122.4	S-5	8.0 - 10.0	Brown SILT; and mf- SAND	57.0	24.8	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey mf+ SAND; trace SILT	--	17.5	--	--	--	--	--	--	--	--	--	--	--
	S-13	49.0 - 51.0	Greyish-Black c-mf SAND; little SILT; trace mf GRAVEL	19.0	21.7	--	--	--	--	--	--	--	--	--	--	--
	S-16	58.0 - 60.0	Greyish-Black cm+f SAND; trace SILT	1.7	9.9	--	--	--	--	--	--	--	--	--	--	--
K-123.2	S-3	4.0 - 6.0	Brown SILT; little mf SAND; trace CLAY	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown f SAND; some SILT	--	31.3	--	--	--	--	--	--	--	--	--	--	--
	S-6	10.0 - 12.0	Grey CLAY; little SILT; trace f SAND	--	28.4	48	20	28	--	--	--	--	--	--	--	--
	S-8	19.0 - 21.0	Grey c-m+f SAND; trace SILT	10.0	29.8	--	--	--	--	--	--	--	--	--	--	--
	S-10	28.0 - 30.0	Grey CLAY; little SILT; trace f SAND	97.0	65.5	67	21	46	--	--	--	--	--	--	--	--
	ST-1	30.0 - 32.0	Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	1,400	15	8.24	5,418	--	--	--
K-123.7	S-3	4.0 - 6.0	Mottled Blackish-Grey CLAY; trace SILT; trace f SAND; trace ORGANIC MATERIAL (roots)	--	41.4	--	--	--	7.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Mottled Orangish-Grey CLAY; trace SILT	100.0	25.9	79	23	56	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT	100.0	48.4	73	20	53	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Grey CLAY; trace SILT	--	37.3	--	--	--	--	--	--	--	--	--	--	--
K-123.8	S-3	4.0 - 6.0	Orangish-Brown cmf+ SAND; little SILT	16.0	18.1	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	--	66.5	54	23	31	6.9	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Mottled Orangish-Greyish-Brown CLAY; trace SILT	100.0	37.2	67	18	49	--	--	--	--	--	--	--	--
	S-11	40.0 - 42.0	Bluish-Grey CLAY; trace SILT	--	33.5	--	--	--	--	--	--	--	--	--	--	--
K-125.5	S-3	4.0 - 6.0	Orangish-Brown SILT; trace f SAND	--	21.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Grey CLAY; trace SILT	--	27.5	--	--	--	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Black mf+ SAND; trace SILT	7.7	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	51.5	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0 - 30.0	Grey CLAY; trace SILT; trace mf SAND	94.0	38.0	70	21	49	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-125.6	S-3	4.0 - 6.0	Brown mf+ SAND; and SILT	48.0	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Brownish-Grey CLAY; trace mf SAND; trace SILT	--	24.7	50	22	28	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; little SILT; trace mf SAND	--	49.2	--	--	--	--	--	--	--	--	--	--	--
	ST-1	28.0 - 30.0	Grey CLAY; little SILT	100.0	49.4	60	20	40	--	--	--	--	--	--	--	--
K-127.0	S-3	4.0 - 6.0	Brown CLAY; and SILT; trace f SAND	--	32.8	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown CLAY; and SILT; trace f SAND	--	31.3	51	22	29	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Brown mf+ SAND; some SILT	25.0	22.8	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT; trace mf SAND	96.0	81.7	72	20	52	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT; trace mf SAND	--	--	--	--	--	--	7,100	35	8.75	1,548	--	--	--
	S-11	39.0 - 41.0	Grey CLAY; trace SILT; trace mf SAND	--	63.9	--	--	--	--	--	--	--	--	--	--	--
K-127.1	S-3	4.0 - 6.0	Blackish-Brown SILT; some CLAY; some mf SAND; trace DEBRIS (cinders); trace ORGANIC MATERIAL (root hairs)	--	30.7	34	22	12	4.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	4.4	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	71.7	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT	100.0	58.0	68	19	49	--	--	--	--	--	--	--	--
K-127.9	S-3	4.0 - 6.0	Brownish-Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	300	65	7.93	1,170	--	--	--
	S-4	6.0 - 8.0	Brownish-Grey CLAY; little SILT; trace f SAND	95.0	30.0	70	25	45	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Brown CLAY; trace f SAND; trace SILT	--	32.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Greyish-Brown CLAY; trace SILT	--	28.8	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	30.0	30	17	13	--	--	--	--	--	--	--	--
K-128.0	S-5	8.0 - 10.0	Brownish-Grey CLAY; some mf SAND; trace SILT	--	28.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	100.0	39.2	78	23	55	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	51.2	43	18	25	--	--	--	--	--	--	--	--
K-129.9A	S-5	8.0 - 10.0	Brown SILT; some mf SAND; little ORGANIC MATERIAL (root hairs)	24.0	134.2	NP	NP	NP	16.8	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf+ SAND; little SILT	20.0	31.1	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT		52.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	41.0 - 43.0	Grey CLAY; trace SILT	100.0	40.5	44	20	24	--	--	--	--	--	--	--	--

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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

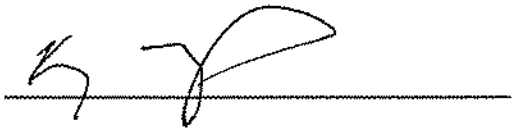
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-122.35	S-3	4-6	23.5
	S-8	24-26	23.8
	S-12	39-41	17.8
	S-15	54-56	27.2
K-123.2	S-3 [1]	4-6	22.3
	S-4	6-8	31.3
	S-6	10-12	28.4
	S-8	19-21	29.8
	S-10	28-30	65.5
K-123.7	S-3	4-6	41.4
	S-6	14-16	25.9
	S-9	28-30	48.4
	S-11	40-42	37.3
K-123.8	S-3	4-6	18.1
	S-6	14-16	66.5
	S-9	28-30	37.2
	S-11	40-42	33.5

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-125.5	S-3	4-6	21.4
	S-5	8-10	27.5
	S-7	19-21	51.5
	S-9	28-30	38.0
K-127.0	S-3	4-6	32.8
	S-4	6-8	31.2
	S-6	14-16	22.8
	S-9	30-32	81.7
	S-11	39-41	63.9
K-127.1	S-3	4-6	30.7
	S-7	19-21	71.7
	S-9	30-32	58.0

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

Reviewed By:  Date: 01/31/22

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-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

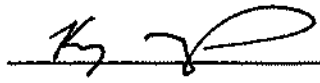
TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-1.6A	S-3	6-8	6.8
	S-6 [1]	19-21	25.3
	S-8	28-30	33.3
K-122.4	S-5	8-10	24.8
	S-9 [1]	29-31	17.5
	S-13 [1]	49-51	21.7
	S-16	58-60	9.9
K-125.6	S-3	4-6	17.8
	S-5	8-10	24.7
	S-7	19-21	49.2
	ST-1	28-30	49.4
K-127.9	S-4	6-8	30.0
	S-6	14-16	32.4
	S-8	24-26	28.8
	ST-1	38-40	30.0
K-128.0	S-5	8-10	28.0
	S-7	19-21	39.2
	S-9	29-31	30.3
	ST-1	38-40	51.2

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-129.9A	S-5	8-10	134.2
	S-8	24-26	31.1
	S-10	34-36	52.6
	ST-1	41-43	40.5
K-129.9B	S-6	14-16	88.0
	S-8	24-26	18.3
	ST-1	27-29	51.2
	S-10	34-36	50.8

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

Reviewed By:  Date: 02/07/22

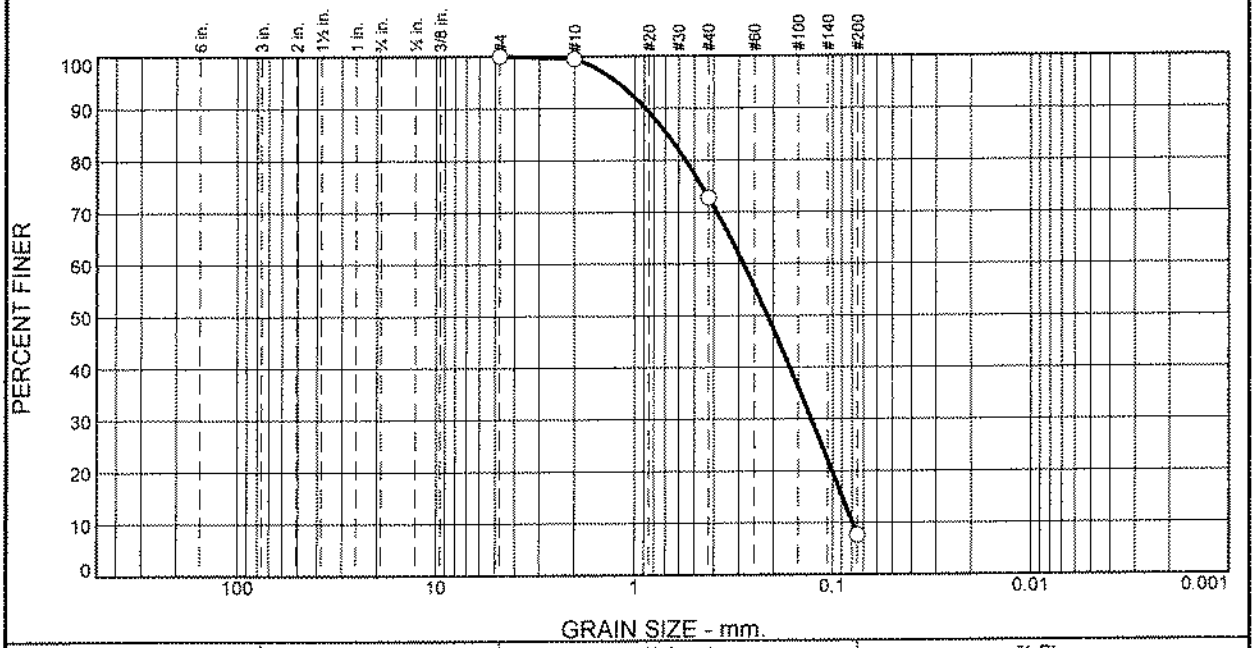
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-125.5, S-6 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 14-16'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	27	65	8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	73		
#200	7.7		

* (no specification provided)

Soil Description

Greyish Black mf+ SAND; trace SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.6869 D_{60}= 0.2840 D_{50}= 0.2147
D_{30}= 0.1286 D_{15}= 0.0894 D_{10}= 0.0793
C_u= 3.58 C_c= 0.73

Classification

USCS= AASHTO=

Remarks

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 01/31/22

ATLANTIC TESTING LABORATORIES

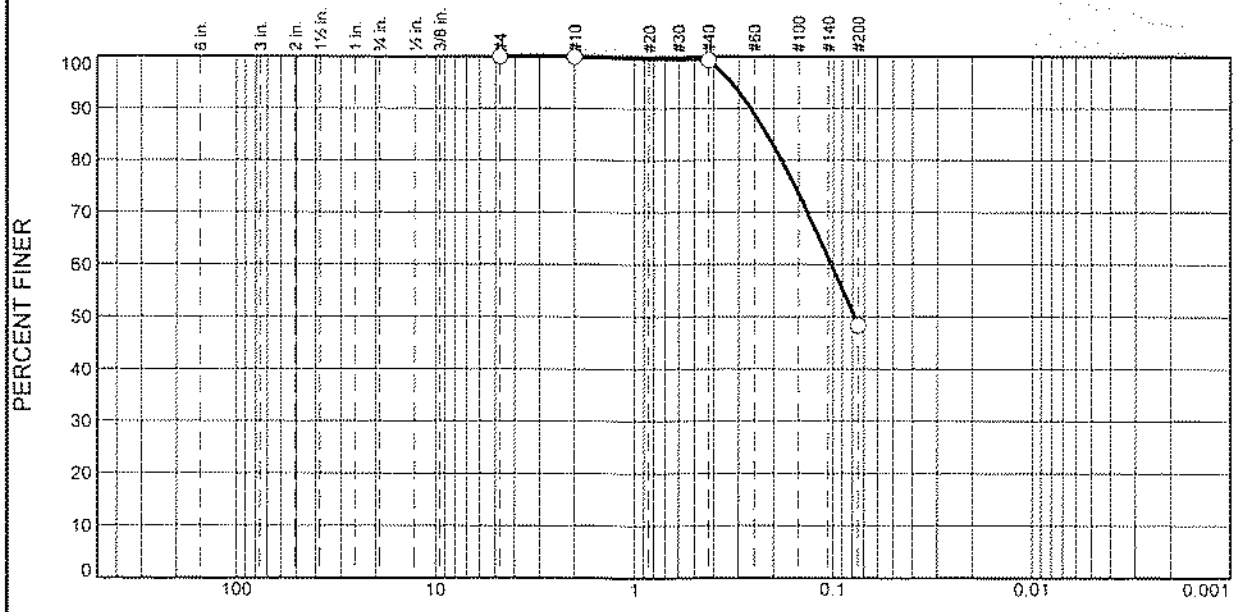
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-02-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/07/22

Sample No: K-125.6, S-3 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 4-6'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	51	48	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	99		
#200	48		

Soil Description

Brown mf- SAND; and SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.2168 D_{60}= 0.1026 D_{50}= 0.0785

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

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 17.8%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/07/22

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-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Test Date:**	January 25, 2022
	Various Locations, New York	**Performed By:**	R. Parrow

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-123.2	S-10	28-30	A	10	107.62	97
K-123.7	S-6	14-16	A	10	78.62	100
K-123.7	S-9	28-30	A	10	120.67	100
K-123.8	S-9	28-30	A	10	219.15	100
K-125.5	S-9	28-30	A	10	219.28	94
K-127.0	S-9	30-32	A	10	119.17	96
K-127.1	S-9	30-32	A	10	124.57	100

Reviewed By: _____ Date: January 31, 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-02-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 7, 2022
	United Cable Installation	**Test Date:**	February 3, 2022
	Various Locations, New York	**Performed By:**	M. White

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-117.6-1.6A	S-8	28-30	A	10	672.08	70
K-122.4	S-5	8-10	A	10	339.75	57
K-125.6	ST-1	28-30	A	10	257.41	100
K-127.9	S-4	6-8	A	10	164.08	95
K-127.9	ST-1	38-40	A	10	392.67	100
K-128.0	S-7	19-21	A	10	163.31	100
K-128.0	ST-1	38-40	A	10	216.36	100
K-129.9A	S-5	8-10	A	10	136.68	24
K-129.9A	ST-1	41-43	A	10	240.79	100
K-129.9B	ST-1	27-29	A	10	186.13	100

Reviewed By: _____ Date: February 7, 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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-122.35	S-3	NP	NP	NP
K-122.35	S-15	NP	NP	NP
K-123.2	S-6	48	20	28
K-123.2	S-10	67	21	46
K-123.7	S-6	79	23	56
K-123.7	S-9	73	20	53
K-123.8	S-6	54	23	31
K-123.8	S-9	67	18	49
K-125.5	S-3	NP	NP	NP
K-125.5	S-9	70	21	49
K-127.0	S-4	51	22	29
K-127.0	S-9	72	20	52
K-127.1	S-3	34	22	12
K-127.1	S-9	68	19	49

SAMPLE INFORMATION

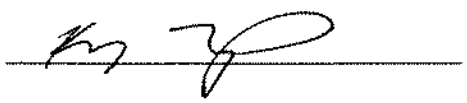
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-122.35	S-3	2	5	23.5
K-122.35	S-15	4.76	52	27.2
K-123.2	S-6	2	1	28.4
K-123.2	S-10	6.35	1	65.5
K-123.7	S-6	0.297	0	25.9
K-123.7	S-9	0.297	0	48.4
K-123.8	S-6	2	7	66.5
K-123.8	S-9	0.297	0	37.2
K-125.5	S-3	2	5	21.4
K-125.5	S-9	9.51	2	38.0
K-127.0	S-4	2	2	31.2
K-127.0	S-9	9.51	2	81.7
K-127.1	S-3	6.35	24	30.7
K-127.1	S-9	2	1	58.0

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-122.35	S-3	Air Dry	Pulverizing and Screening
K-122.35	S-15	Air Dry	Pulverizing and Screening
K-123.2	S-6	Air Dry	Pulverizing and Screening
K-123.2	S-10	Air Dry	Pulverizing and Screening
K-123.7	S-6	Air Dry	Not Necessary
K-123.7	S-9	Air Dry	Not Necessary
K-123.8	S-6	Air Dry	Pulverizing and Screening
K-123.8	S-9	Air Dry	Not Necessary
K-125.5	S-3	Air Dry	Pulverizing and Screening
K-125.5	S-9	Air Dry	Pulverizing and Screening
K-127.0	S-4	Air Dry	Pulverizing and Screening
K-127.0	S-9	Air Dry	Pulverizing and Screening
K-127.1	S-3	Air Dry	Pulverizing and Screening
K-127.1	S-9	Air Dry	Pulverizing and Screening

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: 01/31/22

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-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-1.6A	S-6	46	20	26
K-117.6-1.6A	S-8	47	19	28
K-122.4	S-5	NP	NP	NP
K-125.6	S-5	50	22	28
K-125.6	ST-1	60	20	40
K-127.9	S-4	70	25	45
K-127.9	ST-1	30	17	13
K-128.0	S-7	78	23	55
K-128.0	ST-1	43	18	25
K-129.9A	S-5	NP	NP	NP
K-129.9A	ST-1	44	20	24
K-129.9B	S-6	96	49	47
K-129.9B	ST-1	55	20	35

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-1.6A	S-6	4.76	19	25.3
K-117.6-1.6A	S-8	6.35	28	33.3
K-122.4	S-5	2	5	24.8
K-125.6	S-5	0.42	2	24.7
K-125.6	ST-1	0.177	0	49.4
K-127.9	S-4	2	13	30.0
K-127.9	ST-1	0.177	0	30.0
K-128.0	S-7	0.149	0	39.2
K-128.0	ST-1	0.177	0	51.2
K-129.9A	S-5	2	25	134.2
K-129.9A	ST-1	0.177	0	40.5
K-129.9B	S-6	0.841	9	88.0
K-129.9B	ST-1	0.177	0	51.2

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-1.6A	S-6	Air Dry	Pulverizing and Screening
K-117.6-1.6A	S-8	Air Dry	Pulverizing and Screening
K-122.4	S-5	Air Dry	Pulverizing and Screening
K-125.6	S-5	Air Dry	Pulverizing and Screening
K-125.6	ST-1	Air Dry	Not Necessary
K-127.9	S-4	Air Dry	Pulverizing and Screening
K-127.9	ST-1	Air Dry	Not Necessary
K-128.0	S-7	Air Dry	Not Necessary
K-128.0	ST-1	Air Dry	Not Necessary
K-129.9A	S-5	Air Dry	Pulverizing and Screening
K-129.9A	ST-1	Air Dry	Not Necessary
K-129.9B	S-6	Air Dry	Pulverizing and Screening
K-129.9B	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: 02/07/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 16 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 16 is STA 20499+00 (43.359146° N, 73.494706° 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, 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 16
Borings B127.06-1, K-127.0,
K-127.1
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

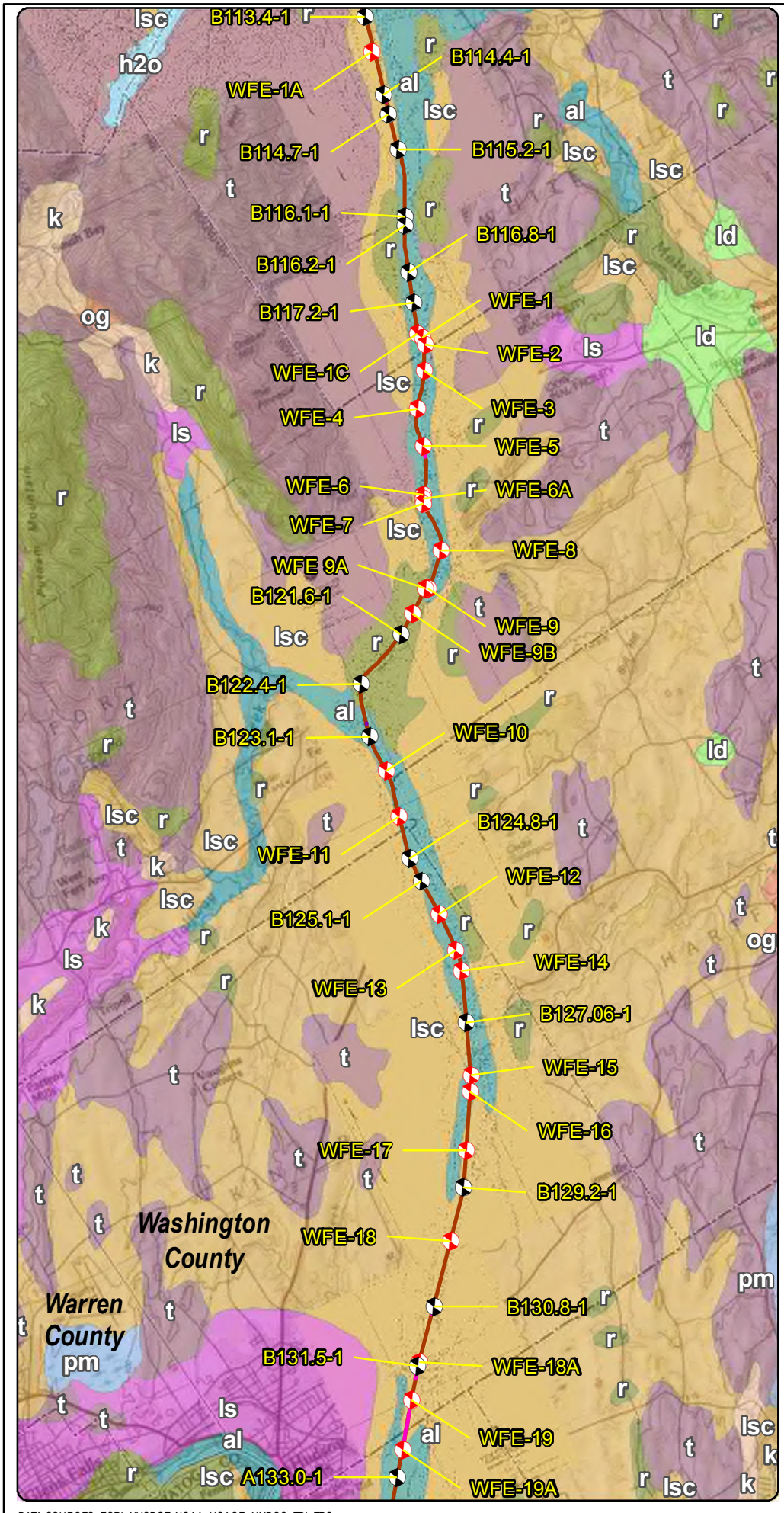
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

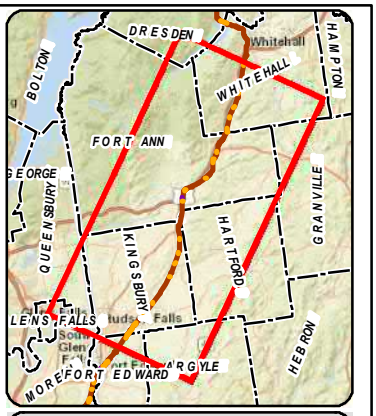
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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

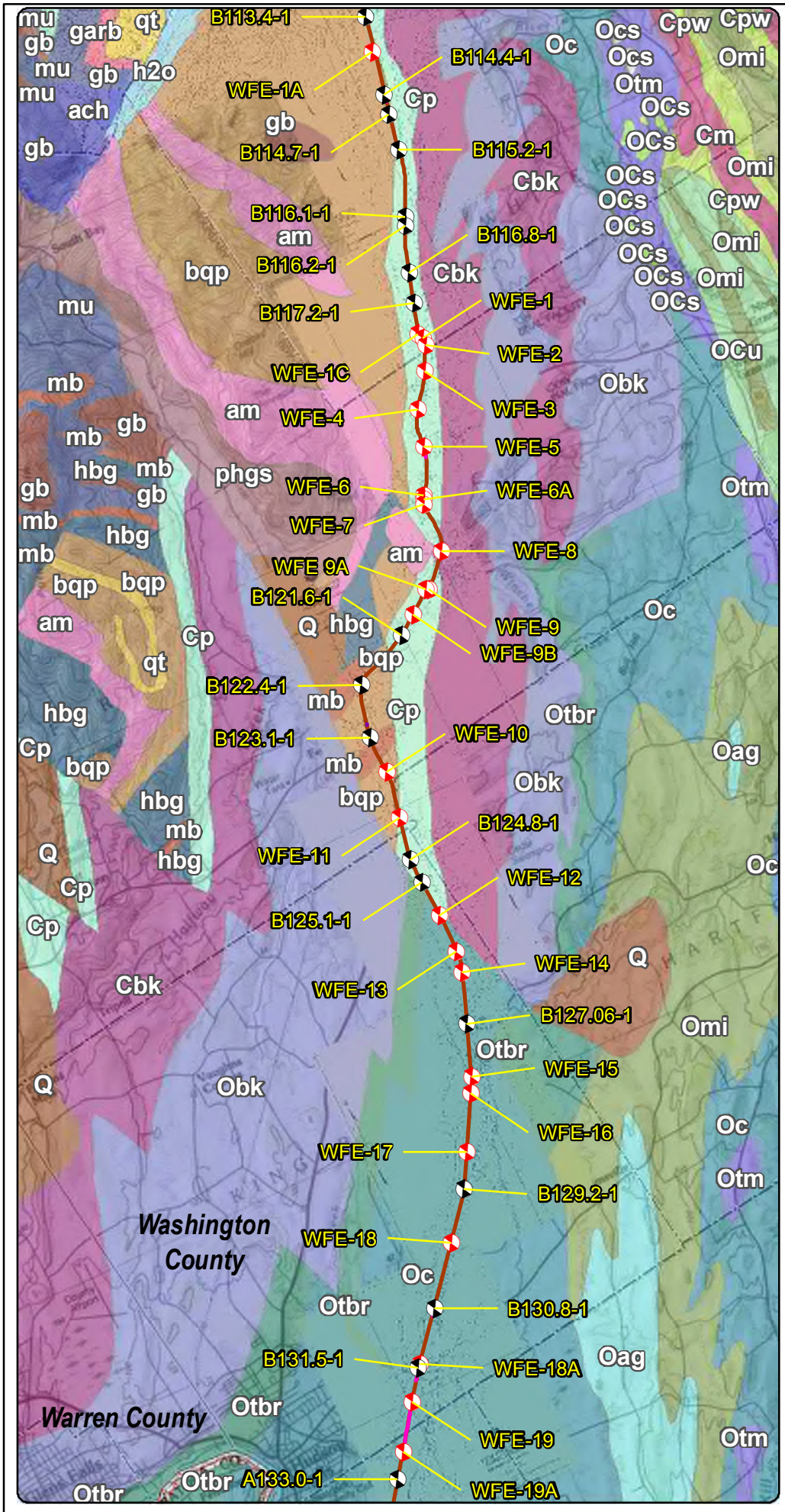
Champlain Hudson Power Express Inc.

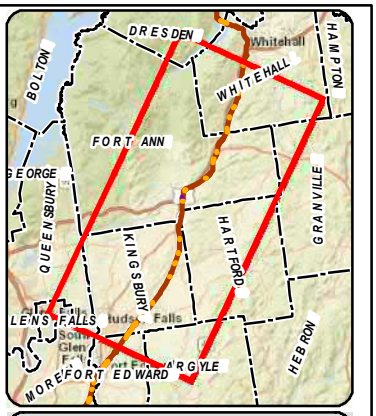
Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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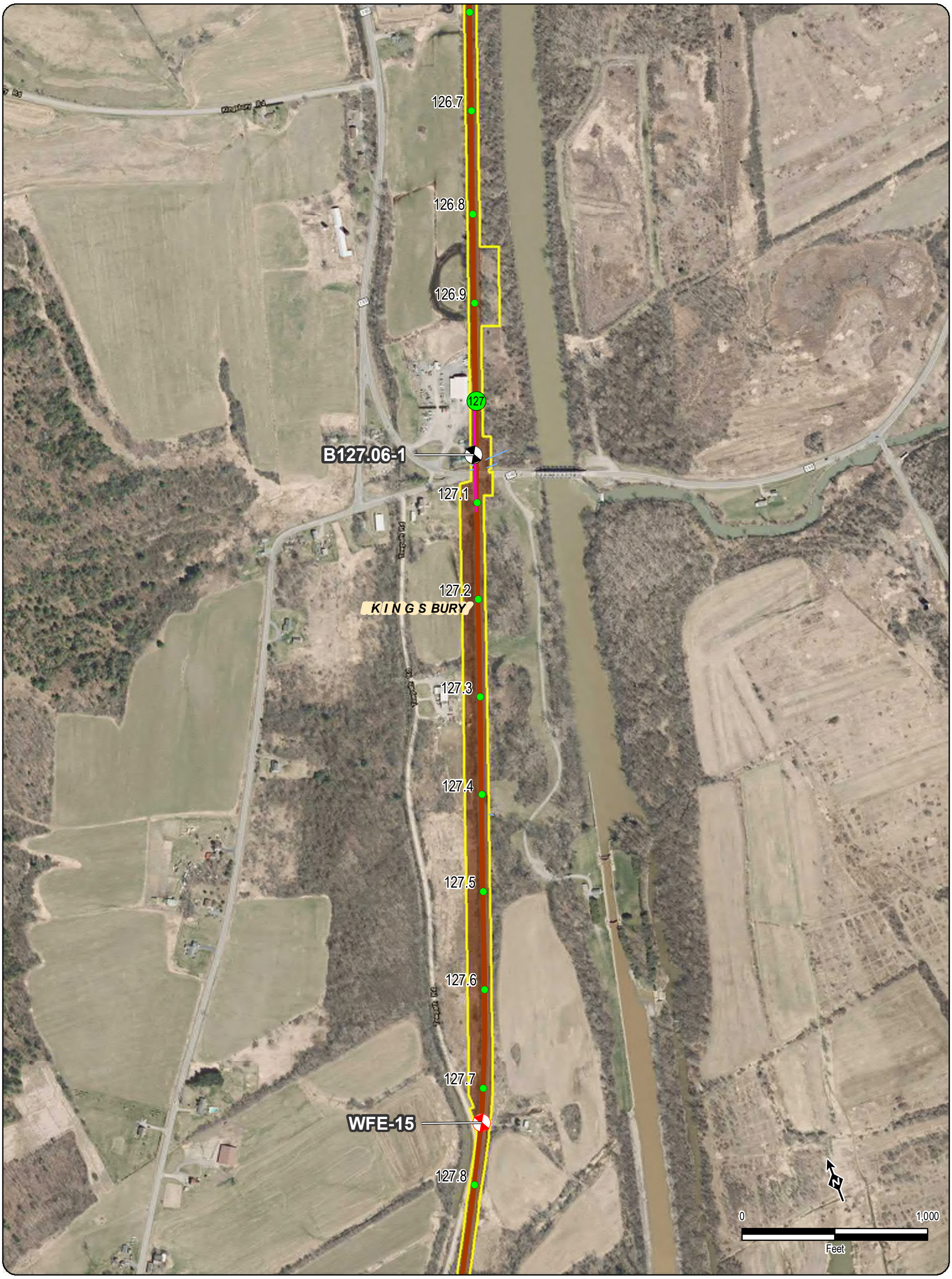

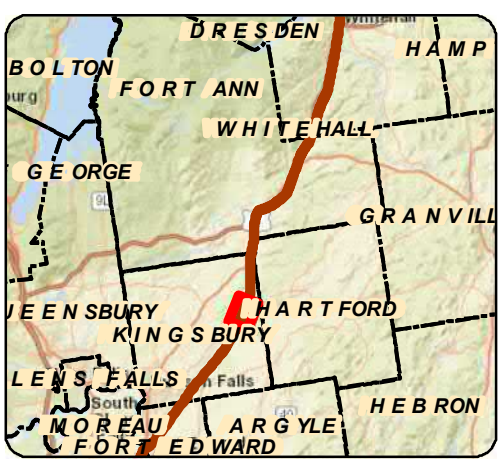

111.8 Certified Milepost - Tenths
135 Certified Milepost
111.8 Preferred Alternative Milepost - Tenths
135 Preferred Alternative Milepost
Terrestrial Route HVDC
Submarine Route HVDC
Terrestrial Route HVAC
Preliminary HDD Locations
Preliminary Pipe Bridge Location
2021 Boring Location
Previous (2013) 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

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

Whitehall to Fort Edward

Figure A-3

Sheet 12 of 16

Prepared by: AECOM 5/19/2021

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TEST BORING LOG

BORING	**B127.06-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

GROUNDWATER DATA			
FIRST ENCOUNTERED 2.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	30.0 '

DRILLER	J. MEHALICK
HELPER	M. KERLIN
INSPECTOR	J. STAPLETON
DATE STARTED	01/07/2013
DATE COMPLETED	01/07/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 6 4 3		***DARK BROWN SILT, TR TO SM F/ SAND, TR F/ GRAVEL (FILL)***		
	S-2	3 2 3 3		2.0 ***BROWN F/ GRAVEL-SIZED ROCK FRAGMENTS, SM CLAY, SM SILT, TR F/ SAND (FILL)*** 4.0		
5	S-3	4 3 4 5			26.8	
	S-4	5 8 10 9		***BROWN CLAY, TR SILT, TR F/M SAND***		
10	S-5	10 12 13 13			29.3	
				13.5		
15	S-6	6 7 13			24.7	
				BROWN SILT, TR TO SM F/ SAND		
20	S-7	4 2 2				
				23.5		
25	S-8	1 1 1			61.2	
				GRAY CLAY, TR SILT		
30	S-9	1 1 1		30.0		
				END OF BORING AT 30'		
35						

DRN.	CMP
CKD.	PWK

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

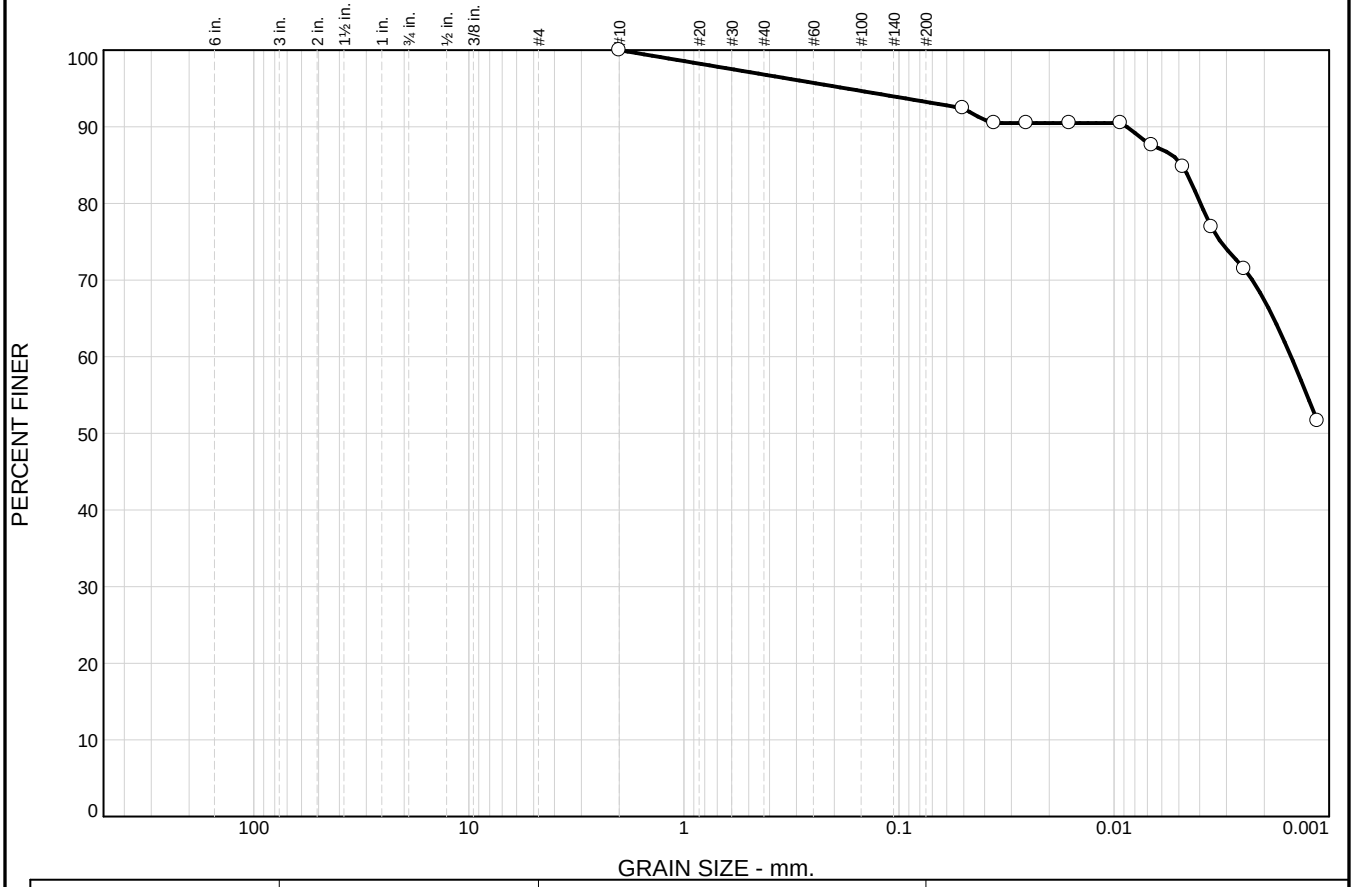
SAMPLE IDENTIFICATION			Soil Group (USCS System)	GRAIN SIZE DISTRIBUTION				PLASTICITY				Specific Gravity	Moisture Content (%)	Unit Weight (pcf)	Compressive Strength (tsf)	Organic Content (%)
Boring #	Sample #	Depth (ft)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index)					
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	36.7	-	-	-
	S-6	13.5-15.0	-	0.4	36.8	62.8		-	-	-	-	-	29.0	-	-	-
	S-7	18.5-20.0	-	-	-	-	-	-	-	-	-	-	23.8	-	-	-
B124.8-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	13.7	-	-	-
	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	22.6	107.1	-	-
	S-5	8.0-10.0	-	0.0	22.1	77.9		-	-	-	-	-	6.2	-	-	-
B125.1-1	S-1	0.0-2.0	SW-SM	29.5	60.3	10.2		-	-	-	-	-	17.9	-	-	-
	S-2	2.0-4.0														
	S-5	8.0-10.0	SP-SM	0.3	90.5	9.2		-	-	-	-	-	19.1	-	-	-
	S-6	13.5-15.0														
	S-8	23.5-25.0	CH	-	-	-	-	53	25	28	0.1	-	29.1	-	-	-
B127.06-1	S-3	4.0-6.0	-	-	-	-	-	-	-	-	-	-	26.8	-	-	-
	S-5	8.0-10.0	-	0.0	6.7	7.8	85.5	-	-	-	-	2.80	29.3	-	-	-

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-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	61.2	-	-	-
B129.2-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	39.1	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	62.5	60.1	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	42.1	80.5	-	-
B130.8-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	33.2	-	-	-
	S-6	13.5-15.0	CL	-	-	-	-	35	17	18	1.6	-	45.7	-	-	-
	S-7	18.5-20.0														
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	23.8	-	-	-
B131.5-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	21.7	-	-	-
	S-3	4.0-6.0	CL	-	-	-	-	48	23	25	0.3	-	30.0	97.0	-	-
	S-5	8.0-10.0	-	0.0	14.2	85.8		-	-	-	-	-	34.7	-	-	-
	S-6	13.5-15.0	CL	0.0	15.7	41.0	43.3	47	21	26	0.2	2.74	25.5	-	-	-

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	3.2	3.5	7.8	85.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			0.0048	0.0015						

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

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

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B127.06-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

TRC Engineers, Inc.

Mt. Laurel, NJ

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

Figure 26

Tested By: TBT 02/26/13 **Checked By:** _____

Boring Location Plans Page 8 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/14/2022** Finish Date: **1/14/2022**

Boring No.: **K-127.0** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/14/2022	AM	4.2'	8.0'
1/14/2022	AM	*3.3'	9.0'
1/14/2022	PM	*9.9'	9.0'

Coordinates
Northing **759451.404**
Easting **1650434.627**

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

Ground Elev.: **141.47**

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	16 11 6 5	0.7	8" TOPSOIL & ORGANIC MATERIAL	12
2								Black cmf SAND; little SILT; trace f GRAVEL (moist, non-plastic) SM FILL	
3		2	2.0	4.0	SS	7 7 3 3	3.0		10
4								Brown SILT; and CLAY; trace f SAND (moist, moderately plastic) ML/CL	
5		3	4.0	6.0	SS	2 2 3 5		Brown CLAY; and SILT; trace f SAND (moist, plastic) CL/ML w = 32.8%	12
6									
7		4	6.0	8.0	SS	4 4 5 8		Similar Soil (moist, plastic) CL/ML w = 31.2%, LL = 51, PL = 22, PI = 29	12
8									
9		5	8.0	10.0	SS	3 3 5 7	9.0		24
10	WET ROTARY							Brown mf SAND; some SILT; little CLAY (moist, slightly plastic) SM-SC	
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	9 8 7 6		Brown mf+ SAND; some SILT (wet, non-plastic) SM w = 22.8% % Fines = 25.0%	18
15									
16							17.0		
17									
18									
19		7	19.0	21.0	SS	2 1 WH 2		Grey CLAY; little SILT (wet, plastic) CH	24
20									
21									
22									
23									
24		8	24.0	26.0	SS	WH/18" 1		Grey CLAY; trace SILT (wet, plastic) CH	16
25									

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

Drillers: **Mark Childs; Ian Ross**

Inspector: **Aaron Woods (ATL); Rae Kim (Kiewit)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-127.0** Report No.: **CD10279D-01-03-22** 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%	
28		ST-1	28.0	30.0	SH	SHELBY TUBE		NO RECOVERY	0
30		9	30.0	32.0	SS	WH 1 2 2		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace mf SAND (saturated, plastic) CH w = 81.7%, LL = 72, PL = 20, PI = 52 % Fines = 96.0%	24
34		10	34.0	36.0	SS	WR/18" WH		Similar Soil (saturated, plastic) CH	24
39		11	39.0	41.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH w = 63.9%	24
41							41.0	Boring terminated at 41.0 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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/17/2022** Finish Date: **1/17/2022**

Boring No.: **K-127.1** Sheet **1** of **2**

Coordinates
Northing **759281.613**
Easting **1649993.938**

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

Ground Elev.: **141.015**

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

Groundwater Observations

Date	Time	Depth	Casing
1/17/2022	PM	DRY	4.0'
1/17/2022	PM	4.5'	9.0'
1/17/2022	PM	*7.8'	9.0'
1/17/2022	PM	*10.7'	9.0'

***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 27 7 4	0.3	3" TOPSOIL & ORGANIC MATERIAL	12
2							2.0	Blackish-Reddish-Grey cmf GRAVEL; some cmf SAND; trace SILT; trace DEBRIS (cinders) (moist, non-plastic) GW FILL	
2		2	2.0	4.0	SS	4 4 4 3	2.2	Brownish-Grey SILT; some CLAY (saturated, moderately plastic) ML Possible FILL	10
3							4.0		
4		3	4.0	6.0	SS	4 2 2 3		Brownish-Grey cmf SAND; some cmf GRAVEL; little SILT; little CLAY (wet, slightly plastic) SW-SC Possible FILL	14
5									
6		4	6.0	8.0	SS	6 5 4 6		Blackish-Brown SILT; some CLAY; some mf SAND; trace DEBRIS (cinders); trace ORGANIC MATERIAL (root hairs) (saturated, moderately plastic) ML/CL	0
7									
8		5	8.0	10.0	SS	4 7 10 10		w = 30.7%, LL = 34, PL = 22, PI = 12, OC = 4.5%	6
9	WET ROTARY							NO RECOVERY	
10								Greyish-Brown CLAY; little SILT; trace f GRAVEL; trace cmf SAND (saturated, plastic) CL	
11									
12							12.0	Advanced casing to 9.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	5 5 5 6		Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL (saturated, non-plastic) SP % Fines = 4.4%	7
15									
16									
17							17.0		
18									
19		7	19.0	21.0	SS	WR/12" WH/12"		Grey CLAY; trace SILT (saturated, plastic) CH	21
20								w = 71.7%	
21									
22									
23									
24		8	24.0	26.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH	22
25									

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

Drillers: **Mark Childs; John Trathen**

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

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-127.1** Report No.: **CD10279D-01-03-22** 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%	
30		9	30.0	32.0	SS	WR/12" WH/12"		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT (saturated, plastic) CH w = 58.0%, LL = 68, PL = 19, PI = 49 % Fines = 100.0%	12
34		10	34.0	36.0	SS	WR/12" WH/12"		Similar Soil (saturated, plastic) CH	22
36							36.0	Boring terminated at 36.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classifications.
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

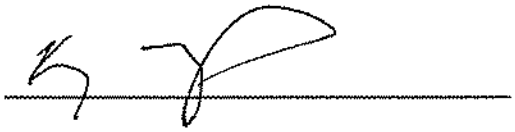
ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

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-125.6	S-3	4.0 - 6.0	Brown mf+ SAND; and SILT	48.0	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Brownish-Grey CLAY; trace mf SAND; trace SILT	--	24.7	50	22	28	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; little SILT; trace mf SAND	--	49.2	--	--	--	--	--	--	--	--	--	--	--
	ST-1	28.0 - 30.0	Grey CLAY; little SILT	100.0	49.4	60	20	40	--	--	--	--	--	--	--	--
K-127.0	S-3	4.0 - 6.0	Brown CLAY; and SILT; trace f SAND	--	32.8	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown CLAY; and SILT; trace f SAND	--	31.3	51	22	29	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Brown mf+ SAND; some SILT	25.0	22.8	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT; trace mf SAND	96.0	81.7	72	20	52	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT; trace mf SAND	--	--	--	--	--	--	7,100	35	8.75	1,548	--	--	--
	S-11	39.0 - 41.0	Grey CLAY; trace SILT; trace mf SAND	--	63.9	--	--	--	--	--	--	--	--	--	--	--
K-127.1	S-3	4.0 - 6.0	Blackish-Brown SILT; some CLAY; some mf SAND; trace DEBRIS (cinders); trace ORGANIC MATERIAL (root hairs)	--	30.7	34	22	12	4.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	4.4	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	71.7	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT	100.0	58.0	68	19	49	--	--	--	--	--	--	--	--
K-127.9	S-3	4.0 - 6.0	Brownish-Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	300	65	7.93	1,170	--	--	--
	S-4	6.0 - 8.0	Brownish-Grey CLAY; little SILT; trace f SAND	95.0	30.0	70	25	45	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Brown CLAY; trace f SAND; trace SILT	--	32.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Greyish-Brown CLAY; trace SILT	--	28.8	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	30.0	30	17	13	--	--	--	--	--	--	--	--
K-128.0	S-5	8.0 - 10.0	Brownish-Grey CLAY; some mf SAND; trace SILT	--	28.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	100.0	39.2	78	23	55	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	51.2	43	18	25	--	--	--	--	--	--	--	--
K-129.9A	S-5	8.0 - 10.0	Brown SILT; some mf SAND; little ORGANIC MATERIAL (root hairs)	24.0	134.2	NP	NP	NP	16.8	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf+ SAND; little SILT	20.0	31.1	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT		52.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	41.0 - 43.0	Grey CLAY; trace SILT	100.0	40.5	44	20	24	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-125.5	S-3	4-6	21.4
	S-5	8-10	27.5
	S-7	19-21	51.5
	S-9	28-30	38.0
K-127.0	S-3	4-6	32.8
	S-4	6-8	31.2
	S-6	14-16	22.8
	S-9	30-32	81.7
	S-11	39-41	63.9
K-127.1	S-3	4-6	30.7
	S-7	19-21	71.7
	S-9	30-32	58.0

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

Reviewed By:  Date: 01/31/22

ATLANTIC TESTING LABORATORIES

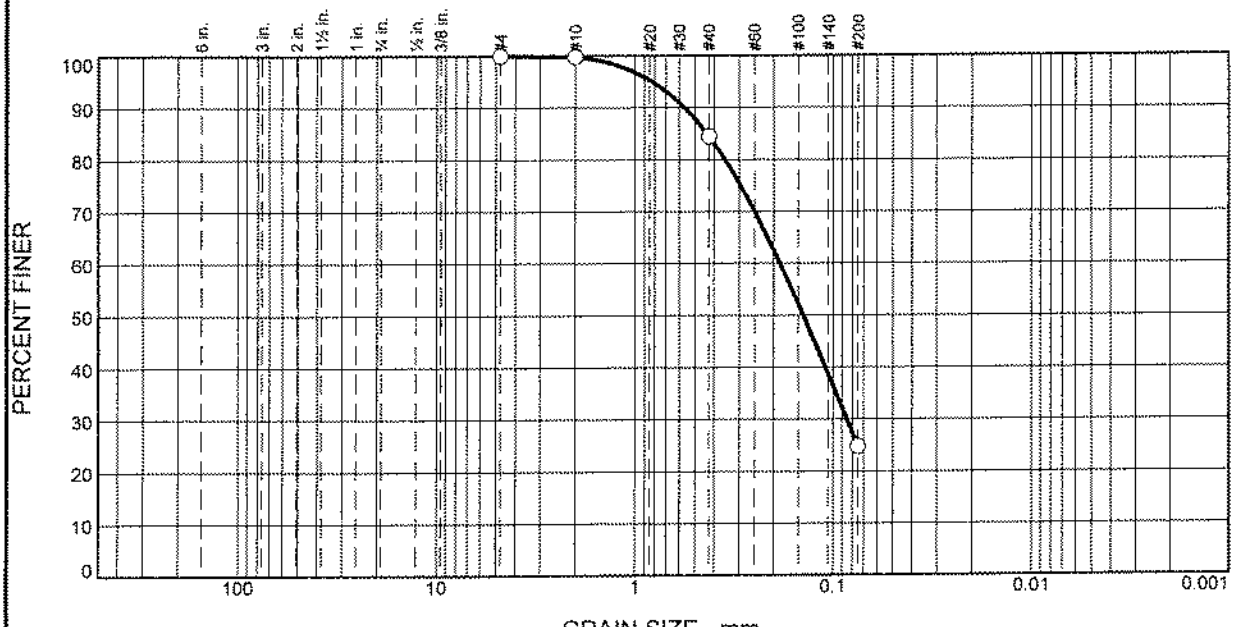
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-127.0, S-6 **Source of Sample:** Boring Sample

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



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	16	59	25	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	84		
#200	25		

Soil Description

Brown mf+ SAND; some SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.4359 D_{60}= 0.1858 D_{50}= 0.1416
D_{30}= 0.0854 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: 01/31/22

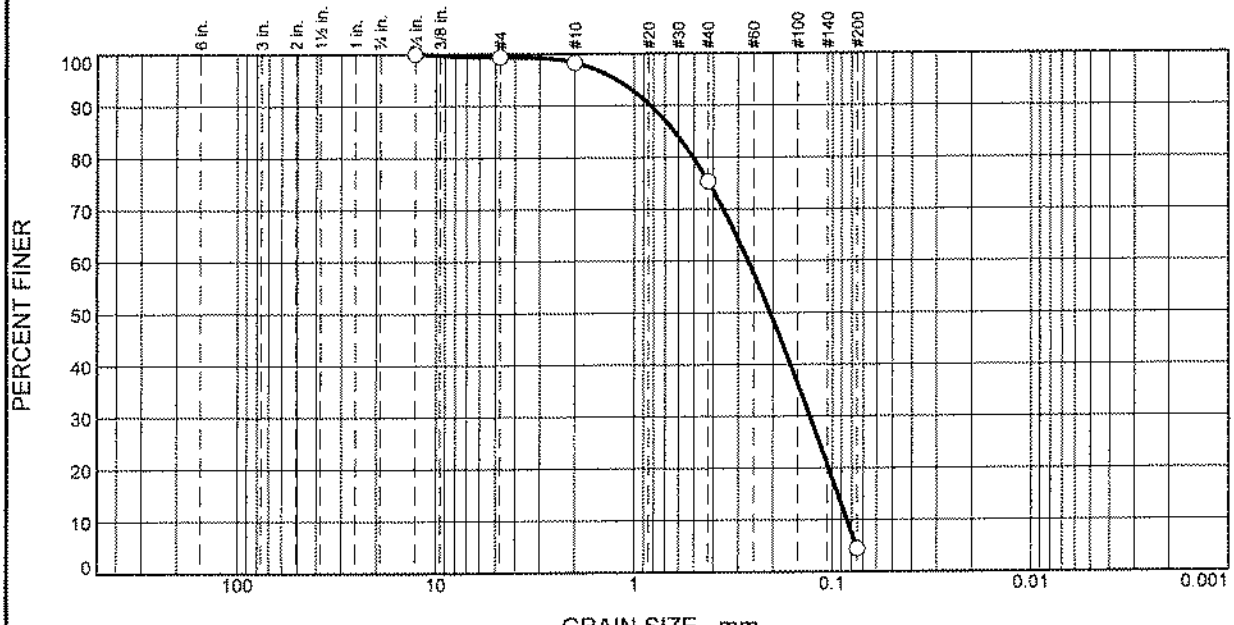
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-01-22

Client: Kiewit Intrastructure Co. **Date:** 01/31/22

Sample No: K-127.1, S-6 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 14-16'



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	1	23	71	4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	99		
#10	98		
#40	75		
#200	4.4		

Soil Description

Blackish Grey c-mf+ SAND; trace SILT; trace f GRAVEL

Atterberg Limits

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

Coefficients

D_{85}= 0.6308 D_{60}= 0.2671 D_{50}= 0.2067
D_{30}= 0.1300 D_{15}= 0.0939 D_{10}= 0.0844
C_u= 3.16 C_c= 0.75

Classification

USCS= SP AASHTO=

Remarks

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 01/31/22

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-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Test Date:**	January 25, 2022
	Various Locations, New York	**Performed By:**	R. Parrow

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-123.2	S-10	28-30	A	10	107.62	97
K-123.7	S-6	14-16	A	10	78.62	100
K-123.7	S-9	28-30	A	10	120.67	100
K-123.8	S-9	28-30	A	10	219.15	100
K-125.5	S-9	28-30	A	10	219.28	94
K-127.0	S-9	30-32	A	10	119.17	96
K-127.1	S-9	30-32	A	10	124.57	100

Reviewed By: _____ Date: January 31, 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-01-01-22
Report Date: January 31, 2022
Date Received: January 25, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-122.35	S-3	NP	NP	NP
K-122.35	S-15	NP	NP	NP
K-123.2	S-6	48	20	28
K-123.2	S-10	67	21	46
K-123.7	S-6	79	23	56
K-123.7	S-9	73	20	53
K-123.8	S-6	54	23	31
K-123.8	S-9	67	18	49
K-125.5	S-3	NP	NP	NP
K-125.5	S-9	70	21	49
K-127.0	S-4	51	22	29
K-127.0	S-9	72	20	52
K-127.1	S-3	34	22	12
K-127.1	S-9	68	19	49

SAMPLE INFORMATION

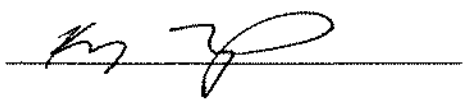
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-122.35	S-3	2	5	23.5
K-122.35	S-15	4.76	52	27.2
K-123.2	S-6	2	1	28.4
K-123.2	S-10	6.35	1	65.5
K-123.7	S-6	0.297	0	25.9
K-123.7	S-9	0.297	0	48.4
K-123.8	S-6	2	7	66.5
K-123.8	S-9	0.297	0	37.2
K-125.5	S-3	2	5	21.4
K-125.5	S-9	9.51	2	38.0
K-127.0	S-4	2	2	31.2
K-127.0	S-9	9.51	2	81.7
K-127.1	S-3	6.35	24	30.7
K-127.1	S-9	2	1	58.0

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-122.35	S-3	Air Dry	Pulverizing and Screening
K-122.35	S-15	Air Dry	Pulverizing and Screening
K-123.2	S-6	Air Dry	Pulverizing and Screening
K-123.2	S-10	Air Dry	Pulverizing and Screening
K-123.7	S-6	Air Dry	Not Necessary
K-123.7	S-9	Air Dry	Not Necessary
K-123.8	S-6	Air Dry	Pulverizing and Screening
K-123.8	S-9	Air Dry	Not Necessary
K-125.5	S-3	Air Dry	Pulverizing and Screening
K-125.5	S-9	Air Dry	Pulverizing and Screening
K-127.0	S-4	Air Dry	Pulverizing and Screening
K-127.0	S-9	Air Dry	Pulverizing and Screening
K-127.1	S-3	Air Dry	Pulverizing and Screening
K-127.1	S-9	Air Dry	Pulverizing and Screening

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: 01/31/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-01-01-22
Project:	Champlain Hudson Power Express	**Report Date:**	January 31, 2022
	United Cable Installation	**Date Received:**	January 25, 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-122.35	S-4	4.5	95.5	22.8	A	440
K-123.7	S-3	7.5	92.5	41.4	A	440
K-123.8	S-6	6.9	93.1	66.5	A	440
K-127.1	S-3	4.5	95.5	30.7	A	440

Reviewed By: _____ Date: 01/31/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 17 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 17 is STA 20545+00 (43.347016° N, 73.501611° 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, 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 17
Borings WFE-16, K-127.9,
K-128.0
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

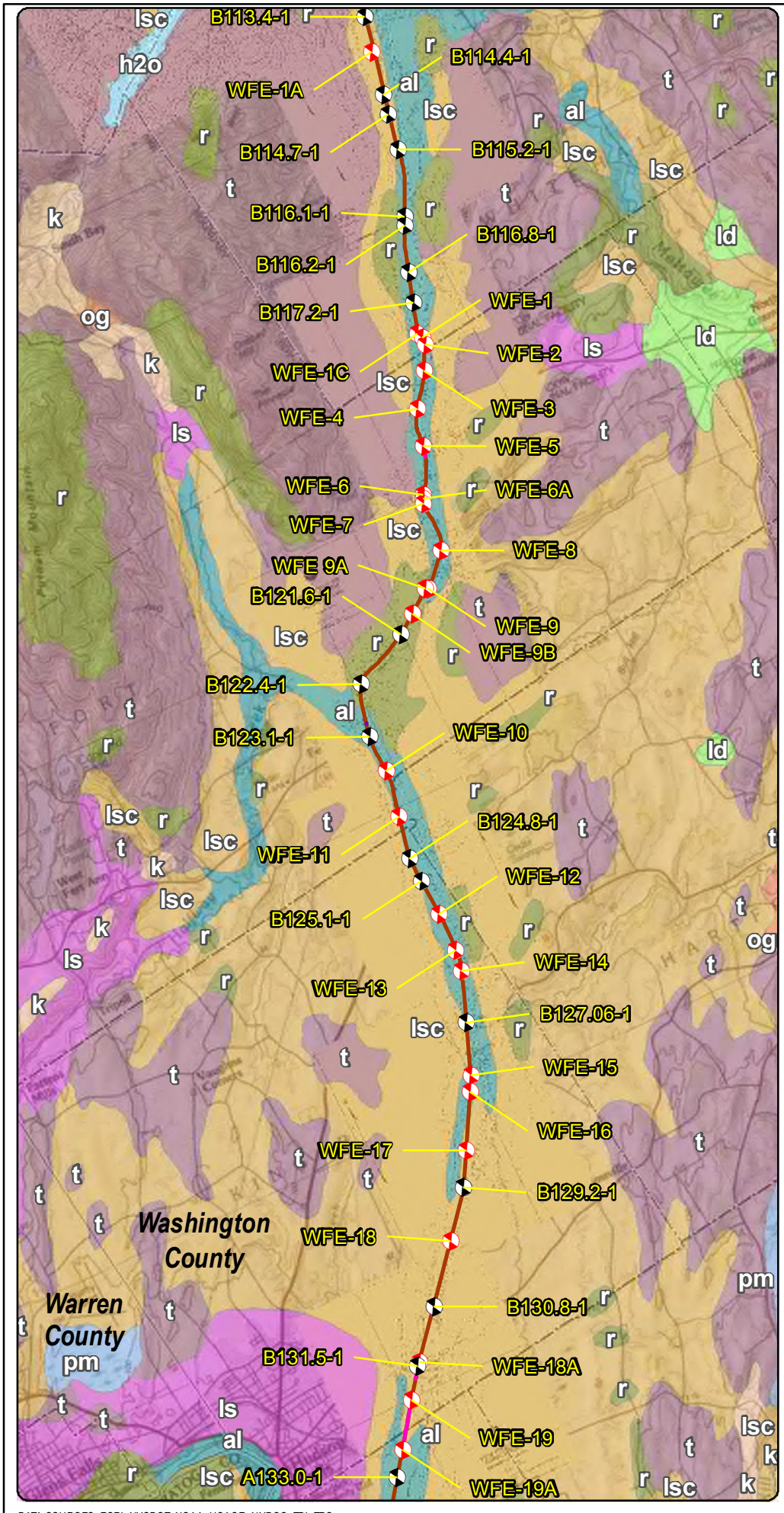
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

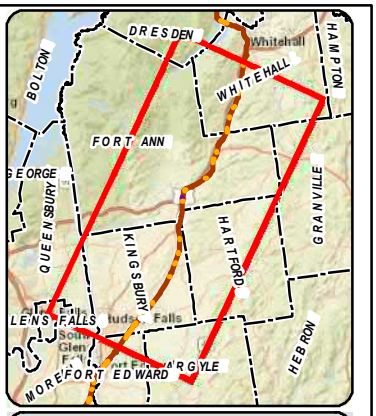
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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 Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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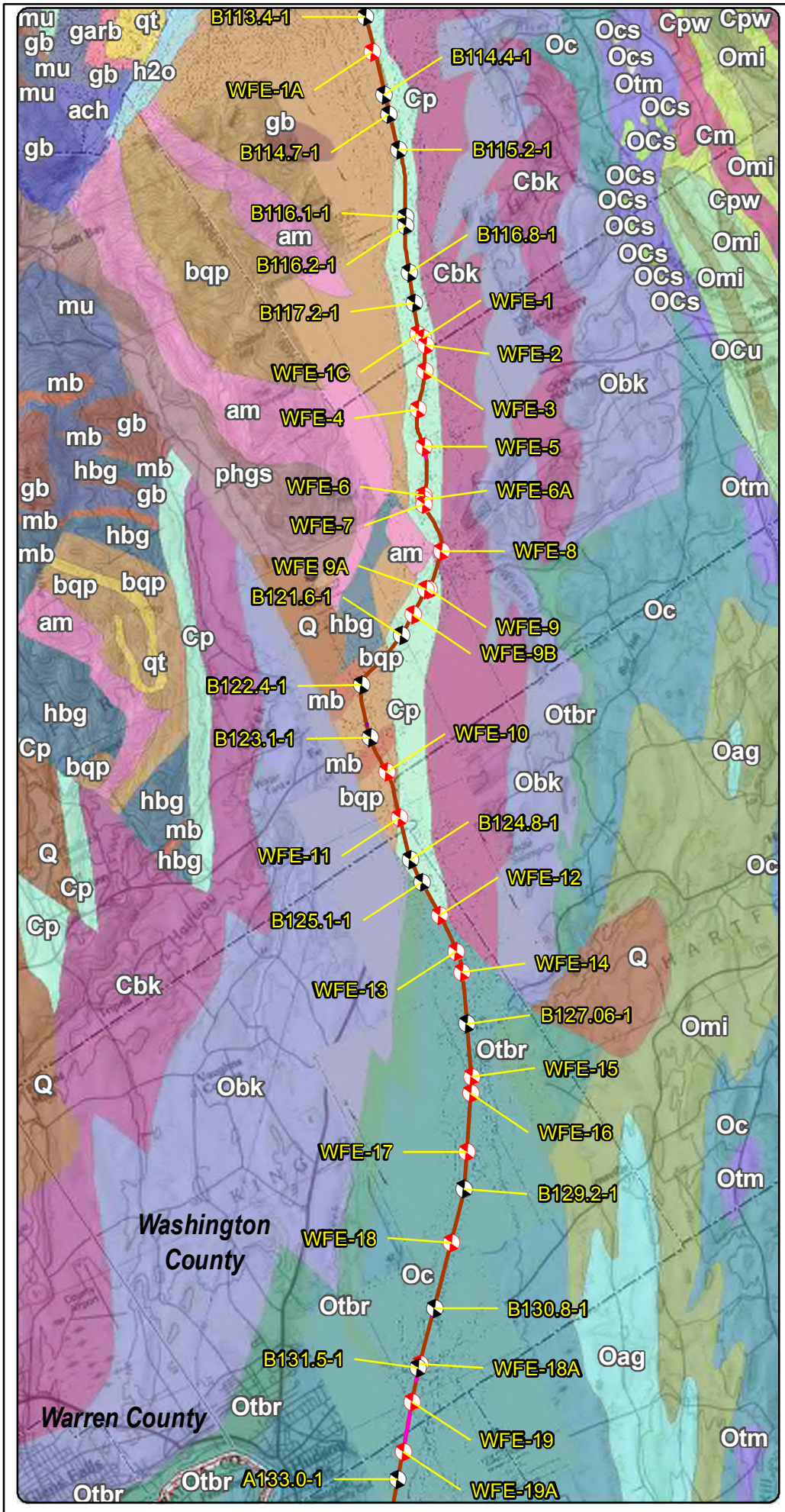

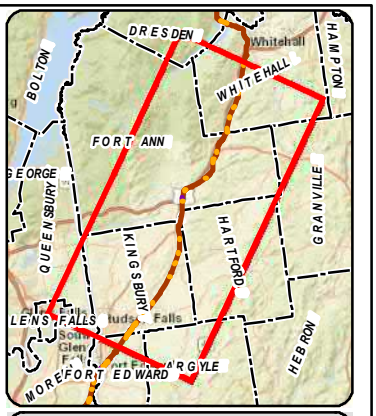

LEGEND

- 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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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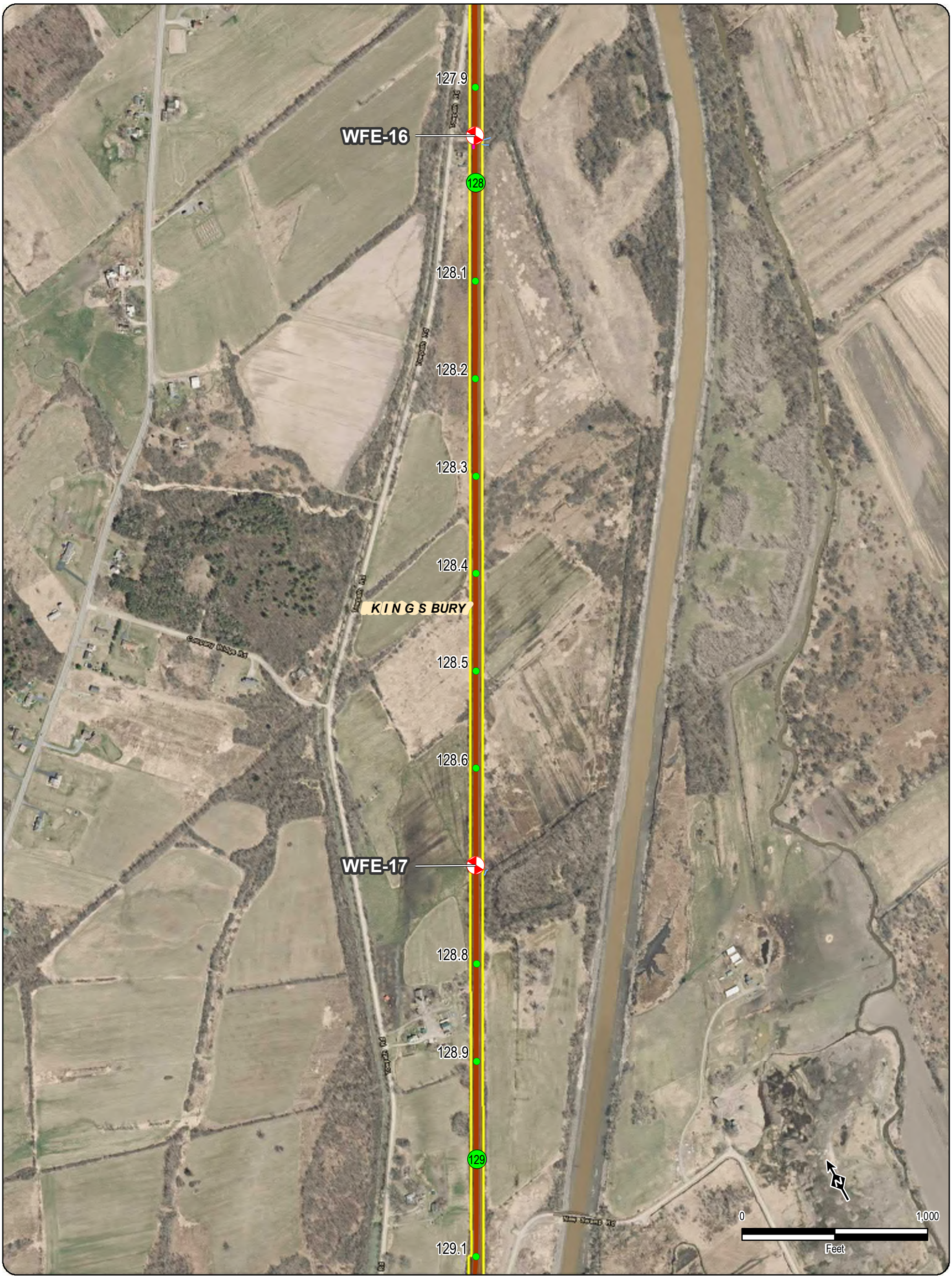

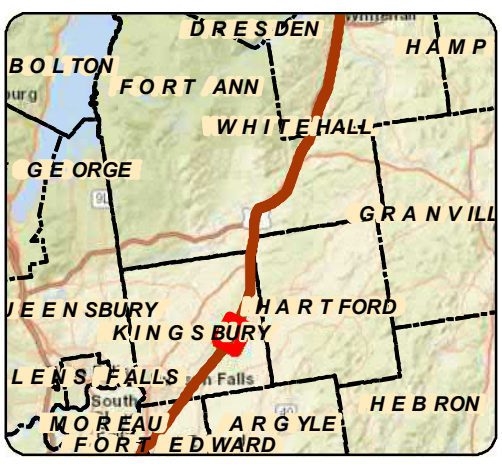

LEGEND

- Certified Milepost - Tenths
- Certified Milepost
- Preferred Alternative Milepost - Tenths
- 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

Whitehall to Fort Edward

Figure A-3

Sheet 13 of 16

Prepared by: AECOM 5/19/2021

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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: M.P. - 127.95 (CP Rail)			HOLE NO.: **WFE-16**
			START DATE: 1/8/21
			FINISH DATE: 1/8/21
			OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
No water observed	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			NORTHING
	HAMMER FALL	30"	30"			EASTING

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		SP/SM	SAND	0.0'-0.5'; Black fine-coarse SAND, some angular gravel; frozen 0.5'-1.5'; Black fine-coarse SAND, llittle silt, little angular gravel; loose, moist 1.5'-4.0'; Light brown fine-medium SAND, little silt, loose, moist
1.0										
2.0										
3.0		3'-5'	S-1							
4.0								ML/CL	SILT AND CLAY	4.0'-5.0'; Gray SILT and clay; medium stiff, moist TR-1; (3.0'-5.0')
5.0		5'-7'	S-2	24"	18"	7 6 8 9	9	CL/ML		Gray CLAY and silt, trace fine sand; stiff, moist
6.0										
7.0		7'-9'	S-3	24"	24"	6 9 13 11	8	ML/CL		Gray and brown SILT, some clay; stiff, moist TR-2; (8.0'-8.5')
8.0										
9.0		9'-11'	S-4	24"	24"	12 12 17 17	19	ML/CL		SAA
10.0										
11.0		11'-13'	S-5	24"	12"	8 7 10 11	11	ML/CL		Gray SILT, some clay; medium stiff, moist
12.0										
13.0		13'-15'	S-6	24"	16"	12 11 10 14	14	CL/ML	SILTY CLAY	Brown CLAY and silt; very stiff, moist
14.0										
15.0		15'-17'	S-7	24"	24"	3 4 4 5	5	CL		Brown silty CLAY; stiff, moist TR-3; (16.0'-16.5')
16.0										
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: M.P. - 127.95 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-16**

START DATE: 1/8/21

FINISH DATE: 1/8/21

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"	3	5	6	7	7	CL		SAA
21.0													
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	24"	2	4	5	8	6	CL		Gray silty CLAY; medium stiff, moist
26.0													TR-4; (26.0'-26.5')
27.0													
28.0													
29.0													
30.0												SILTY CLAY	
		30'-32'	S-10	24"	24"	2	4	6	14	7	CL		SAA
31.0													
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	3	5	6	13	7	CL		Gray silty CLAY; soft, moist
36.0													TR-5; (36.0'-36.5')
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOH	2	4	7	4	CL		SAA
39.0													
40.0													
													WFE-16 terminated at 40' then 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.

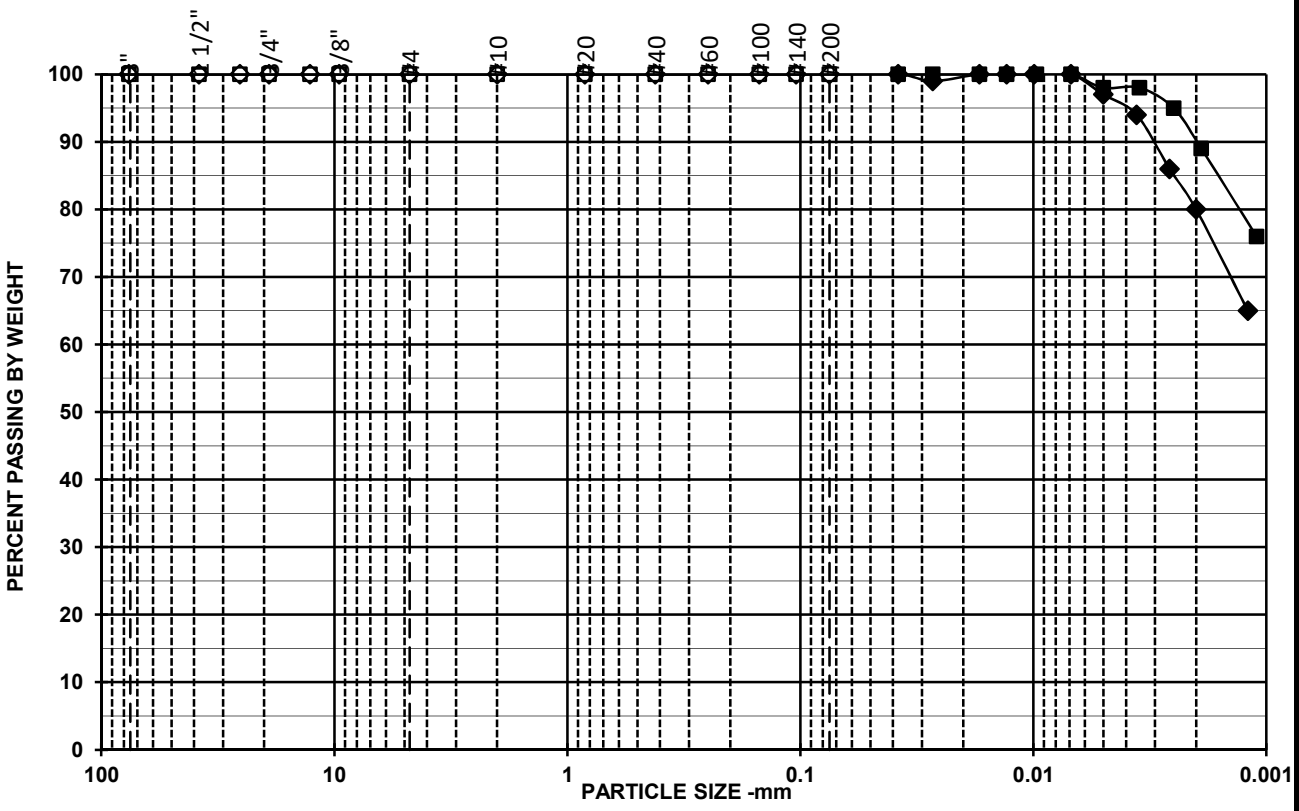
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

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

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	36.7	75	25	50	CH		Brown, Fat clay	04/26/21
◇	37.1	73	24	49	CH		Gray, Fat clay	04/26/21
○								

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-16	WFE-16	
Sample	S-3	S-9	
Depth	7-9	25-27	
% +3"	0	0	
% Gravel	0	0	
% SAND	0	0	
%C SAND	0	0	
%M SAND	0	0	
%F SAND	0	0	
% FINES	100	100	
D_{100} (mm)	4.75	0.075	
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	100	100	
#140	100	100	
#200	100	100	
5μ m	98	97	
2μ m	90	80	
1μ m	74	60	

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Boring Location Plans Page 9 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/26/2022** Finish Date: **1/26/2022**

Boring No.: **K-127.9** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/26/2022	PM	*7.3'	7.0'

Coordinates
Northing **757681.003**
Easting **1646016.024**

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

Ground Elev.: **145.159**

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	13 15 8 7		Black cmf SAND; trace f GRAVEL; trace SILT (frozen, non-plastic) SW FILL	8
2		2	2.0	4.0	SS	4 8 10 7		Brown cmf SAND; trace f GRAVEL; trace SILT (wet, non-plastic) SW Possible FILL	4
4		3	4.0	6.0	SS	7 6 6 7	4.0	Brownish-Grey CLAY; little SILT; trace f SAND (wet, plastic) CH	12
6		4	6.0	8.0	SS	7 7 8 8		Similar Soil (wet, plastic) CH w = 30.0%, LL = 70, PL = 25, PI = 45 % Fines = 95.0%	24
8		5	8.0	10.0	SS	10 8 8 8		Brownish-Grey CLAY; some mf SAND; trace SILT (moist, plastic) CH	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.	
12							12.0		
14		6	14.0	16.0	SS	2 2 2 2		Greyish-Brown CLAY; trace f SAND; trace SILT (wet, plastic) CL w = 32.4%	22
19		7	19.0	21.0	SS	1 2 3 4		Brown CLAY; trace SILT (wet, plastic) CL	24
24		8	24.0	26.0	SS	1 2 2 5		Greyish-Brown CLAY; trace SILT (wet, plastic) CL	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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-127.9** Report No.: **CD10279D-01-03-22** 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 = 28.8%	
29		9	29.0	31.0	SS	3 4 4 5		Similar Soil (wet, plastic) CL	24
34		10	34.0	36.0	SS	WH/18" 2		Grey CLAY; trace SILT (saturated, plastic) CL	24
38		ST-1	38.0	40.0	SS	WH/18" 4		(3" Brass Lined Split Spoon) Similar Soil (saturated, plastic) CL w = 30.0%, LL = 30, PL = 17, PI = 13 % Fines = 100.0%	24
43		11	43.0	45.0	SS	WH/24"		Similar Soil (wet, plastic) CL	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 classifications.
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/26/2022** Finish Date: **1/26/2022**

Boring No.: **K-128.0** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/27/2022	AM	*12.3'	10.0'

Coordinates
Northing **757486.435**
Easting **1645655.384**

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

Ground Elev.: **145.207**

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	19 15 7 5	2.0	Black and Brown cmf SAND; little mf GRAVEL; trace SILT (moist, non-plastic) SW FILL	18
2	CASING	2	2.0	4.0	SS	7 7 7 7		Brown CLAY; some mf SAND; trace f GRAVEL; trace SILT (moist, plastic) CL	8
4		3	4.0	6.0	SS	4 4 4 4		Brownish-Grey CLAY; trace f SAND; trace SILT (moist, plastic) CL	6
6		4	6.0	8.0	SS	4 5 6 7		Grey CLAY; little SILT (moist, plastic) CL	23
8		5	8.0	10.0	SS	8 7 8 8		Brownish-Grey CLAY; some mf SAND; trace SILT (moist, plastic) CL w = 28.0%	18
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.	
12							12.0		
14		6	14.0	16.0	SS	1 3 3 4		Brownish-Grey CLAY; trace SILT (wet, plastic) CH	24
19		7	19.0	21.0	SS	1 2 3 4		Grey CLAY; trace SILT (moist, plastic) CH w = 39.2%, LL = 78, PL = 23, PI = 55 % Fines = 100.0%	24
24		8	24.0	26.0	SS	1 2 2 2		Grey CLAY; trace SILT (wet, plastic) CH	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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-128.0** Report No.: **CD10279D-01-03-22** 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%	
29		9	29.0	31.0	SS	WH/12" 1 4		Similar Soil (wet, plastic) CH w = 30.3%	24
34		10	34.0	36.0	SS	WH/12" 1 4		Similar Soil (wet, plastic) CH	24
38		ST-1	38.0	40.0	SS	WH 2 4 5		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT (wet, plastic) CL w = 51.2%, LL = 43, PL = 18, PI = 25 % Fines = 100.0%	24
43		11	43.0	45.0	SS	WH/18" 2		Similar Soil (saturated, plastic) CL	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 classifications.
3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-125.6	S-3	4.0 - 6.0	Brown mf+ SAND; and SILT	48.0	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Brownish-Grey CLAY; trace mf SAND; trace SILT	--	24.7	50	22	28	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; little SILT; trace mf SAND	--	49.2	--	--	--	--	--	--	--	--	--	--	--
	ST-1	28.0 - 30.0	Grey CLAY; little SILT	100.0	49.4	60	20	40	--	--	--	--	--	--	--	--
K-127.0	S-3	4.0 - 6.0	Brown CLAY; and SILT; trace f SAND	--	32.8	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown CLAY; and SILT; trace f SAND	--	31.3	51	22	29	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Brown mf+ SAND; some SILT	25.0	22.8	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT; trace mf SAND	96.0	81.7	72	20	52	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT; trace mf SAND	--	--	--	--	--	--	7,100	35	8.75	1,548	--	--	--
	S-11	39.0 - 41.0	Grey CLAY; trace SILT; trace mf SAND	--	63.9	--	--	--	--	--	--	--	--	--	--	--
K-127.1	S-3	4.0 - 6.0	Blackish-Brown SILT; some CLAY; some mf SAND; trace DEBRIS (cinders); trace ORGANIC MATERIAL (root hairs)	--	30.7	34	22	12	4.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	4.4	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	71.7	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT	100.0	58.0	68	19	49	--	--	--	--	--	--	--	--
K-127.9	S-3	4.0 - 6.0	Brownish-Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	300	65	7.93	1,170	--	--	--
	S-4	6.0 - 8.0	Brownish-Grey CLAY; little SILT; trace f SAND	95.0	30.0	70	25	45	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Brown CLAY; trace f SAND; trace SILT	--	32.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Greyish-Brown CLAY; trace SILT	--	28.8	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	30.0	30	17	13	--	--	--	--	--	--	--	--
K-128.0	S-5	8.0 - 10.0	Brownish-Grey CLAY; some mf SAND; trace SILT	--	28.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	100.0	39.2	78	23	55	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	51.2	43	18	25	--	--	--	--	--	--	--	--
K-129.9A	S-5	8.0 - 10.0	Brown SILT; some mf SAND; little ORGANIC MATERIAL (root hairs)	24.0	134.2	NP	NP	NP	16.8	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf+ SAND; little SILT	20.0	31.1	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT		52.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	41.0 - 43.0	Grey CLAY; trace SILT	100.0	40.5	44	20	24	--	--	--	--	--	--	--	--

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-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-1.6A	S-3	6-8	6.8
	S-6 [1]	19-21	25.3
	S-8	28-30	33.3
K-122.4	S-5	8-10	24.8
	S-9 [1]	29-31	17.5
	S-13 [1]	49-51	21.7
	S-16	58-60	9.9
K-125.6	S-3	4-6	17.8
	S-5	8-10	24.7
	S-7	19-21	49.2
	ST-1	28-30	49.4
K-127.9	S-4	6-8	30.0
	S-6	14-16	32.4
	S-8	24-26	28.8
	ST-1	38-40	30.0
K-128.0	S-5	8-10	28.0
	S-7	19-21	39.2
	S-9	29-31	30.3
	ST-1	38-40	51.2

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-02-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 7, 2022
	United Cable Installation	**Test Date:**	February 3, 2022
	Various Locations, New York	**Performed By:**	M. White

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-117.6-1.6A	S-8	28-30	A	10	672.08	70
K-122.4	S-5	8-10	A	10	339.75	57
K-125.6	ST-1	28-30	A	10	257.41	100
K-127.9	S-4	6-8	A	10	164.08	95
K-127.9	ST-1	38-40	A	10	392.67	100
K-128.0	S-7	19-21	A	10	163.31	100
K-128.0	ST-1	38-40	A	10	216.36	100
K-129.9A	S-5	8-10	A	10	136.68	24
K-129.9A	ST-1	41-43	A	10	240.79	100
K-129.9B	ST-1	27-29	A	10	186.13	100

Reviewed By: _____ Date: February 7, 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-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-1.6A	S-6	46	20	26
K-117.6-1.6A	S-8	47	19	28
K-122.4	S-5	NP	NP	NP
K-125.6	S-5	50	22	28
K-125.6	ST-1	60	20	40
K-127.9	S-4	70	25	45
K-127.9	ST-1	30	17	13
K-128.0	S-7	78	23	55
K-128.0	ST-1	43	18	25
K-129.9A	S-5	NP	NP	NP
K-129.9A	ST-1	44	20	24
K-129.9B	S-6	96	49	47
K-129.9B	ST-1	55	20	35

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-1.6A	S-6	4.76	19	25.3
K-117.6-1.6A	S-8	6.35	28	33.3
K-122.4	S-5	2	5	24.8
K-125.6	S-5	0.42	2	24.7
K-125.6	ST-1	0.177	0	49.4
K-127.9	S-4	2	13	30.0
K-127.9	ST-1	0.177	0	30.0
K-128.0	S-7	0.149	0	39.2
K-128.0	ST-1	0.177	0	51.2
K-129.9A	S-5	2	25	134.2
K-129.9A	ST-1	0.177	0	40.5
K-129.9B	S-6	0.841	9	88.0
K-129.9B	ST-1	0.177	0	51.2

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-1.6A	S-6	Air Dry	Pulverizing and Screening
K-117.6-1.6A	S-8	Air Dry	Pulverizing and Screening
K-122.4	S-5	Air Dry	Pulverizing and Screening
K-125.6	S-5	Air Dry	Pulverizing and Screening
K-125.6	ST-1	Air Dry	Not Necessary
K-127.9	S-4	Air Dry	Pulverizing and Screening
K-127.9	ST-1	Air Dry	Not Necessary
K-128.0	S-7	Air Dry	Not Necessary
K-128.0	ST-1	Air Dry	Not Necessary
K-129.9A	S-5	Air Dry	Pulverizing and Screening
K-129.9A	ST-1	Air Dry	Not Necessary
K-129.9B	S-6	Air Dry	Pulverizing and Screening
K-129.9B	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: 02/07/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 18 – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 18 is STA 20648+00 (43.323835° N, 73.522193° 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, 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 18
Borings WFE-18, K-129.9A, K-129.9B
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

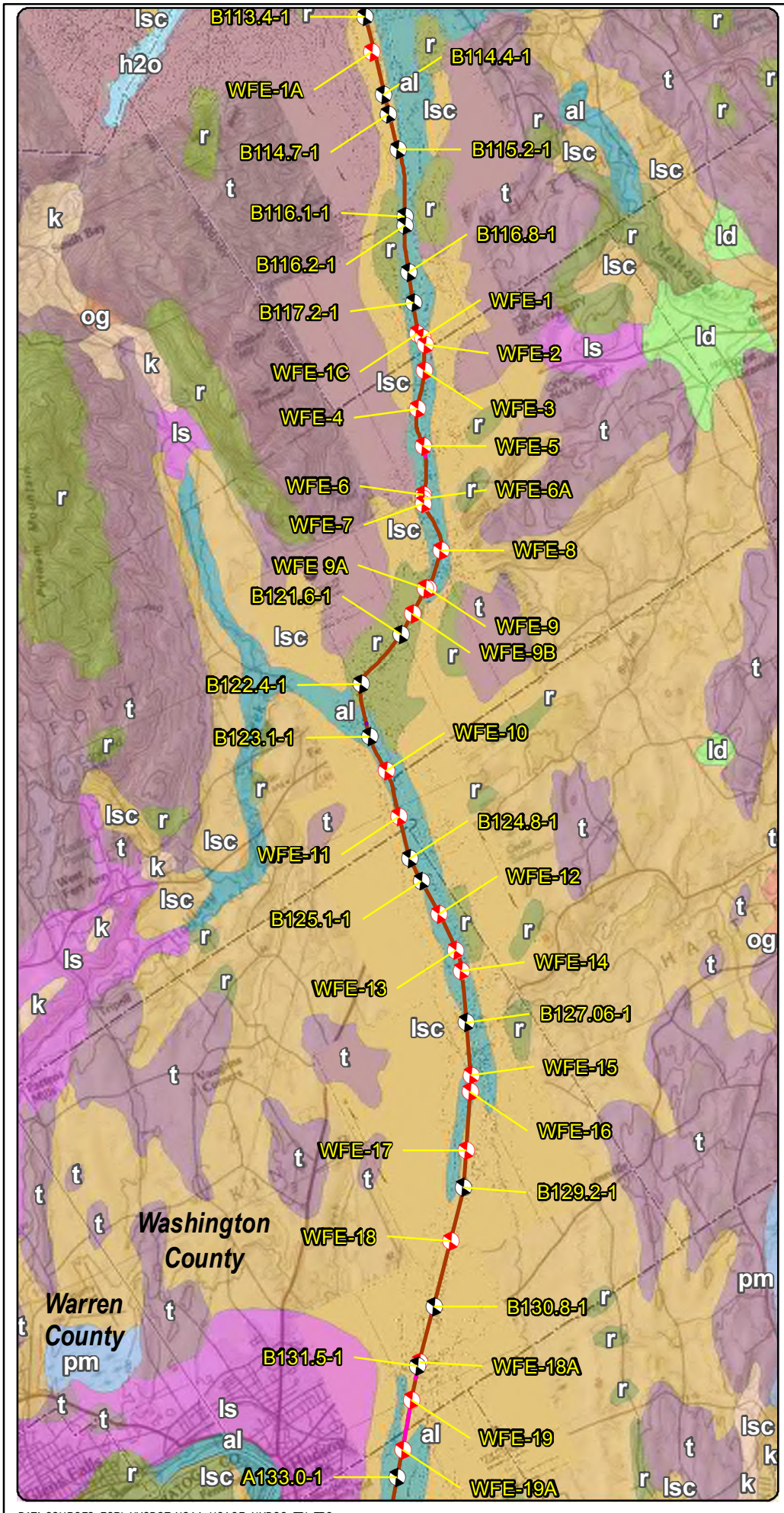
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

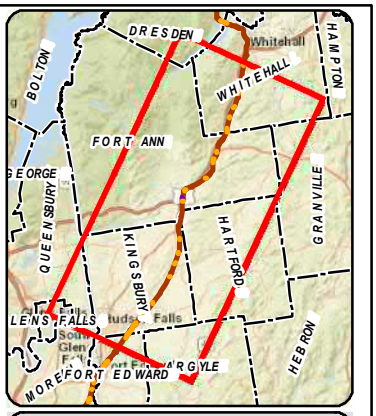
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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

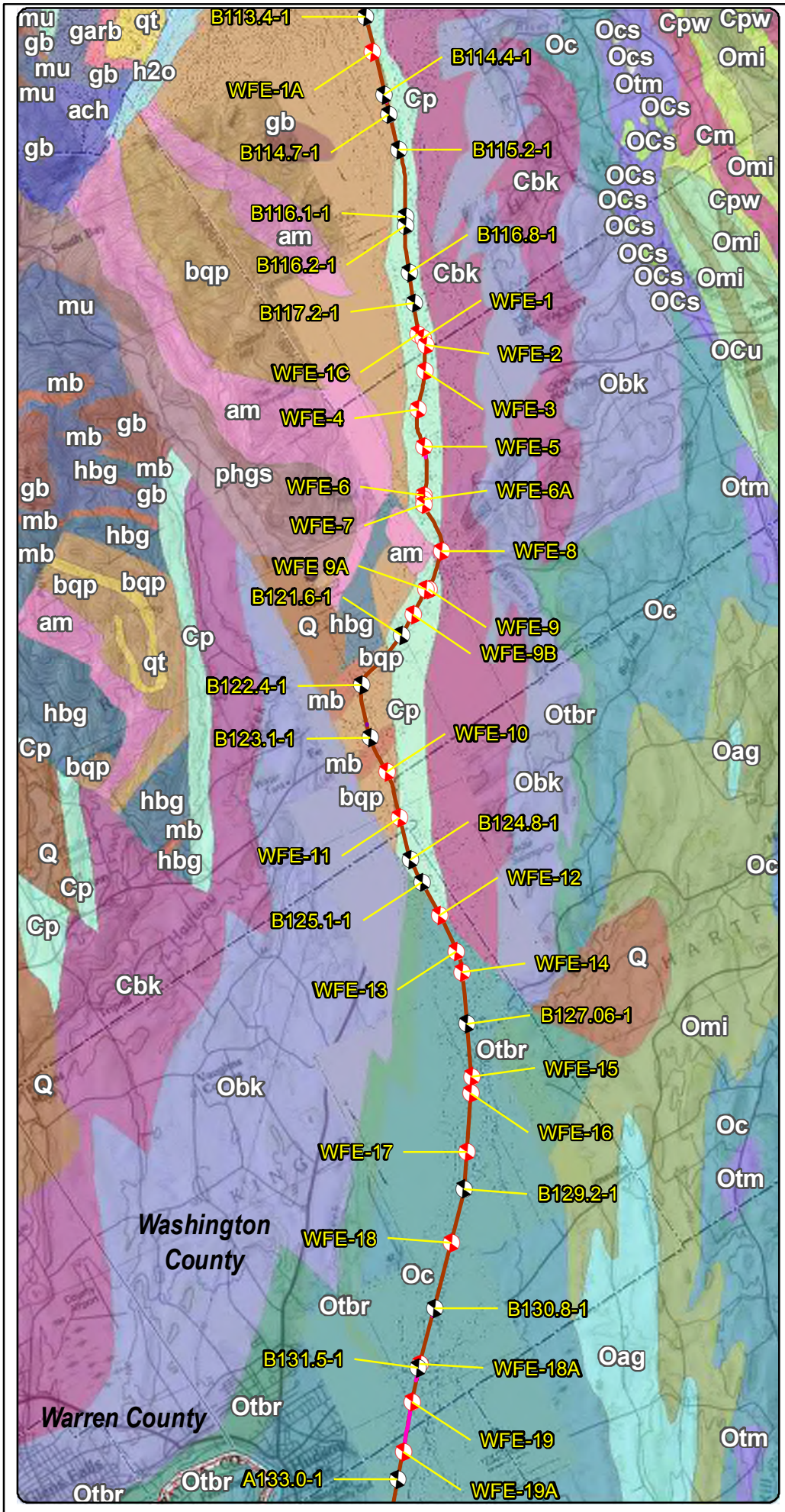
Champlain Hudson Power Express Inc.

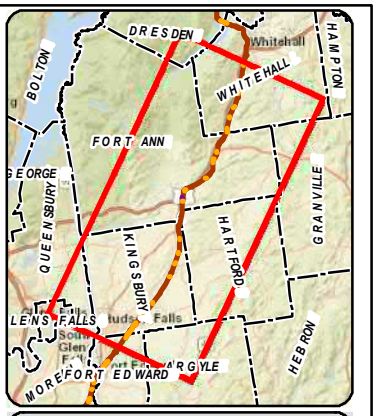
Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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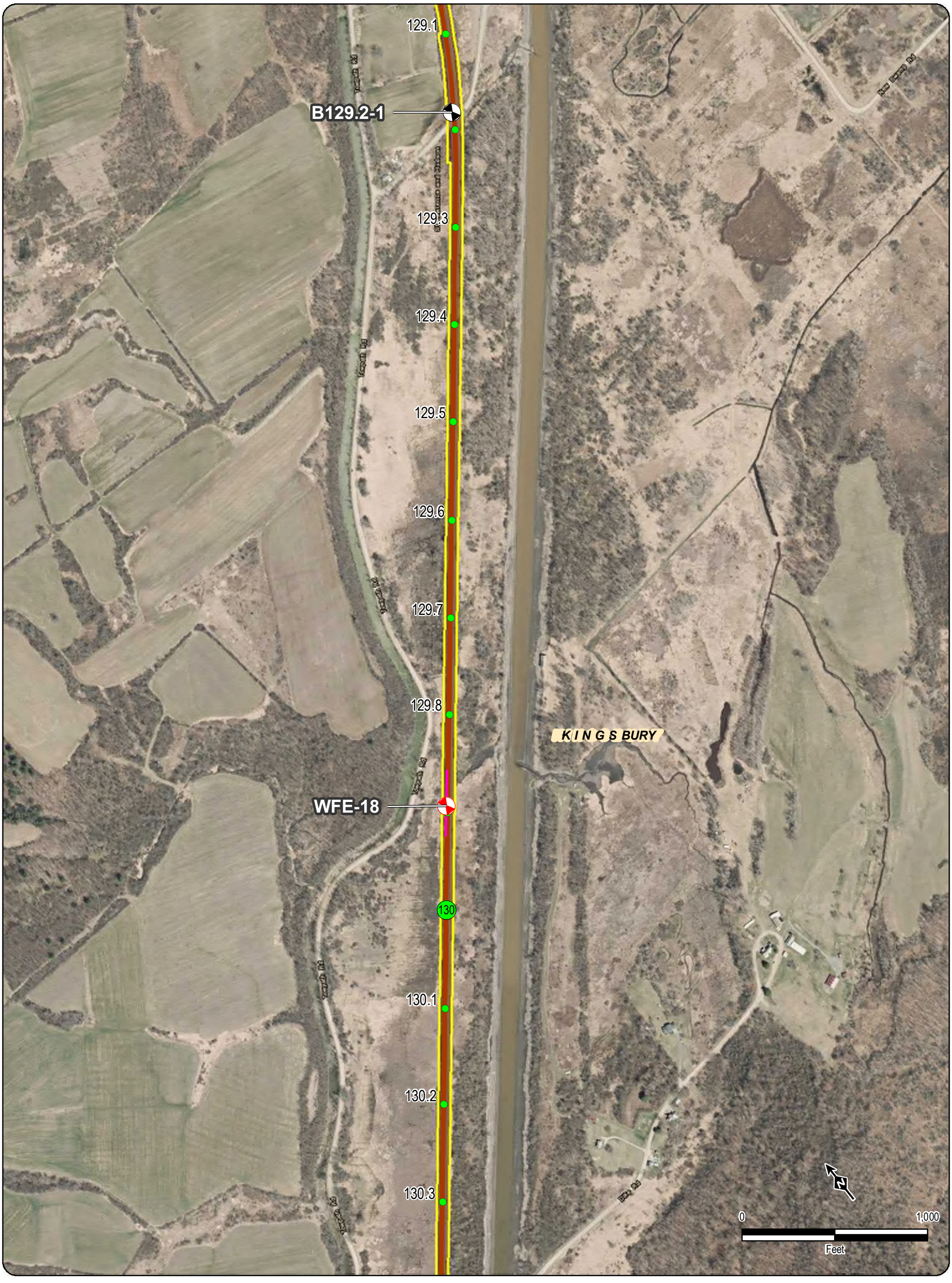


LEGEND

- 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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 14 of 16

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\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

BORING LOG

BORING CONTRACTOR: ADT	AECOM	SHEET 1 OF 2
		PROJECT NAME: CHPE -
DRILLER: Chris Chaillou		PROJECT NO.: 60323056
		HOLE NO.: **WFE-18**
SOILS ENGINEER/GEOLOGIST: Chris French		START DATE: 1/11/21
	BORING LOG	FINISH DATE: 1/11/21
LOCATION: M.P. - 129.89 (CP Rail)		OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55
No water observed	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			NORTHING
	HAMMER FALL	30"	30"			EASTING

DEPTH	CORING RATE MIN/FT	SAMPLE DEPTHS FROM - TO (FEET)	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						SAND	0.0'-2.5'; Black fine-coarse SAND, little silt, little angular to subrounded gravel, trace cobbles; loose, moist
1.0													
2.0													
3.0													2.5'-3.5'; Brown fine-medium SAND; very loose, moist
		3'-5'	S-1										
4.0											ML/SM		3.5'-5.0'; Gray SILT and fine sand; medium stiff
													TR-1; (3.0'-5.0')
5.0													
		5'-7'	S-2	24"	0"	6	3	4	4	5		SILT/organic Silt	No recovery
6.0													
7.0													
		7'-9'	S-3	24"	24"	3	2	3	2	2	ML/OL		Dark brown SILT, organics (organic silt); stiff, moist
8.0													TR-2; (7.0'-9.0')
9.0													
		9'-11'	S-4	24"	24"	3	3	3	3	4	ML/OL		SAA
10.0													
11.0													
		11'-13'	S-5	24"	24"	3	3	4	3	5	ML/OL		Gray SILT, trace fine sand, very thin decomposing organics and organic silt laminates; soft, moist
12.0													
13.0													
		13'-15'	S-6	24"	24"	2	4	5	5	6	ML/OL		SAA
14.0													
15.0													
		15'-17'	S-7	24"	24"	WOH	1	2	3	2	ML/OL		Dark brown SILT, little decomposing organics; soft, moist
16.0													
17.0													TR-3; (16.0'-16.5')
18.0													18.5' (*inferred*)
19.0												Silty SAND	
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: M.P. - 129.89 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-18**

START DATE: 1/11/21

FINISH DATE: 1/11/21

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"	WOH	3	4	3	5	ML/SM		Gray SILT, little fine sand, trace clay; soft, moist
21.0													
22.0													
23.0													
24.0													
25.0												Silty SAND	
		25'-27'	S-9	24"	10"	11	19	13	7	21	SP		Gray medium SAND, little fine sand, trace silt; very loose, saturated
26.0													
27.0													
28.0													
													28.5' (*inferred*)
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH	WOH	WOH	3		CL		Gray silty CLAY; soft, moist
31.0													
32.0													
33.0													
34.0													
35.0												Silty CLAY	
		35'-37'	S-11	24"	24"	WOH	WOH	WOH	2		CL		SAA
36.0													
													TR-4; (36.0'-36.5')
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOH	WOH	WOH	3		CL		SAA
39.0													
40.0													
													WFE-18 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.

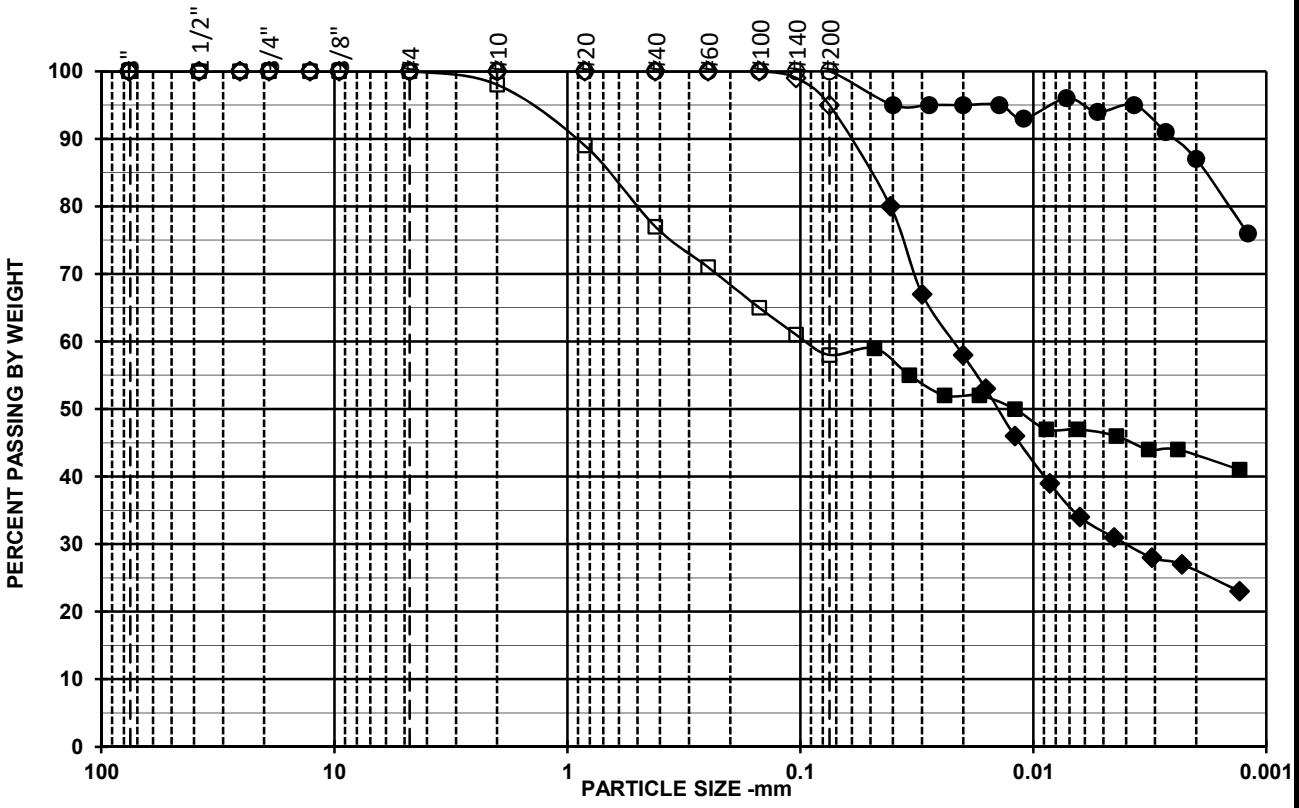
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

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

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	229.7	293	93	200	OH		Dark brown, Sandy Organic silt organic mat'l noted, Insufficient sample size	04/23/21
◇	34.3	30	21	9	CL		Gray, Lean clay	04/22/21
○	64.3	56	21	35	CH		Gray, Fat clay	04/20/21

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-18	WFE-18	WFE-18
Sample	S-3	S-8	S-10
Depth	7-9	20-22	30-32
% +3"	0	0	0
% Gravel	0	0	0
% SAND	42	5	0
%C SAND	2	0	0
%M SAND	21	0	0
%F SAND	19	5	0
% FINES	58	95	100
D_{100} (mm)	4.75	2	0.075
D_{60} (mm)	0.093	0.022	
D_{30} (mm)		0.004	
D_{10} (mm)			
Cc			
Cu			

Sieve Size/ID #	Percent Finer Data		
6"	100	100	100
4"	100	100	100
3"	100	100	100
1 1/2"	100	100	100
1"	100	100	100
3/4"	100	100	100
1/2"	100	100	100
3/8"	100	100	100
#4	100	100	100
#10	98	100	100
#20	89	100	100
#40	77	100	100
#60	71	100	100
#100	65	100	100
#140	61	99	100
#200	58	95	100
5μ m	46	32	94
2μ m	43	26	87
1μ m	40	21	72

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Boring Location Plans Page 10 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/27/2022** Finish Date: **1/27/2022**

Boring No.: **K-129.9A** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/27/2022	PM	*14.3'	10.0'

Coordinates
Northing **752271.857**
Easting **1637451.428**

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

Ground Elev.: **143.39**

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	14 6 3 3	2.0	Blackish-Grey cmf GRAVEL; some c-m SAND; trace SILT (frozen, non-plastic) GW FILL	6
2	CASING	2	2.0	4.0	SS	4 3 5 6		Brown CLAY; little f SAND; trace SILT (moist, plastic) CL	16
4		3	4.0	6.0	SS	2 2 2 2		Brown cmf SAND; and CLAY; little SILT; trace f GRAVEL (moist, plastic) SC	12
6		4	6.0	8.0	SS	2 3 3 2		Brown CLAY; little SILT; trace f SAND (moist, plastic) CL	14
8		5	8.0	10.0	SS	WH/12" 1 1	8.0	Brown SILT; some mf SAND; little ORGANIC MATERIAL (root hairs) (wet, non-plastic) ML w = 134.2% LL = NP, PL = NP, PI = NP, OC = 16.8% % Fines = 24.0% Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	16
12	WET ROTARY	6	14.0	16.0	SS	WH/24"	12.0	Brown SILT; and CLAY; trace f SAND (wet, plastic) ML/CL	18
19		7	19.0	21.0	SS	WH/24"	22.0	Grey CLAY; little SILT; trace f SAND (wet, plastic) CL	24
24		8	24.0	26.0	SS	4 5 9 14		Grey c-mf+ SAND; little SILT (wet, non-plastic) SM	10

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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-129.9A** Report No.: **CD10279D-01-03-22** 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)
26								w = 31.1% % Fines = 20.0%	
27							27.0		
28									
29		9	29.0	31.0	SS	WR/12" WH/12"		Grey CLAY; trace SILT (wet, plastic) CL	24
30									
31									
32									
33									
34		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CL w = 52.6%	24
35									
36									
37									
38									
39		11	39.0	41.0	SS	WH/24"		Similar Soil (wet, plastic) CL	21
40									
41		ST-1	41.0	43.0	SS	WH 2 2 3		(3" Brass Lined Split Spoon) Similar Soil (wet, plastic) CL	24
42								w = 40.5%, LL = 44, PL = 20, PI = 24 % Fines = 100.0%	
43									
44									
45									
46									
47									
48		12	48.0	50.0	SS	1 WH/12" 2		Similar Soil (wet, plastic) CL	24
49									
50							50.0		
51								Boring terminated at 50.0 feet.	
52									
53								Notes:	
54								1. Borehole backfilled with cement-bentonite grout.	
55								2. Soil classifications based on ATL Field Engineer's field classifications.	
56								3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/27/2022** Finish Date: **1/28/2022**

Boring No.: **K-129.9B** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/28/2022	AM	*9.3'	10.0'

Coordinates
Northing **752027.252**
Easting **1637156.904**

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

Ground Elev.: **143.756**

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	21 18 12 5	2.0	Brown cmf GRAVEL; some cmf SAND; trace SILT (frozen, non-plastic) GW Possible FILL	8
3	CASING	2	2.0	4.0	SS	5 4 3 3	4.0	Brown cmf SAND; little SILT; trace CLAY (moist, very slightly plastic) SM Possible FILL	10
5		3	4.0	6.0	SS	2 2 2 2	6.0	Brown CLAY; and mf SAND; trace SILT (moist, plastic) CL	13
7		4	6.0	8.0	SS	2 2 1 1	8.0	Brown CLAY; some ORGANIC MATERIAL (root hairs); trace SILT (moist, plastic) OH OC = 34.9%	14
9		5	8.0	10.0	SS	WH/24"		Grey CLAY; trace SILT (moist, plastic) CH	18
11	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.	
15		6	14.0	16.0	SS	WH/24"		Grey CLAY; little SILT; trace f SAND (moist, plastic) CH w = 88.0%, LL = 96, PL = 49, PI = 47	24
19		7	19.0	21.0	SS	WH/12" 1 1	22.0	Grey CLAY; some f SAND; trace SILT (wet, plastic) CL	18
24		8	24.0	26.0	SS	4 5 8 10		Grey c-mf SAND; trace SILT; trace f GRAVEL (moist, non-plastic)	8

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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-129.9B** Report No.: **CD10279D-01-03-22** 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	SP-SM w = 18.3% % Fines = 7.0%	
		ST-1	27.0	29.0	SS	WH/18" 2		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT (wet, plastic) CH w = 51.2%, LL = 55, PL = 20, PI = 35 % Fines = 100.0%	24
		9	29.0	31.0	SS	WH/18" 1		Similar Soil (wet, plastic) CH	24
		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CH w = 50.8%	24
		11	38.0	40.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
							40.0	Boring terminated at 40.0 feet.	

f - fine; m - medium; c - course

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

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classifications.
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-125.6	S-3	4.0 - 6.0	Brown mf+ SAND; and SILT	48.0	17.8	--	--	--	--	--	--	--	--	--	--	--
	S-5	8.0 - 10.0	Brownish-Grey CLAY; trace mf SAND; trace SILT	--	24.7	50	22	28	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; little SILT; trace mf SAND	--	49.2	--	--	--	--	--	--	--	--	--	--	--
	ST-1	28.0 - 30.0	Grey CLAY; little SILT	100.0	49.4	60	20	40	--	--	--	--	--	--	--	--
K-127.0	S-3	4.0 - 6.0	Brown CLAY; and SILT; trace f SAND	--	32.8	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0 - 8.0	Brown CLAY; and SILT; trace f SAND	--	31.3	51	22	29	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Brown mf+ SAND; some SILT	25.0	22.8	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT; trace mf SAND	96.0	81.7	72	20	52	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT; trace mf SAND	--	--	--	--	--	--	7,100	35	8.75	1,548	--	--	--
	S-11	39.0 - 41.0	Grey CLAY; trace SILT; trace mf SAND	--	63.9	--	--	--	--	--	--	--	--	--	--	--
K-127.1	S-3	4.0 - 6.0	Blackish-Brown SILT; some CLAY; some mf SAND; trace DEBRIS (cinders); trace ORGANIC MATERIAL (root hairs)	--	30.7	34	22	12	4.5	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Blackish-Grey c-mf+ SAND; trace SILT; trace f GRAVEL	4.4	--	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	--	71.7	--	--	--	--	--	--	--	--	--	--	--
	S-9	30.0 - 32.0	Grey CLAY; trace SILT	100.0	58.0	68	19	49	--	--	--	--	--	--	--	--
K-127.9	S-3	4.0 - 6.0	Brownish-Grey CLAY; little SILT; trace f SAND	--	--	--	--	--	--	300	65	7.93	1,170	--	--	--
	S-4	6.0 - 8.0	Brownish-Grey CLAY; little SILT; trace f SAND	95.0	30.0	70	25	45	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Greyish-Brown CLAY; trace f SAND; trace SILT	--	32.4	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Greyish-Brown CLAY; trace SILT	--	28.8	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	30.0	30	17	13	--	--	--	--	--	--	--	--
K-128.0	S-5	8.0 - 10.0	Brownish-Grey CLAY; some mf SAND; trace SILT	--	28.0	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey CLAY; trace SILT	100.0	39.2	78	23	55	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	30.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	38.0 - 40.0	Grey CLAY; trace SILT	100.0	51.2	43	18	25	--	--	--	--	--	--	--	--
K-129.9A	S-5	8.0 - 10.0	Brown SILT; some mf SAND; little ORGANIC MATERIAL (root hairs)	24.0	134.2	NP	NP	NP	16.8	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf+ SAND; little SILT	20.0	31.1	--	--	--	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT		52.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	41.0 - 43.0	Grey CLAY; trace SILT	100.0	40.5	44	20	24	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

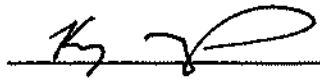
ATL No. CD10279: Kiewit Infrastructure Co. - Champlain Hudson Power Express

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-129.9B	S-4	6.0 - 8.0	Brown CLAY; some ORGANIC MATERIAL (root hairs); trace SILT	--	--	--	--	--	34.9	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey CLAY; little SILT; trace f SAND	--	88.0	96	49	47	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf SAND; trace SILT; trace f GRAVEL	7.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	27.0 - 29.0	Grey CLAY; trace SILT	100.0	51.2	55	20	35	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT	--	50.8	--	--	--	--	--	--	--	--	--	--	--
K-130.9	S-4	6.0 - 8.0	Grey CLAY; little SILT; little mf SAND	85.8	46.6	39	18	21	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey c-mf+ SAND; some SILT; trace CLAY	35.0	65.2	--	--	--	--	--	--	--	--	--	--	--
	RC-2	30.5 - 31.5	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	--	1,153	2.75
	RC-2	31.5 - 31.8	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	7,220	--	--
K-131.6	S-4	6.0 - 8.0	Grey CLAY; trace mf SAND; trace SILT	96.9	48.7	41	20	21	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey c-mf+ SAND; little SILT	15.0	22.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	35.0 - 37.0	Grey CLAY; trace f SAND; trace SILT	99.9	55.9	62	25	37	--	--	--	--	--	--	--	--
K-131.7A	S-3	4.0 - 6.0	Blackish-Brown cmf SAND; some mf GRAVEL; trace SILT	--	--	--	--	--	--	500	35	7.69	42,570	--	--	--
	S-4	6.0 - 8.0	Grey mf+ SAND; and SILT; trace CLAY	50.0	23.3	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey SILT; some CLAY; little f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	78.3	43.6	53	21	32	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; little SILT; trace f SAND	--	70.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; little mf SAND; trace SILT	86.6	66.4	53	25	28	--	--	--	--	--	--	--	--
K-131.7B	S-5	8.0 - 10.0	Brownish-Grey CLAY; little SILT; little ORGANIC MATERIAL (root hairs); trace mf SAND	--	--	--	--	--	10.5	--	--	--	--	--	--	--
	S-6	14.0 -16.0	Black ORGANIC MATERIAL (peat, root hairs); trace SILT	3.1	178.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	60.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; trace SILT; trace f SAND	99.8	58.7	55	19	36	--	--	--	--	--	--	--	--
K-131.9	S-5	8.0 - 10.0	Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT	2.0	411.1	NP	NP	NP	--	--	--	--	--	--	--	--
	S-8	24.0 - 36.0	Grey c-m SAND; trace CLAY; trace SILT	--	62.8	--	--	--	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-129.9A	S-5	8-10	134.2
	S-8	24-26	31.1
	S-10	34-36	52.6
	ST-1	41-43	40.5
K-129.9B	S-6	14-16	88.0
	S-8	24-26	18.3
	ST-1	27-29	51.2
	S-10	34-36	50.8

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

Reviewed By:  Date: 02/07/22

ATLANTIC TESTING LABORATORIES

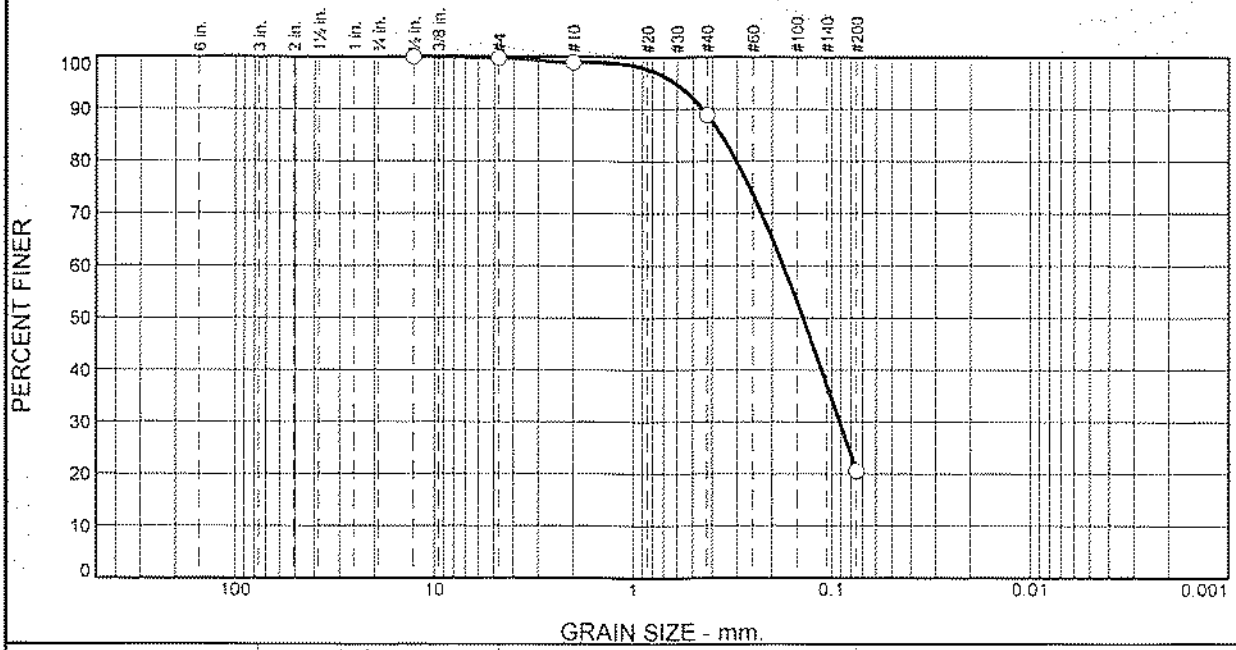
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-02-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/07/22

Sample No: K-129.9A, 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	1	10	69	20	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	100		
#10	99		
#40	89		
#200	20		

Soil Description

Grey c-mF+ SAND; little SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.3609 D_{60}= 0.1763 D_{50}= 0.1401

D_{30}= 0.0914 D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 31.1%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/07/22

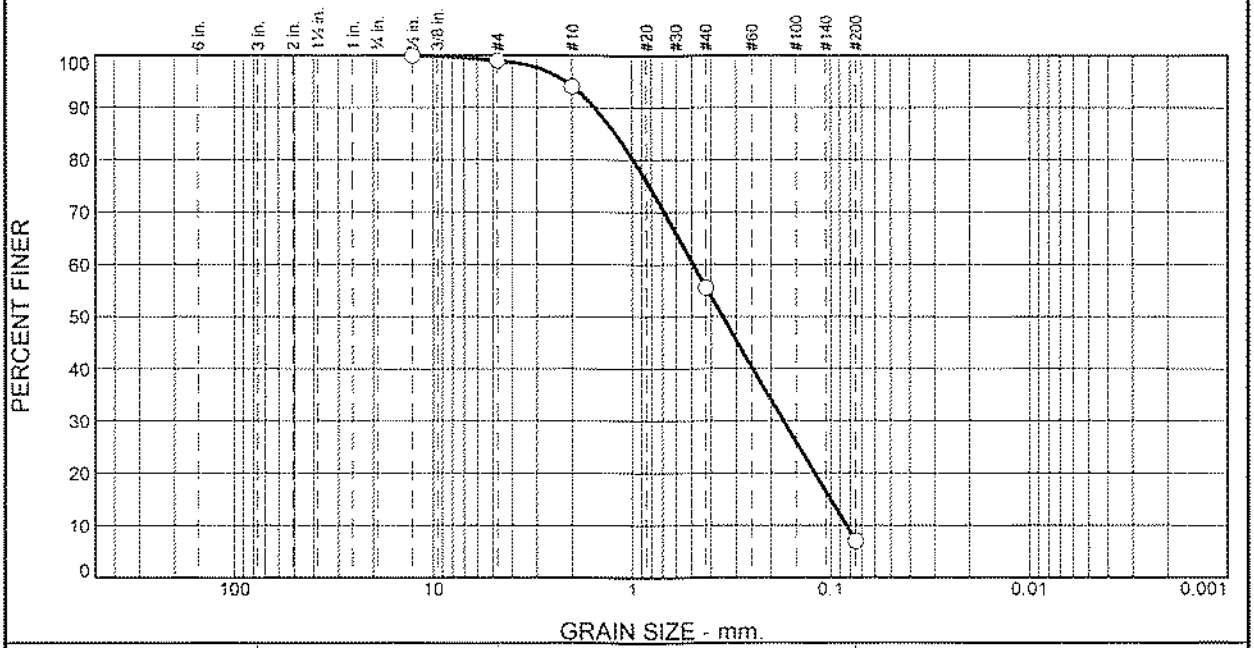
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-02-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/07/22

Sample No: K-129.9B, 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	1	5	38	49	7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	99		
#10	94		
#40	56		
#200	7.0		

Soil Description

Grey c-mf SAND; trace SILT; trace f GRAVEL

Atterberg Limits

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

Coefficients

D_{85}= 1.2169 D_{60}= 0.4924 D_{50}= 0.3512
D_{30}= 0.1736 D_{15}= 0.1006 D_{10}= 0.0837
C_u= 5.88 C_c= 0.73

Classification

USCS= AASHTO=

Remarks

Moisture Content= 18.3%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/07/22

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-02-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 7, 2022
	United Cable Installation	**Test Date:**	February 3, 2022
	Various Locations, New York	**Performed By:**	M. White

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-117.6-1.6A	S-8	28-30	A	10	672.08	70
K-122.4	S-5	8-10	A	10	339.75	57
K-125.6	ST-1	28-30	A	10	257.41	100
K-127.9	S-4	6-8	A	10	164.08	95
K-127.9	ST-1	38-40	A	10	392.67	100
K-128.0	S-7	19-21	A	10	163.31	100
K-128.0	ST-1	38-40	A	10	216.36	100
K-129.9A	S-5	8-10	A	10	136.68	24
K-129.9A	ST-1	41-43	A	10	240.79	100
K-129.9B	ST-1	27-29	A	10	186.13	100

Reviewed By: _____ Date: February 7, 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-02-02-22
Report Date: February 7, 2022
Date Received: February 1, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-1.6A	S-6	46	20	26
K-117.6-1.6A	S-8	47	19	28
K-122.4	S-5	NP	NP	NP
K-125.6	S-5	50	22	28
K-125.6	ST-1	60	20	40
K-127.9	S-4	70	25	45
K-127.9	ST-1	30	17	13
K-128.0	S-7	78	23	55
K-128.0	ST-1	43	18	25
K-129.9A	S-5	NP	NP	NP
K-129.9A	ST-1	44	20	24
K-129.9B	S-6	96	49	47
K-129.9B	ST-1	55	20	35

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-1.6A	S-6	4.76	19	25.3
K-117.6-1.6A	S-8	6.35	28	33.3
K-122.4	S-5	2	5	24.8
K-125.6	S-5	0.42	2	24.7
K-125.6	ST-1	0.177	0	49.4
K-127.9	S-4	2	13	30.0
K-127.9	ST-1	0.177	0	30.0
K-128.0	S-7	0.149	0	39.2
K-128.0	ST-1	0.177	0	51.2
K-129.9A	S-5	2	25	134.2
K-129.9A	ST-1	0.177	0	40.5
K-129.9B	S-6	0.841	9	88.0
K-129.9B	ST-1	0.177	0	51.2

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-1.6A	S-6	Air Dry	Pulverizing and Screening
K-117.6-1.6A	S-8	Air Dry	Pulverizing and Screening
K-122.4	S-5	Air Dry	Pulverizing and Screening
K-125.6	S-5	Air Dry	Pulverizing and Screening
K-125.6	ST-1	Air Dry	Not Necessary
K-127.9	S-4	Air Dry	Pulverizing and Screening
K-127.9	ST-1	Air Dry	Not Necessary
K-128.0	S-7	Air Dry	Not Necessary
K-128.0	ST-1	Air Dry	Not Necessary
K-129.9A	S-5	Air Dry	Pulverizing and Screening
K-129.9A	ST-1	Air Dry	Not Necessary
K-129.9B	S-6	Air Dry	Pulverizing and Screening
K-129.9B	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: 02/07/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-02-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 7, 2022
	United Cable Installation	**Date Received:**	February 1, 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-129.9A	S-5	16.8	83.2	134.2	A	440
K-129.9B	S-4	34.9	65.1	219.6	A	440

Reviewed By: _____ Date: 02/07/22

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 19 – Revision 1
Champlain Hudson Power Express Project
Hudson 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 east of Hudson Falls, New York. The approximate station for the start of HDD crossing Number 19 is STA 20696+00 (43.3134° N, 73.5341° 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, 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 19
Boring B130.8-1, K-130.9
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

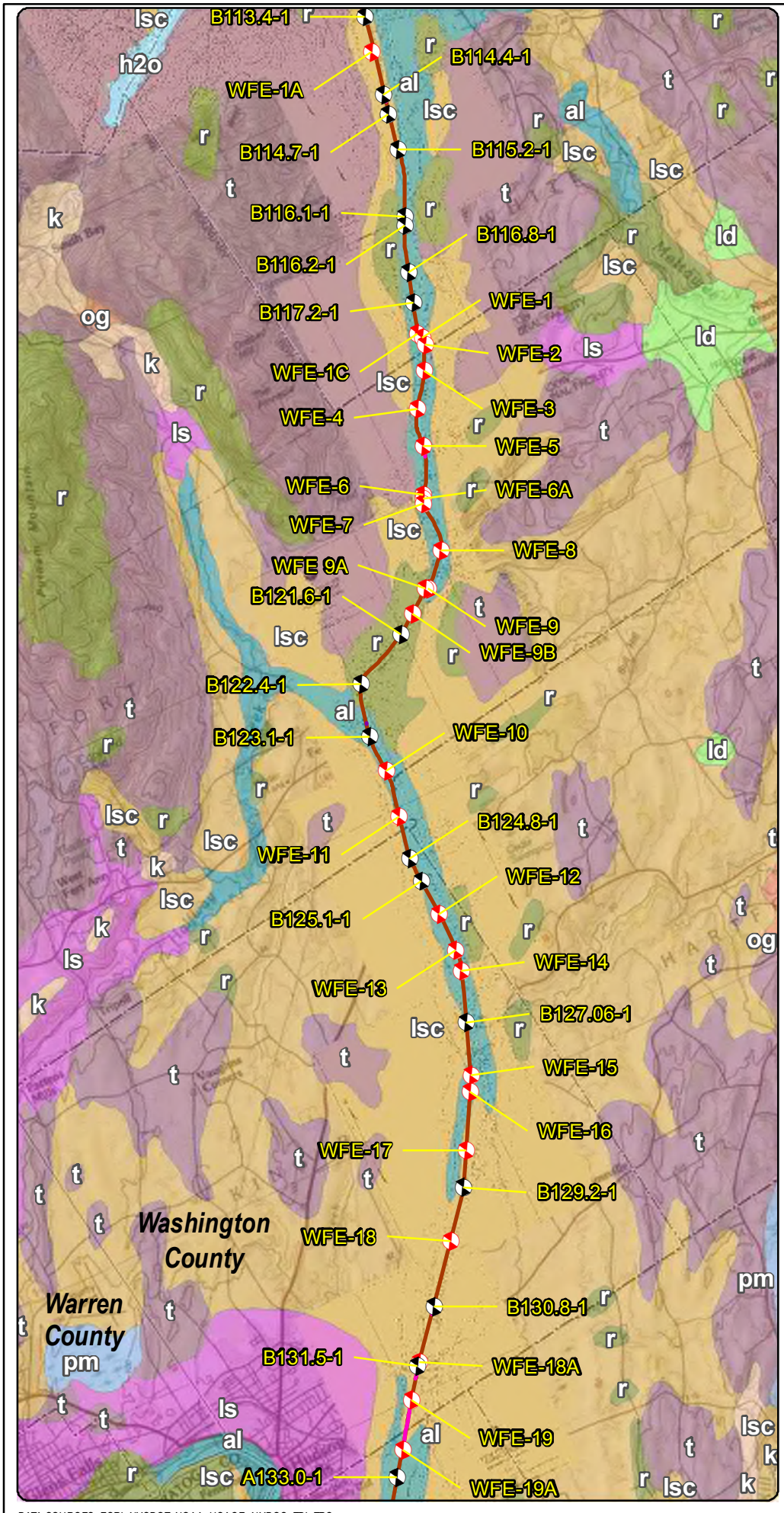
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

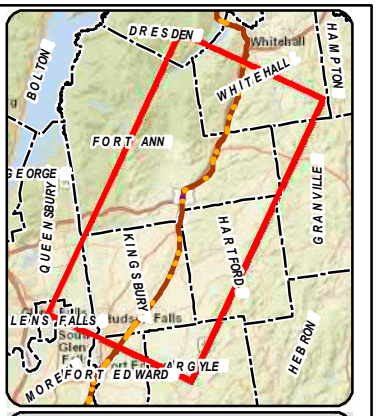
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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 Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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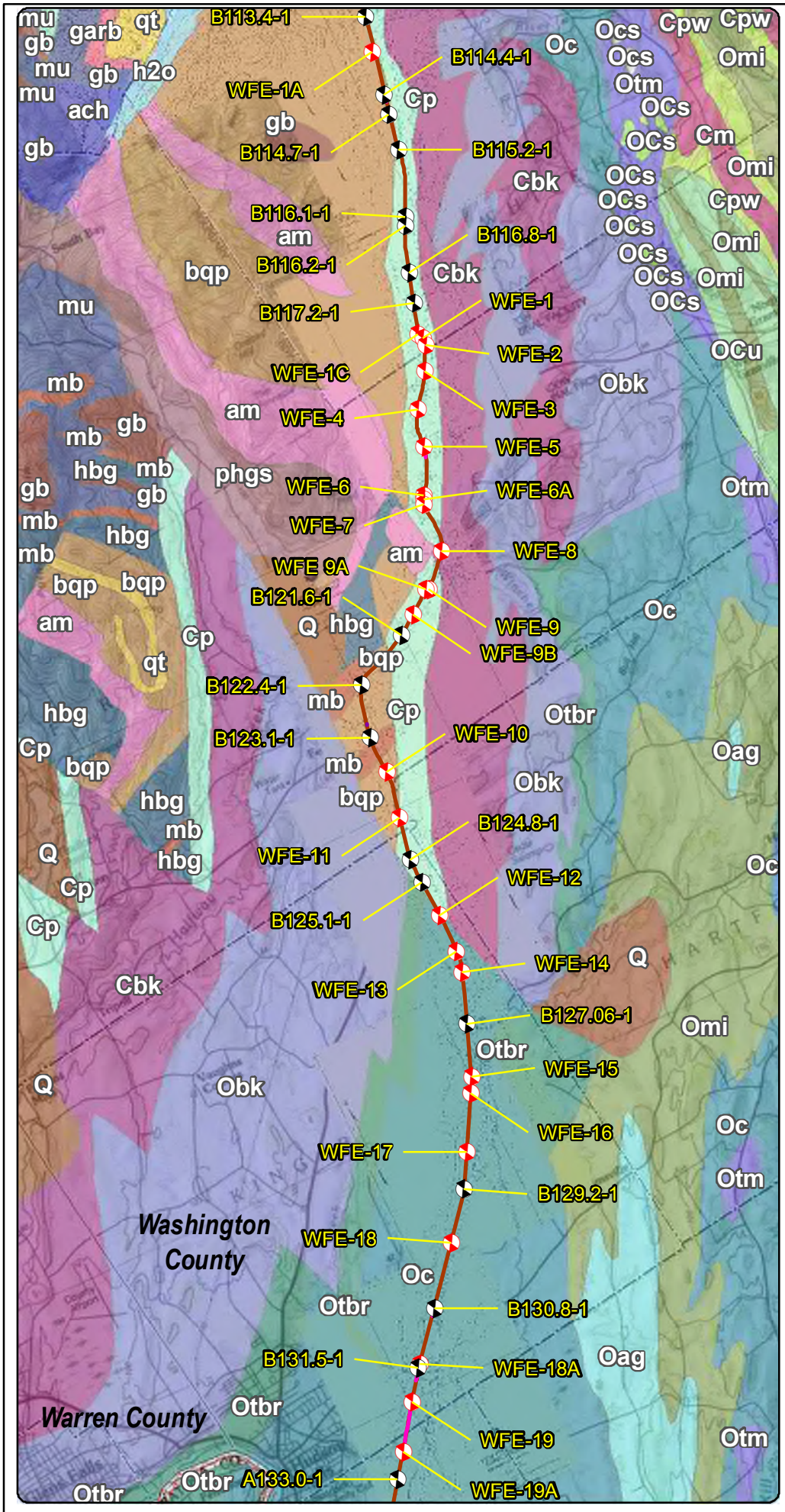

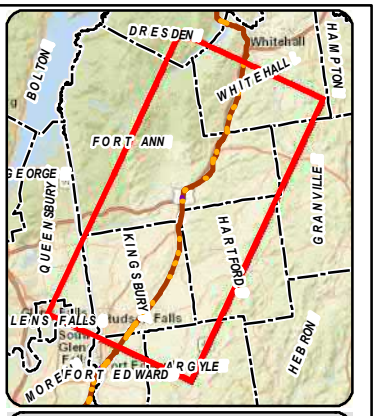

LEGEND

- 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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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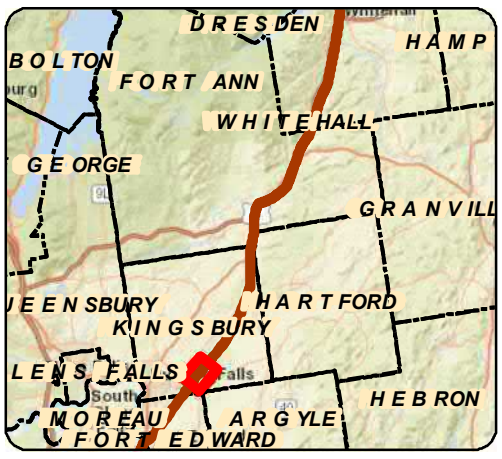
130.5
130.6
130.7
B130.8-1
130.8
130.9
131
131.1
131.2
KINGSBURY
131.3
131.4
WFE-18A
B131.5-1
131.6
131.7
0
1,000
Feet



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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 15 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_Mapset_May_2021_Report.mxd

TEST BORING LOG

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

BORING	**B130.8-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

GROUNDWATER DATA			
FIRST ENCOUNTERED 9.0 '			
DEPTH	HOUR	DATE	ELAPSED TIME

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	30.0 '

DRILLER	P. PLANTIER
HELPER	M. NAGEY
INSPECTOR	J. STAPLETON
DATE STARTED	01/23/2013
DATE COMPLETED	01/23/2013

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	3 3 4 5		***DARK BROWN ORGANIC CLAY, SM SILT, SM COBBLES (FILL)***		
	S-2	2 2 2 3		4.0		
5	S-3	2 3 2 3		***BROWN CLAY AND SAND (FILL)*** 6.0		
	S-4	4 4 5 6			33.2	
▽ 10	S-5	3 3 3 7		***OLIVE-BROWN CLAY, TR TO SM SILT***		
				13.5		
15	S-6	2 2 3			45.7	
				OLIVE-BROWN CLAY, SM SILT		
20	S-7	3 3 4		23.5		
25				***GREEN-BROWN SILT, TR TO SM CLAY, TR F/ SAND***		
				28.5		
30	S-8	4 5 8		***GREEN-BROWN F/M SAND, SM SILT, TR CLAY*** 30.0	23.8	
				END OF BORING AT 30'		
35						

DRN.	JPB
CKD.	PWK

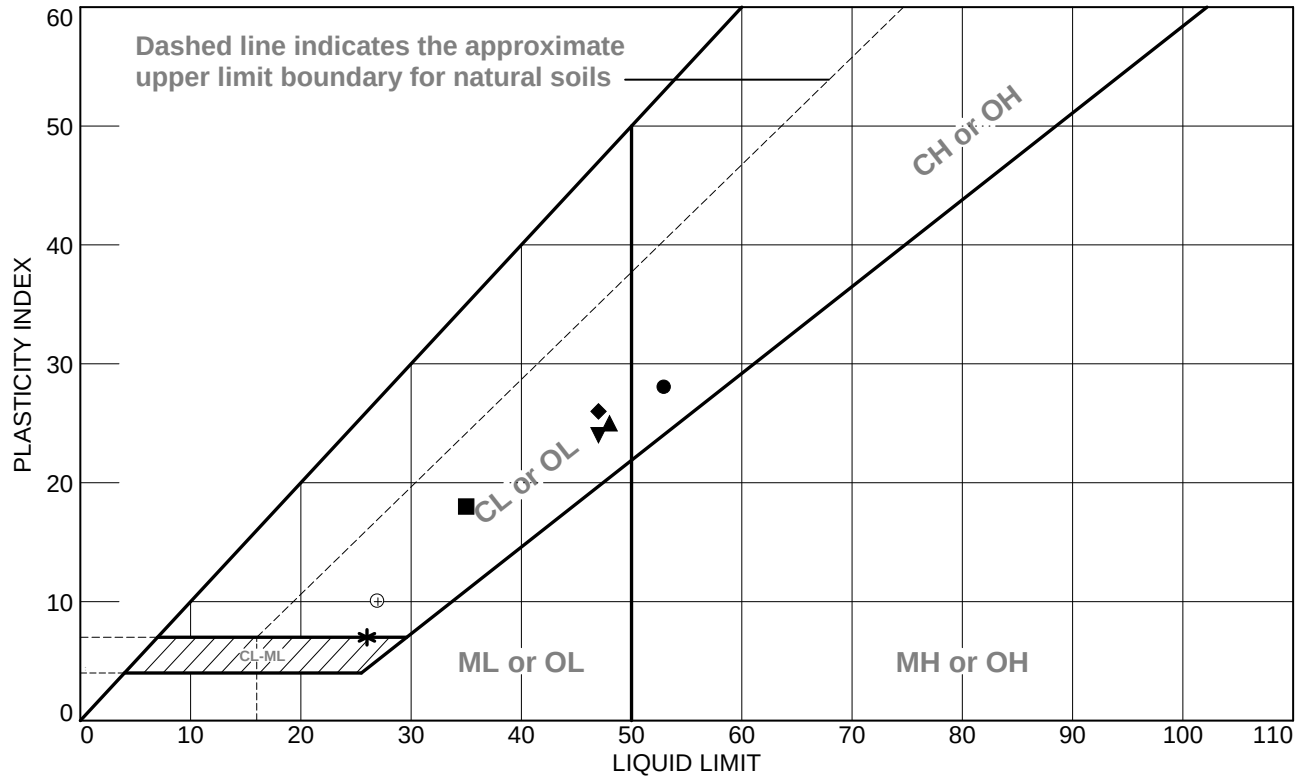
NEW PROJECTS TEST BORING LOG 195651_TDI_CP.GPJ SITE BLAUVELT.GDT 3/27/13

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-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	61.2	-	-	-
B129.2-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	39.1	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	62.5	60.1	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	42.1	80.5	-	-
B130.8-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	33.2	-	-	-
	S-6	13.5-15.0	CL	-	-	-	-	35	17	18	1.6	-	45.7	-	-	-
	S-7	18.5-20.0														
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	23.8	-	-	-
B131.5-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	21.7	-	-	-
	S-3	4.0-6.0	CL	-	-	-	-	48	23	25	0.3	-	30.0	97.0	-	-
	S-5	8.0-10.0	-	0.0	14.2	85.8		-	-	-	-	-	34.7	-	-	-
	S-6	13.5-15.0	CL	0.0	15.7	41.0	43.3	47	21	26	0.2	2.74	25.5	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B125.1-1	S-8	23.5-25.0 FT	29.1	25	53	28	CH
■	B130.8-1	S-6 & S-7	13.5-20.0 FT	45.7	17	35	18	CL
▲	B131.5-1	S-3	4.0-6.0 FT	30.0	23	48	25	CL
◆	B131.5-1	S-6	13.5-15.0 FT	25.5	21	47	26	CL
▼	B135.35-1	S-6	13.5-15.0 FT	38.2	23	47	24	CL
✱	B135.35-1	S-11	38.5-40.0 FT	36.3	19	26	7	CL-ML
⊕	B143.59-1	S-8	23.5-25.0 FT	29.6	17	27	10	CL
⊞	B145.0-1	S-15	58.5-60.0 FT	23.7	20	18	NP	
⊗	B150.5-1	S-3	4.0-6.0 FT	21.5	NP	NV	NP	SM
⊠	B153.1-1	S-7	18.5-20.0 FT	22.8	20	19	NP	

TRC
Engineers, Inc.
Mt. Laurel, NJ

Client: TDI CHAMPLAIN HUDSON POWER EXPRESS - CP
Project: TRANSMISSION DEVELOPERS, INC.

Project No.: 195651 **Figure** 2

Boring Location Plans Page 11 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **1/28/2022** Finish Date: **1/31/2022**

Boring No.: **K-130.9** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
1/31/2022	PM	*12.8'	10.0'

Coordinates
Northing **748893.482**
Easting **1633324.323**

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

Ground Elev.: **143.712**

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	16 20 8 5	2.0	Blackish-Grey cmf GRAVEL; some cm SAND; trace SILT (frozen non-plastic) GW FILL	16
2	CASING	2	2.0	4.0	SS	4 7 7 4	4.0	Brownish-Grey mf SAND; some CLAY; trace SILT (moist, moderately plastic) SC	10
4		3	4.0	6.0	SS	1 1 1 2		Dark Brown & Grey CLAY; little SILT; trace f SAND; trace ORGANIC MATERIAL (root hairs) (moist, plastic) CL	12
6		4	6.0	8.0	SS	2 2 2 2		Grey CLAY; little SILT; little mf SAND (wet, plastic) CL w = 46.6%, LL = 39, PL = 18, PI = 21 % Fines = 85.8%	23
8		5	8.0	10.0	SS	WH/24"		Brownish-Grey CLAY; little f GRAVEL; little mf SAND; trace SILT (saturated, plastic) CL	12
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.	
12							12.0		
14		6	14.0	16.0	SS	WH 1 1 3		Grey c-mf+ SAND; some SILT; trace CLAY (wet, very slightly plastic) SM w = 65.2% % Fines = 35.0%	24
16							17.0		
18									
20		7	19.0	20.0	SS	13 30 50/0"	20.0	Black cmf GRAVEL; some c-f SAND; little CLAY; trace SILT (moist, slightly plastic) Possible WEATHERED ROCK Fragments GC	12
22								Encountered possible WEATHERED ROCK at 20.0 feet. Advanced 3 7/8" tri-cone roller bit to 25.0 feet and began coring.	
24		8	24.0	24.0	SS	50/0"	25.0	NO RECOVERY	0

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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-130.9** Report No.: **CD10279D-01-03-22** Sheet **2** of **2**

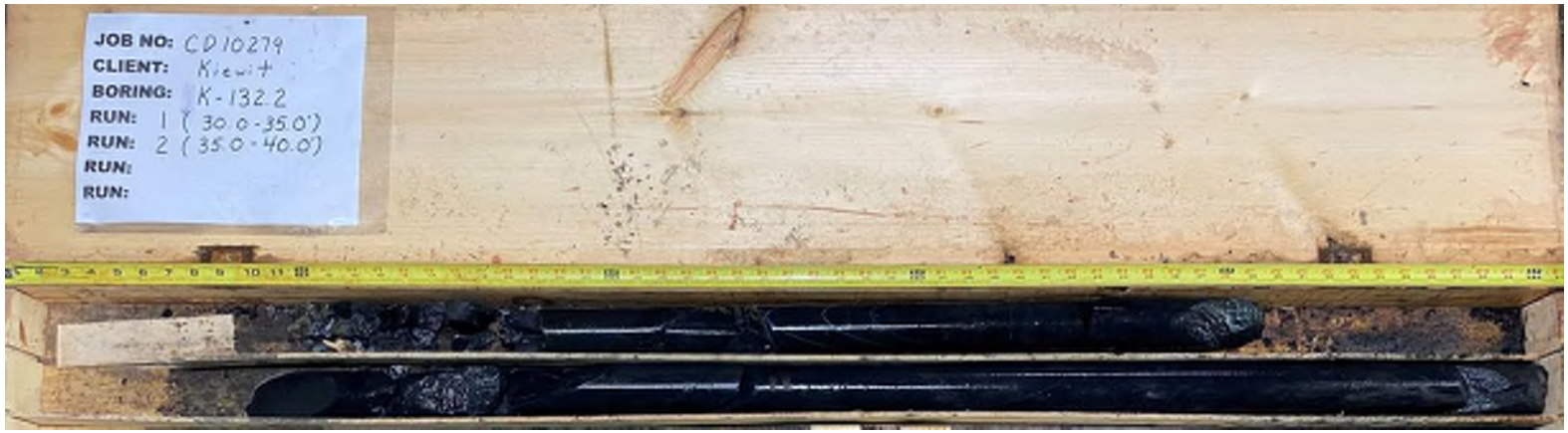
DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	DEPTH OF SAMPLE To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	RECOVERY (inches)
								f - fine; m - medium; c - course; and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%	
25	NX CORE (WET)		25.0	30.0	NX	RUN 1		Dark Grey SHALE 56" or 93% Recovery 8 Pieces (53") - 5% Chips and Fragments 6 Pieces longer than 4" (48") - RQD = 80%	56
30			30.0	35.0	NX	RUN 2	30.0	Dark Grey SHALE 58" or 97% Recovery 10 Pieces (50") - 14% Chips and Fragments 6 Pieces longer than 4" (35") - RQD = 58%	58
35			35.0	40.0	NX	RUN 3	35.0	Dark Grey SHALE 60" or 100% Recovery 5 Pieces (55") - 8% Chips and Fragments 5 Pieces longer than 4" (55") - RQD = 92%	60
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 classifications. 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 2).GPJ ATL4-08.GDT 4/12/22

Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-130.9 - Runs 1 and 2

K-132.2 - Runs 1 and 2



ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-129.9B	S-4	6.0 - 8.0	Brown CLAY; some ORGANIC MATERIAL (root hairs); trace SILT	--	--	--	--	--	34.9	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey CLAY; little SILT; trace f SAND	--	88.0	96	49	47	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf SAND; trace SILT; trace f GRAVEL	7.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	27.0 - 29.0	Grey CLAY; trace SILT	100.0	51.2	55	20	35	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT	--	50.8	--	--	--	--	--	--	--	--	--	--	--
K-130.9	S-4	6.0 - 8.0	Grey CLAY; little SILT; little mf SAND	85.8	46.6	39	18	21	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey c-mf+ SAND; some SILT; trace CLAY	35.0	65.2	--	--	--	--	--	--	--	--	--	--	--
	RC-2	30.5 - 31.5	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	--	1,153	2.75
	RC-2	31.5 - 31.8	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	7,220	--	--
K-131.6	S-4	6.0 - 8.0	Grey CLAY; trace mf SAND; trace SILT	96.9	48.7	41	20	21	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey c-mf+ SAND; little SILT	15.0	22.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	35.0 - 37.0	Grey CLAY; trace f SAND; trace SILT	99.9	55.9	62	25	37	--	--	--	--	--	--	--	--
K-131.7A	S-3	4.0 - 6.0	Blackish-Brown cmf SAND; some mf GRAVEL; trace SILT	--	--	--	--	--	--	500	35	7.69	42,570	--	--	--
	S-4	6.0 - 8.0	Grey mf+ SAND; and SILT; trace CLAY	50.0	23.3	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey SILT; some CLAY; little f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	78.3	43.6	53	21	32	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; little SILT; trace f SAND	--	70.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; little mf SAND; trace SILT	86.6	66.4	53	25	28	--	--	--	--	--	--	--	--
K-131.7B	S-5	8.0 - 10.0	Brownish-Grey CLAY; little SILT; little ORGANIC MATERIAL (root hairs); trace mf SAND	--	--	--	--	--	10.5	--	--	--	--	--	--	--
	S-6	14.0 -16.0	Black ORGANIC MATERIAL (peat, root hairs); trace SILT	3.1	178.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	60.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; trace SILT; trace f SAND	99.8	58.7	55	19	36	--	--	--	--	--	--	--	--
K-131.9	S-5	8.0 - 10.0	Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT	2.0	411.1	NP	NP	NP	--	--	--	--	--	--	--	--
	S-8	24.0 - 36.0	Grey c-m SAND; trace CLAY; trace SILT	--	62.8	--	--	--	--	--	--	--	--	--	--	--

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-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-0.2	S-4	6-8	25.3
	S-7 [1]	19-21	18.3
	S-9	28-30	55.0
K-117.6-2.1	S-4	6-8	15.4
	S-6	14-16	47.9
	S-9	29-31	16.4
	S-11 [1]	38-40	16.4
K-117.6-2.3	S-4 [1]	6-8	13.7
K-130.9	S-4	6-8	46.6
	S-6	14-16	65.2
K-131.6	S-4	6-8	48.7
	S-7	19-21	22.6
	ST-1	35-37	55.9
K-131.7A	S-4	6-8	23.3
	S-7	19-21	43.6
	S-9	29-31	70.9
	ST-1	45-47	66.4
K-131.7B	S-6	14-16	178.4
	S-9	29-31	60.9
	ST-1	45-47	58.7

ATLANTIC TESTING LABORATORIES

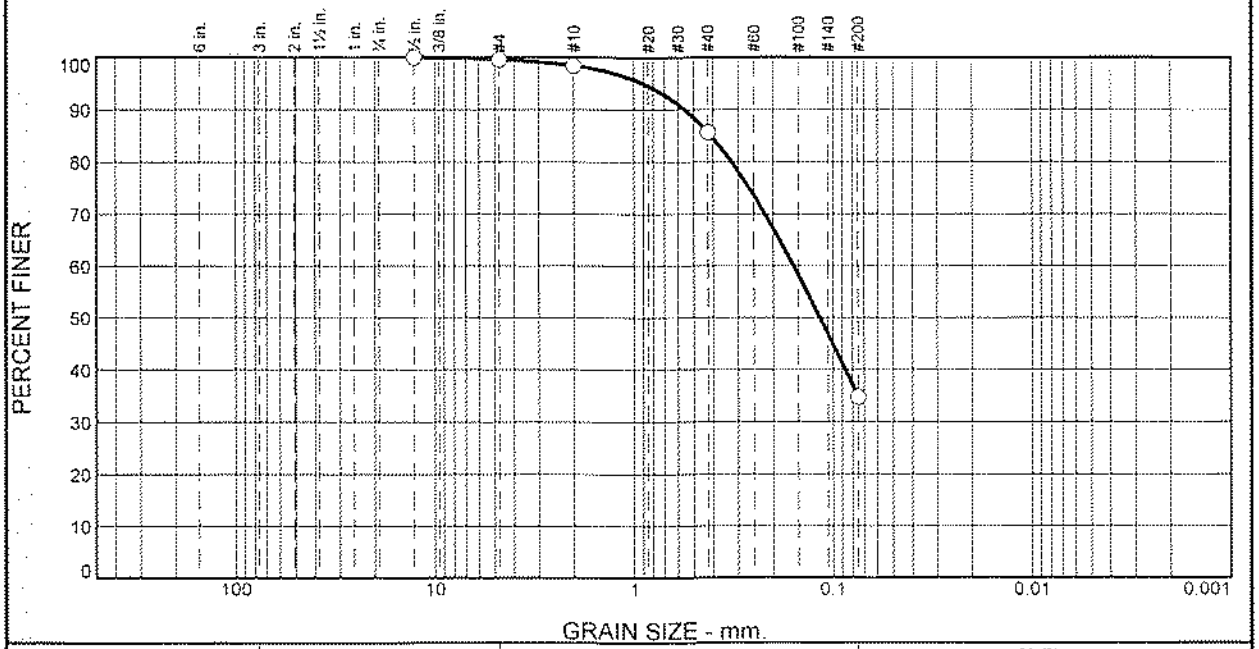
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-130.9, 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	2	12	51	35	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	100		
#10	98		
#40	86		
#200	35		

* (no specification provided)

Soil Description

Grey c-mf+ SAND; some SILT; trace CLAY

Atterberg Limits

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

Coefficients

D_{85}= 0.4113 D_{60}= 0.1585 D_{50}= 0.1168
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 65.2%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/18/22

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-03-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 18, 2022
	United Cable Installation	**Test Date:**	February 11, 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-117.6-0.2	S-4	6-8	A	10	205.83	41.7
K-117.6-0.2	S-7	19-21	A	10	220.45	23.5
K-117.6-0.2	S-9	28-30	A	10	273.37	99.7
K-117.6-2.1	S-6	14-16	A	10	163.54	57.2
K-130.9	S-4	6-8	A	10	144.29	85.8
K-131.6	S-4	6-8	A	10	138.58	96.9
K-131.6	ST-1	35-37	A	10	227.62	99.9
K-131.7A	S-7	19-21	A	10	175.90	78.3
K-131.7A	ST-1	45-47	A	10	221.28	86.6
K-131.7B	S-6	14-16	A	10	147.24	3.1
K-131.7B	ST-1	45-47	A	10	239.55	99.8
K-131.9	S-5	8-10	A	10	133.26	2.0
K-131.9	ST-1	35-37	A	10	194.65	99.0
K-132.1	S-6	14-16	A	10	202.17	44.3
K-132.1	ST-1	35-37	A	10	299.54	99.4

Reviewed By: _____ Date: February 18, 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-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-0.2	S-4	NP	NP	NP
K-117.6-0.2	S-7	NP	NP	NP
K-117.6-0.2	S-9	65	26	39
K-117.6-2.1	S-6	41	19	22
K-130.9	S-4	39	18	21
K-131.6	S-4	41	20	21
K-131.6	ST-1	62	25	37
K-131.7A	S-7	53	21	32
K-131.7A	ST-1	53	25	28
K-131.7B	S-6	NP	NP	NP
K-131.7B	ST-1	55	19	36
K-131.9	S-5	NP	NP	NP
K-131.9	ST-1	51	20	31
K-132.1	S-6	NP	NP	NP
K-132.1	ST-1	44	19	25

SAMPLE INFORMATION

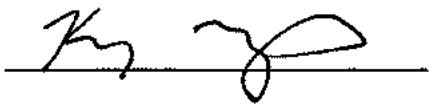
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-0.2	S-4	6.35	15	25.3
K-117.6-0.2	S-7	2.38	30	18.3
K-117.6-0.2	S-9	0.595	1	55.0
K-117.6-2.1	S-6	2	5	47.9
K-130.9	S-4	2	5	46.6
K-131.6	S-4	0.595	2	48.7
K-131.6	ST-1	0.841	1	55.9
K-131.7A	S-7	2	2	43.6
K-131.7A	ST-1	9.51	10	66.4
K-131.7B	S-6	9.51	30	178.4
K-131.7B	ST-1	0.595	1	58.7
K-131.9	S-5	4.76	20	411.1
K-131.9	ST-1	2	1	70.9
K-132.1	S-6	4.76	10	121.0
K-132.1	ST-1	2	1	37.7

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-0.2	S-4	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-7	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-9	Air Dry	Pulverizing and Screening
K-117.6-2.1	S-6	Air Dry	Pulverizing and Screening
K-130.9	S-4	Air Dry	Pulverizing and Screening
K-131.6	S-4	Air Dry	Pulverizing and Screening
K-131.6	ST-1	Air Dry	Pulverizing and Screening
K-131.7A	S-7	Air Dry	Pulverizing and Screening
K-131.7A	ST-1	Air Dry	Pulverizing and Screening
K-131.7B	S-6	Air Dry	Pulverizing and Screening
K-131.7B	ST-1	Air Dry	Pulverizing and Screening
K-131.9	S-5	Air Dry	Pulverizing and Screening
K-131.9	ST-1	Air Dry	Pulverizing and Screening
K-132.1	S-6	Air Dry	Pulverizing and Screening
K-132.1	ST-1	Air Dry	Pulverizing and Screening

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: 02/18/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

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

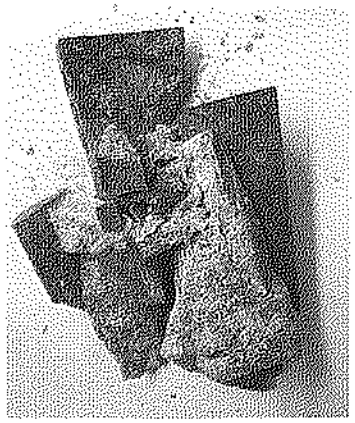
ATL Report No.: CD10279E-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

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

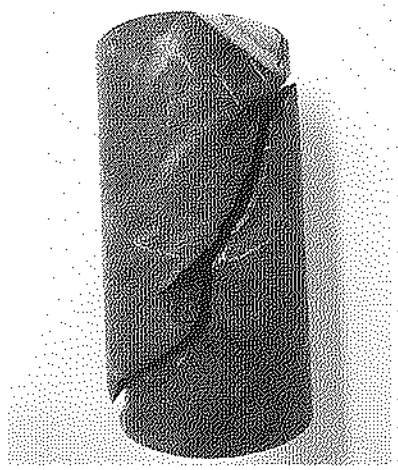
Boring No.	Sample No.	Depth (ft)	Diameter (in)	Length (in)	Load Rate (lbs/sec)	Total Load (lbs)	Area (in^2)	Compressive Strength (psi)
K-117.6-2.3	RC-4	32.7-33.0	1.98	4.01	300	62,970	3.08	20,440
K-130.9	RC-2	31.5-31.8	1.98	4.04	280	22,240	3.08	7,220

Failure Pictures

K-117.6-2.3, RC-4, 32.7-33.0'



K-130.9, RC-2, 31.5-31.8'



Reviewed By: _____ Date: February 18, 2022

Kiewit

MEMORANDUM

DATE: September 23, 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 3 - Package 2 - HDD Crossing 20 and 20.A – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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 Fort Ann, New York. The approximate station for the start of HDD crossing Number 20 is STA 20737+00 (43.305488° N, 73.543174° W). The approximate station for the start of HDD crossing Number 20.A is STA 20741+00 (43.304324° N, 73.544558° W).

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

- AECOM, Geotechnical Data Report, Upland Segments, Champlain Hudson Power Express, dated May 28, 2021.
- 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 2, Whitehall to Glens Falls, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 20, 20.A
Borings WFE-18A, B131.5-1,
K-131.6, K-131.7A, K-131.7B
Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

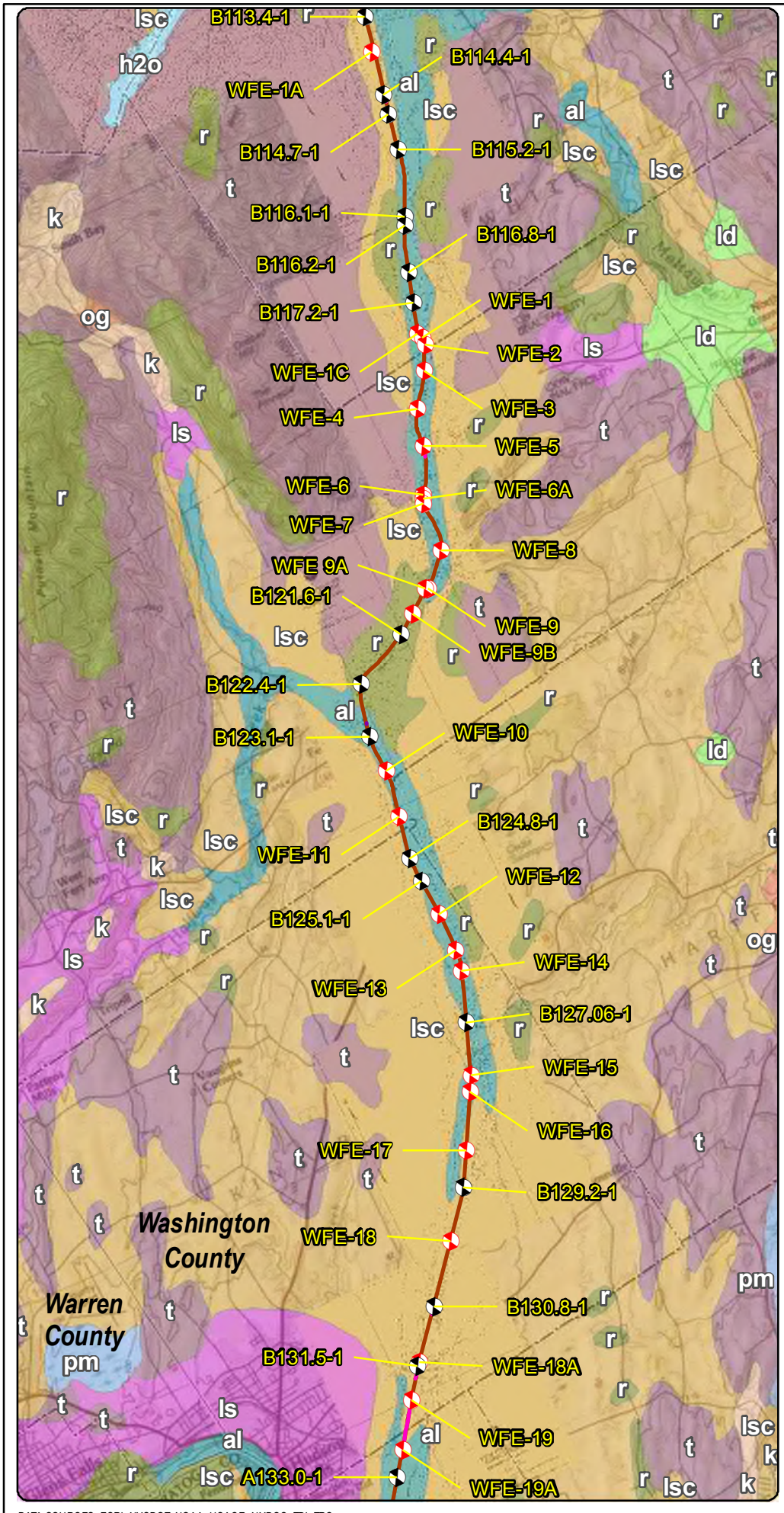
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

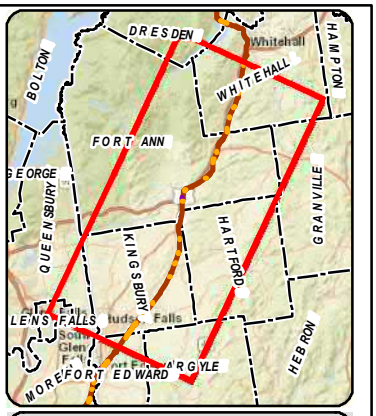
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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 Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

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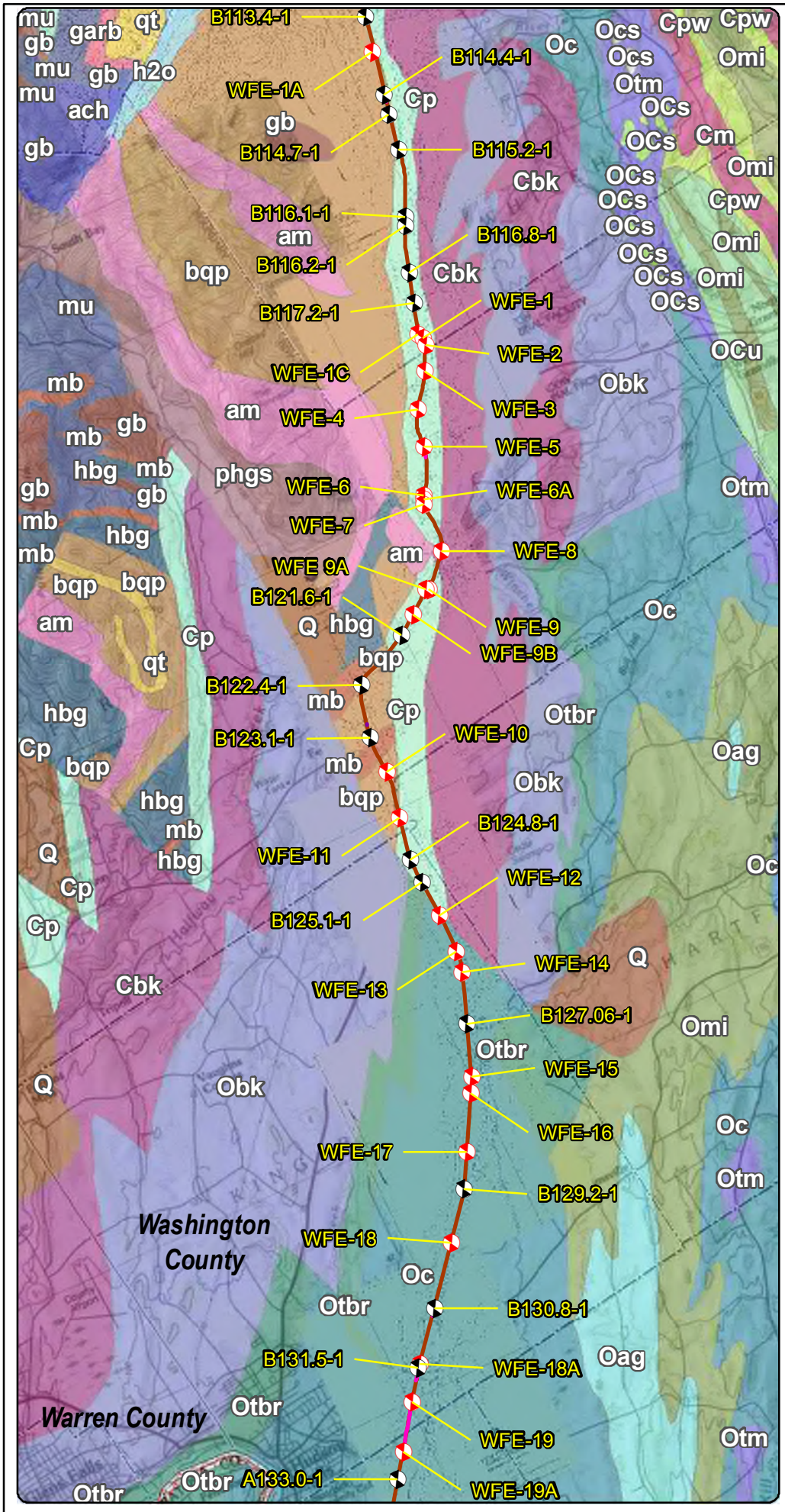

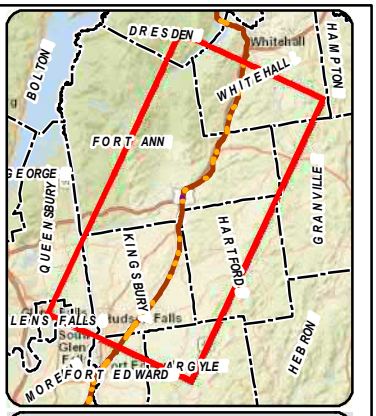

LEGEND

- 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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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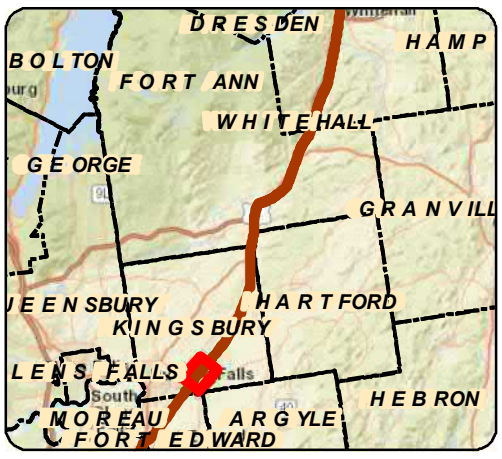
130.5
130.6
130.7
B130.8-1
130.8
130.9
131
131.1
131.2
KINGSBURY
131.3
131.4
WFE-18A
B131.5-1
131.6
131.7
0
1,000
Feet



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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 15 of 16

Prepared by: AECOM 5/19/2021

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

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TEST BORING LOG

BORING	**B131.5-1**
G.S. ELEV.	N/A
FILE	195651
SHEET	1 OF 1

PROJECT: TDI CHAMPLAIN HUDSON POWER EXPRESS

LOCATION: CP RAILROAD ROW, NY

GROUNDWATER DATA			
FIRST ENCOUNTERED NR			
DEPTH	HOUR	DATE	ELAPSED TIME
16.6'	9:30	11/17	0 HR

METHOD OF ADVANCING BOREHOLE				
a	FROM	0.0 '	TO	10.0 '
d	FROM	10.0 '	TO	20.0 '

DRILLER	R.CARUSO
HELPER	C. SMART
INSPECTOR	C. POPPE
DATE STARTED	11/17/2012
DATE COMPLETED	11/17/2012

DEPTH	A	B	C	DESCRIPTION	Wn	REMARKS
	S-1	4 9 10 12		***GRAY SILT, SM F/M SAND, TR CLAY***		
	S-2	16 9 11 11		4.0	21.7	
5	S-3	9 12 14 7			30.0	
	S-4	6 5 6 8				
	S-5	6 7 6 7			34.7	
10				***GRAY SILTY CLAY, TR TO SM F/M SAND***		
	S-6	3 2 3			25.5	
15						
				18.5		
	S-7	WOH		***GRAY F/M SANDY SILT, TR CLAY***		
20				20.0		
				END OF BORING AT 20'		
25						
30						
35						

DRN.	TBT
CKD.	PWK

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

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER/GEOLOGIST: Chris French

LOCATION: M.P. - 131.5 (CP Rail)

AECOM

BORING LOG

SHEET 1 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-18A**

START DATE: 1/12/21

FINISH DATE: 1/12/21

OFFSET: N/A

DRILL RIG: CME LC-55

BORING TYPE: SPT

BORING O.D.: 4.5"

SURFACE ELEV.:

LONGITUDE:

LATITUDE:

GROUND WATER OBSERVATIONS: 11' (inferred)

	CASING	SAMPLER	DRILL BIT	CORE BARREL
TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	
SIZE I.D.	4"	2.5"	- -	
SIZE O.D.	4.5"	3"	3 7/8"	
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				0.0'-1.5'; Black fine-coarse SAND, little silt, little subangular gravel; loose, moist (0'-0.5' frozen)
1.0										
2.0								ML		1.5'-4.0'; Gray SILT, some fine sand (Brown), trace clay; medium stiff, moist
3.0										
		3'-5'	S-1							TR-1; (3.0'-5.0')
4.0								SM		4.0'-5.0'; Brown fine SAND, some silt, trace clay; loose, saturated
5.0										
		5'-7'	S-2	24"	24"	4 5 5 8	7	ML	Silty SAND	Gray SILT, little clay, red-brown mottling; medium stiff, moist
6.0										
7.0										
		7'-9'	S-3	24"	14"	3 3 3 2	4	ML		SAA
8.0										TR-2; (8.0'-8.5')
9.0										
		9'-11'	S-4	24"	24"	WOH WOH 4 5	3	SM		Gray fine SAND, little silt; medium dense, moist-wet
10.0										
11.0										
		11'-13'	S-5	24"	24"	8 18 21 30	25	SP		Brown fine SAND, little medium sand; loose saturated
12.0										
13.0										
		13'-15'	S-6	24"	18"	33 24 26 22	33	SP		SAA
14.0										
15.0										
		15'-17'	S-7	24"	18"	32 23 27 25	33	SP	SAND	Gray fine SAND, some medium sand; very loose, saturated
16.0										TR-3; (16.0'-16.5')
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: M.P. - 131.5 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-18A**

START DATE: 1/12/21

FINISH DATE: 1/12/21

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"	14"	19	17	23	27	26	SP		Gray fine-medium SAND; loose, saturated
21.0													
22.0													
23.0													
24.0													
25.0												SAND	
		25'-27'	S-9	24"	12"	14	15	18	18	21	SP		Gray fine-medium SAND, little coarse sand, trace subangular gravel; very loose, saturated
26.0													
													TR-4; (26.0'-26.5')
27.0													
28.0													
													28.5' (*inferred*)
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH	WOH	WOH	3	0	CH		Gray silty CLAY; soft, moist
31.0													
32.0													
33.0													
34.0													
35.0												Silty CLAY	
		35'-37'	S-11	24"	24"	WOH	WOH	2	2	1	CH		SAA
36.0													
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOH	WOH	3	4	2	CH		SAA
39.0													TR-5; (39.0'-39.5')
40.0													
													WFE-18A 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

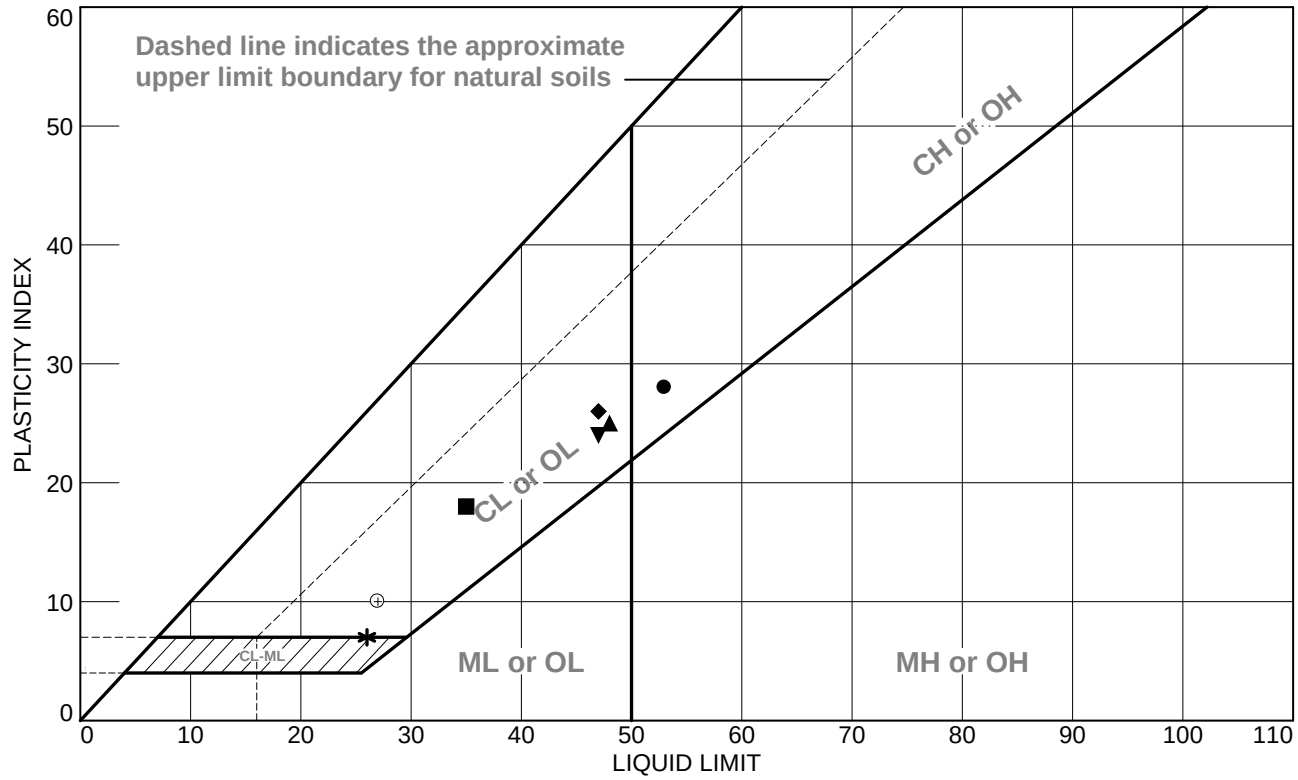
PROPORTIONS: TRACE=1-10% LITTLE=10-20% SOME=20-35% AND=35-50%

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-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	24.7	-	-	-
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	61.2	-	-	-
B129.2-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	39.1	-	-	-
	S-5	8.0-10.0	-	-	-	-	-	-	-	-	-	-	62.5	60.1	-	-
	S-6	13.5-15.0	-	-	-	-	-	-	-	-	-	-	42.1	80.5	-	-
B130.8-1	S-4	6.0-8.0	-	-	-	-	-	-	-	-	-	-	33.2	-	-	-
	S-6	13.5-15.0	CL	-	-	-	-	35	17	18	1.6	-	45.7	-	-	-
	S-7	18.5-20.0														
	S-8	23.5-25.0	-	-	-	-	-	-	-	-	-	-	23.8	-	-	-
B131.5-1	S-2	2.0-4.0	-	-	-	-	-	-	-	-	-	-	21.7	-	-	-
	S-3	4.0-6.0	CL	-	-	-	-	48	23	25	0.3	-	30.0	97.0	-	-
	S-5	8.0-10.0	-	0.0	14.2	85.8		-	-	-	-	-	34.7	-	-	-
	S-6	13.5-15.0	CL	0.0	15.7	41.0	43.3	47	21	26	0.2	2.74	25.5	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

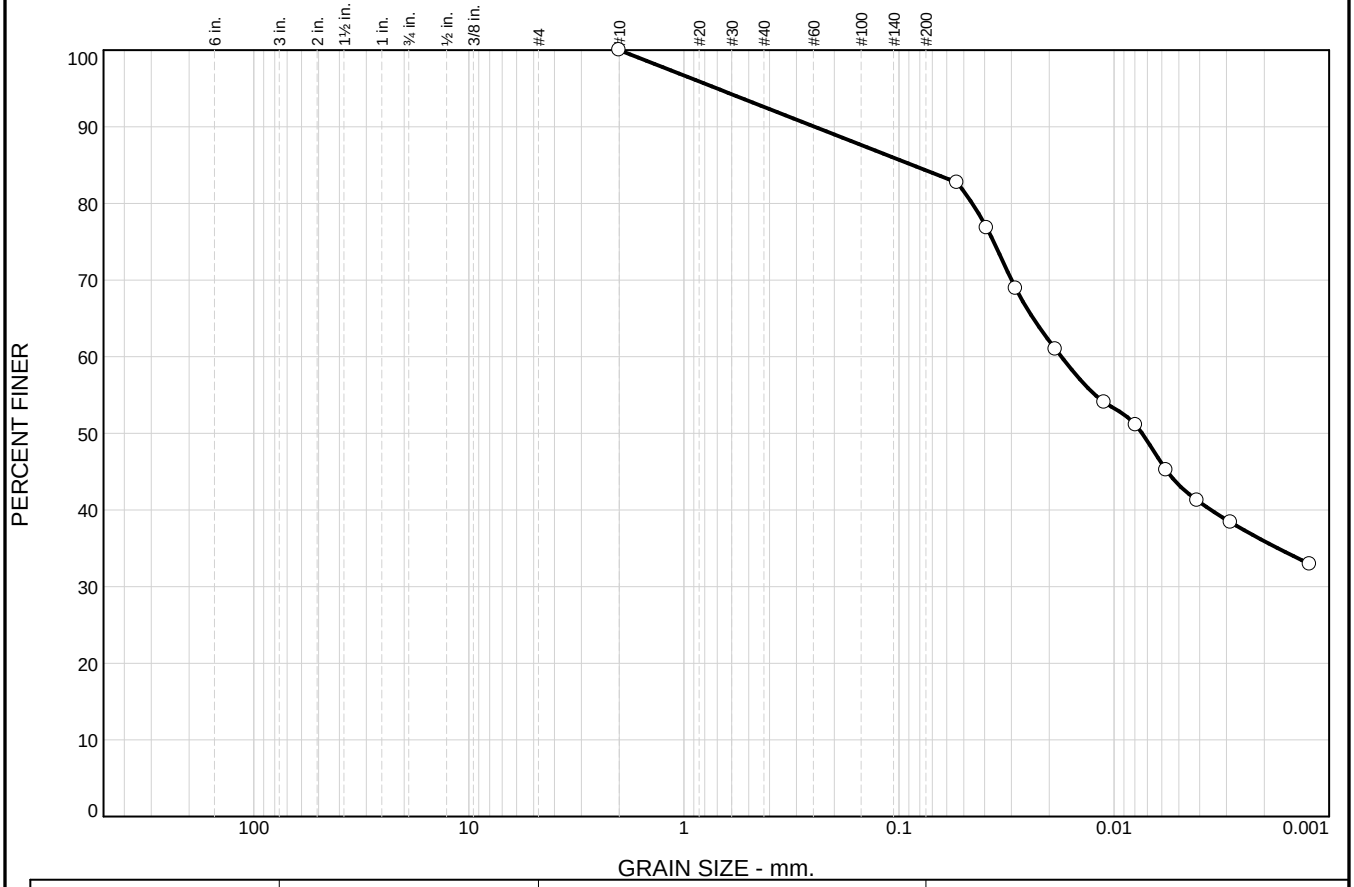
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B125.1-1	S-8	23.5-25.0 FT	29.1	25	53	28	CH
■	B130.8-1	S-6 & S-7	13.5-20.0 FT	45.7	17	35	18	CL
▲	B131.5-1	S-3	4.0-6.0 FT	30.0	23	48	25	CL
◆	B131.5-1	S-6	13.5-15.0 FT	25.5	21	47	26	CL
▼	B135.35-1	S-6	13.5-15.0 FT	38.2	23	47	24	CL
✱	B135.35-1	S-11	38.5-40.0 FT	36.3	19	26	7	CL-ML
⊕	B143.59-1	S-8	23.5-25.0 FT	29.6	17	27	10	CL
⊞	B145.0-1	S-15	58.5-60.0 FT	23.7	20	18	NP	
⊗	B150.5-1	S-3	4.0-6.0 FT	21.5	NP	NV	NP	SM
⊠	B153.1-1	S-7	18.5-20.0 FT	22.8	20	19	NP	

TRC
Engineers, Inc.
Mt. Laurel, NJ

Client: TDI CHAMPLAIN HUDSON POWER EXPRESS - CP
Project: TRANSMISSION DEVELOPERS, INC.

Project No.: 195651 **Figure** 2

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	7.4	8.3	41.0	43.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	47	21	0.0865	0.0176	0.0074					

Material Description	USCS	AASHTO
○ BROWN SILT AND CLAY, SM F/M SAND	CL	A-7-6(23)

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

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B131.5-1 **Depth:** 13.5-15.0 FT **Sample Number:** S-6

TRC Engineers, Inc.

Mt. Laurel, NJ

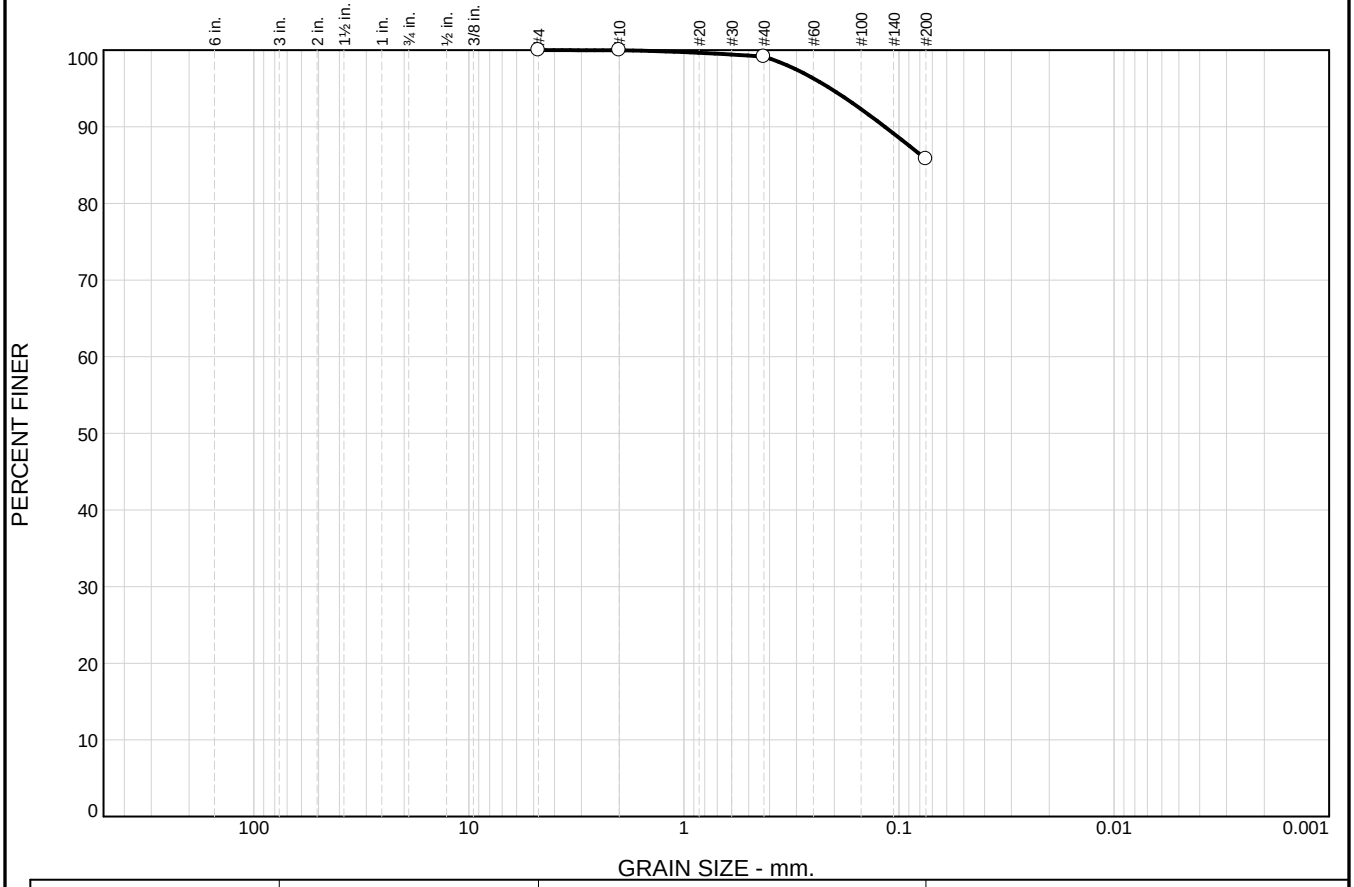
Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

Figure 27

Tested By: TBT 12/20/12 **Checked By:** _____

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.8	13.4	85.8	

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

Material Description	USCS	AASHTO
○ BROWN SILTY CLAY, TR TO SM F/ SAND		

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

Project: TRANSMISSION DEVELOPERS, INC.

○ **Source of Sample:** B131.5-1 **Depth:** 8.0-10.0 FT **Sample Number:** S-5

TRC Engineers, Inc.

Mt. Laurel, NJ

Remarks:

○SAMPLE DESCRIPTION BASED ON VISUAL IDENTIFICATION AND LABORATORY ANALYSIS

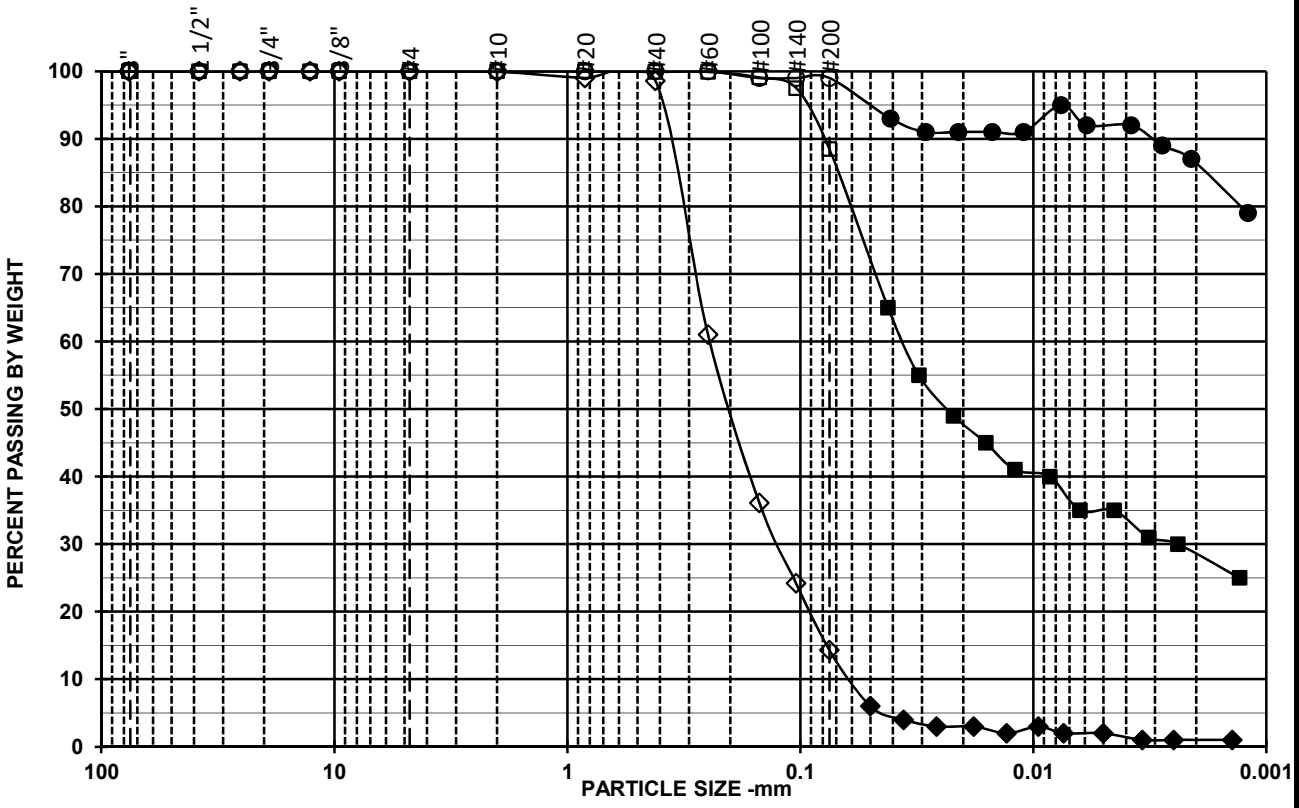
Figure 28

Tested By: TBT 12/18/12 **Checked By:** _____

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	19.9	30	13	17	CL		Gray, Lean clay	04/20/21
◇	18.9				SM		Gray, Silty sand	04/20/21
○	62.9	62	22	40	CH		Gray, Fat clay	04/20/21

Aquifer

TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-18A	WFE-18A	WFE-18A
Sample	S-2	S-7	S-10
Depth	5-7	15-17	30-32
% +3"	0	0	0
% Gravel	0	0	0
% SAND	11.5	85.7	1
%C SAND	0	0.1	0
%M SAND	0.1	1.3	0
%F SAND	11.4	84.3	1
% FINES	88.5	14.3	99
D_{100} (mm)	4.75	4.75	4.75
D_{60} (mm)	0.036	0.244	
D_{30} (mm)	0.002	0.12	
D_{10} (mm)		0.061	
Cc		1	
Cu		4	

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	100
4"	100.0	100.0	100
3"	100.0	100.0	100
1 1/2"	100.0	100.0	100
1"	100.0	100.0	100
3/4"	100.0	100.0	100
1/2"	100.0	100.0	100
3/8"	100.0	100.0	100
#4	100.0	100.0	100
#10	100.0	99.9	100
#20	100.0	99.0	100
#40	99.9	98.6	100
#60	99.9	61.0	100
#100	99.1	36.1	99
#140	97.5	24.2	99
#200	88.5	14.3	99
5μ m	35	2	92
2μ m	29	1	86
1μ m	23	1	76

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928

Boring Location Plans Page 11 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/1/2022** Finish Date: **2/1/2022**

Boring No.: **K-131.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/1/2022	PM	DRY	10.0'

Coordinates
Northing **746435.732**
Easting **1630320.22**

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

Ground Elev.: **145.25**

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

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	16 49 30 6		Grey and White cmf GRAVEL; and cmf SAND; trace SILT (frozen, non-plastic) GW FILL	18
2							2.0		
2	CASING	2	2.0	4.0	SS	5 8 16 8		Grey CLAY; little f SAND; trace SILT (moist, plastic) CL	14
4		3	4.0	6.0	SS	2 2 1 2		Similar Soil (moist, plastic) CL	22
6		4	6.0	8.0	SS	WH/12" 2 1		Grey CLAY; trace mf SAND; trace SILT (moist, plastic) CL w = 48.7%, LL = 41, PL = 20, PI = 21 % Fines = 96.9%	23
8		5	8.0	10.0	SS	1 2 3 3		Grey CLAY; trace mf SAND; trace SILT (moist, plastic) CL	14
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.	
12							12.0		
14		6	14.0	16.0	SS	WH/18" 2		Grey f SAND; some CLAY; little SILT (moist, moderately plastic) SC-SM	24
16							17.0		
18									
19		7	19.0	21.0	SS	7 5 8 9		Grey c-mf+ SAND; little SILT (wet, non-plastic) SM w = 22.6% % Fines = 15.0%	14
22									
24		8	24.0	26.0	SS	5 7 8 10		Similar Soil (wet, non-plastic) SM	12
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-131.6** Report No.: **CD10279D-01-03-22** 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									
27							27.0		
28									
29		9	29.0	31.0	SS	WH/24"		Grey CLAY; trace f SAND; trace SILT (wet, plastic) CH	24
30									
31									
32									
33									
34									
35		ST-1	35.0	37.0	SS	WH/12" 1 2		(3" Brass Lined Split Spoon) Grey CLAY; trace f SAND; trace SILT (wet, plastic) CH w = 55.9%, LL = 62, PL = 25, PI = 37 % Fines = 99.9%	24
36									
37									
38		10	38.0	40.0	SS	WH 1 2 3		Similar Soil (wet, plastic) CH	24
39									
40							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 classifications.	
46								3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/1/2022** Finish Date: **2/2/2022**

Boring No.: **K-131.7A** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/2/2022	**AM**	***5.7'**	**10.0'**

Coordinates
Northing **746175.646**
Easting **1629988.338**

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

Ground Elev.: **144.641**

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	29 30 13 4	2.0	Black cmf GRAVEL; and cmf SAND; trace SILT (moist, non-plastic) GW FILL	12
2	CASING	2	2.0	4.0	SS	3 7 9 6		Blackish-Brown cmf SAND; some mf GRAVEL; trace SILT (moist, non-plastic) SW Possible FILL	10
4		3	4.0	6.0	SS	3 2 2 2	6.0	Similar Soil (moist, non-plastic) SW Possible FILL	6
6		4	6.0	8.0	SS	1 1 1 1	8.0	Grey mf+ SAND; and SILT; trace CLAY (moist, very slightly plastic) SM w = 23.3% % Fines = 50.0%	16
8		5	8.0	10.0	SS	1 1 1 1		Grey CLAY; trace f SAND; trace SILT (wet, plastic) CH	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.	
12							12.0		
14		6	14.0	16.0	SS	WH/24"		Grey c-mf SAND; some SILT; trace CLAY (moist, very slightly plastic) SM	24
16							17.0		
18									
19		7	19.0	21.0	SS	WH/24"		Grey SILT; some CLAY; little f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments) (moist, moderately plastic) MH/CH w = 43.6%, LL = 53, PL = 21, PI = 32 % Fines = 78.3%	24
23									
24		8	24.0	26.0	SS	WH 1 1 1		NO RECOVERY - COBBLE fragment in split spoon shoe	0
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-131.7A** Report No.: **CD10279D-01-03-22** 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									
27							27.0		
28									
29		9	29.0	31.0	SS	WH/24"		Grey CLAY; little SILT; trace f SAND (wet, plastic) CH w = 70.9%	24
30									
31									
32									
33									
34		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
35									
36									
37									
38									
39		11	39.0	41.0	SS	WH/24"		Grey CLAY; little mf SAND; trace SILT (wet, plastic) CH	24
40									
41									
42									
43									
44									
45		ST-1	45.0	47.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; little mf SAND; trace SILT (wet, plastic) CH w = 66.4%, LL = 53, PL = 25, PI = 28 % Fines = 86.6%	24
46									
47									
48		12	48.0	50.0	SS	WH/24"		Grey CLAY; little f SAND; trace SILT (wet, plastic) CH	24
49									
50							50.0		
51								Boring terminated at 50.0 feet.	
52									
53								Notes: 1. Borehole backfilled with cement-bentonite grout. 2. Soil classifications based on ATL Field Engineer's field classifications. 3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

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

Boring No.: **K-131.7B** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/2/2022	PM	*11.7'	10.0'

Coordinates
Northing **746022.808**
Easting **1629771.027**

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

Ground Elev.: **143.464**

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	17 20 20 10	2.0	Brown cmf SAND; some mf GRAVEL; trace SILT (moist, non-plastic) SW Possible FILL	20
2	CASING	2	2.0	4.0	SS	8 10 7 6		Greyish-Brown CLAY; and f SAND; trace SILT (moist, plastic) CL	14
4		3	4.0	6.0	SS	8 5 6 5		Brownish-Grey CLAY; some f SAND; trace SILT (moist, plastic) CL	20
6		4	6.0	8.0	SS	6 5 6 4		Brownish-Grey CLAY; little SILT; trace f SAND (moist, plastic) CL	24
8		5	8.0	10.0	SS	4 3 3 1		Brownish-Grey CLAY; little SILT; little ORGANIC MATERIAL (root hairs); trace mf SAND (moist, plastic) OH OC = 10.5%	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.	
12	WET ROTARY						12.0		
14		6	14.0	16.0	SS	WH/24"		Black ORGANIC MATERIAL (peat, root hairs); trace SILT (saturated, non-plastic) PT w = 178.4%, LL = NP, PL = NP, PI = NP % Fines = 3.1%	24
17							17.0		
19		7	19.0	21.0	SS	WH/24"		Grey CLAY; little SILT; trace mf SAND; trace ORGANIC MATERIAL (root hairs) (moist, plastic) OH	24
24		8	24.0	26.0	SS	WH/24"		Grey CLAY; trace SILT (wet, plastic) CH	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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-131.7B** Report No.: **CD10279D-01-03-22** 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 w = 60.9%	24
34		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
39		11	39.0	41.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
45		ST-1	45.0	47.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace f SAND (wet, plastic) CH w = 58.7%, LL = 55, PL = 19, PI = 36 % Fines = 99.8%	24
48		12	48.0	50.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
50							50.0	Boring terminated at 50.0 feet.	

Notes:
1. Borehole backfilled with cement-bentonite grout.
2. Soil classifications based on ATL Field Engineer's field classifications.
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-129.9B	S-4	6.0 - 8.0	Brown CLAY; some ORGANIC MATERIAL (root hairs); trace SILT	--	--	--	--	--	34.9	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey CLAY; little SILT; trace f SAND	--	88.0	96	49	47	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf SAND; trace SILT; trace f GRAVEL	7.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	27.0 - 29.0	Grey CLAY; trace SILT	100.0	51.2	55	20	35	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT	--	50.8	--	--	--	--	--	--	--	--	--	--	--
K-130.9	S-4	6.0 - 8.0	Grey CLAY; little SILT; little mf SAND	85.8	46.6	39	18	21	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey c-mf+ SAND; some SILT; trace CLAY	35.0	65.2	--	--	--	--	--	--	--	--	--	--	--
	RC-2	30.5 - 31.5	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	--	1,153	2.75
	RC-2	31.5 - 31.8	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	7,220	--	--
K-131.6	S-4	6.0 - 8.0	Grey CLAY; trace mf SAND; trace SILT	96.9	48.7	41	20	21	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey c-mf+ SAND; little SILT	15.0	22.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	35.0 - 37.0	Grey CLAY; trace f SAND; trace SILT	99.9	55.9	62	25	37	--	--	--	--	--	--	--	--
K-131.7A	S-3	4.0 - 6.0	Blackish-Brown cmf SAND; some mf GRAVEL; trace SILT	--	--	--	--	--	--	500	35	7.69	42,570	--	--	--
	S-4	6.0 - 8.0	Grey mf+ SAND; and SILT; trace CLAY	50.0	23.3	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey SILT; some CLAY; little f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	78.3	43.6	53	21	32	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; little SILT; trace f SAND	--	70.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; little mf SAND; trace SILT	86.6	66.4	53	25	28	--	--	--	--	--	--	--	--
K-131.7B	S-5	8.0 - 10.0	Brownish-Grey CLAY; little SILT; little ORGANIC MATERIAL (root hairs); trace mf SAND	--	--	--	--	--	10.5	--	--	--	--	--	--	--
	S-6	14.0 -16.0	Black ORGANIC MATERIAL (peat, root hairs); trace SILT	3.1	178.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	60.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; trace SILT; trace f SAND	99.8	58.7	55	19	36	--	--	--	--	--	--	--	--
K-131.9	S-5	8.0 - 10.0	Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT	2.0	411.1	NP	NP	NP	--	--	--	--	--	--	--	--
	S-8	24.0 - 36.0	Grey c-m SAND; trace CLAY; trace SILT	--	62.8	--	--	--	--	--	--	--	--	--	--	--

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-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-0.2	S-4	6-8	25.3
	S-7 [1]	19-21	18.3
	S-9	28-30	55.0
K-117.6-2.1	S-4	6-8	15.4
	S-6	14-16	47.9
	S-9	29-31	16.4
	S-11 [1]	38-40	16.4
K-117.6-2.3	S-4 [1]	6-8	13.7
K-130.9	S-4	6-8	46.6
	S-6	14-16	65.2
K-131.6	S-4	6-8	48.7
	S-7	19-21	22.6
	ST-1	35-37	55.9
K-131.7A	S-4	6-8	23.3
	S-7	19-21	43.6
	S-9	29-31	70.9
	ST-1	45-47	66.4
K-131.7B	S-6	14-16	178.4
	S-9	29-31	60.9
	ST-1	45-47	58.7

ATLANTIC TESTING LABORATORIES

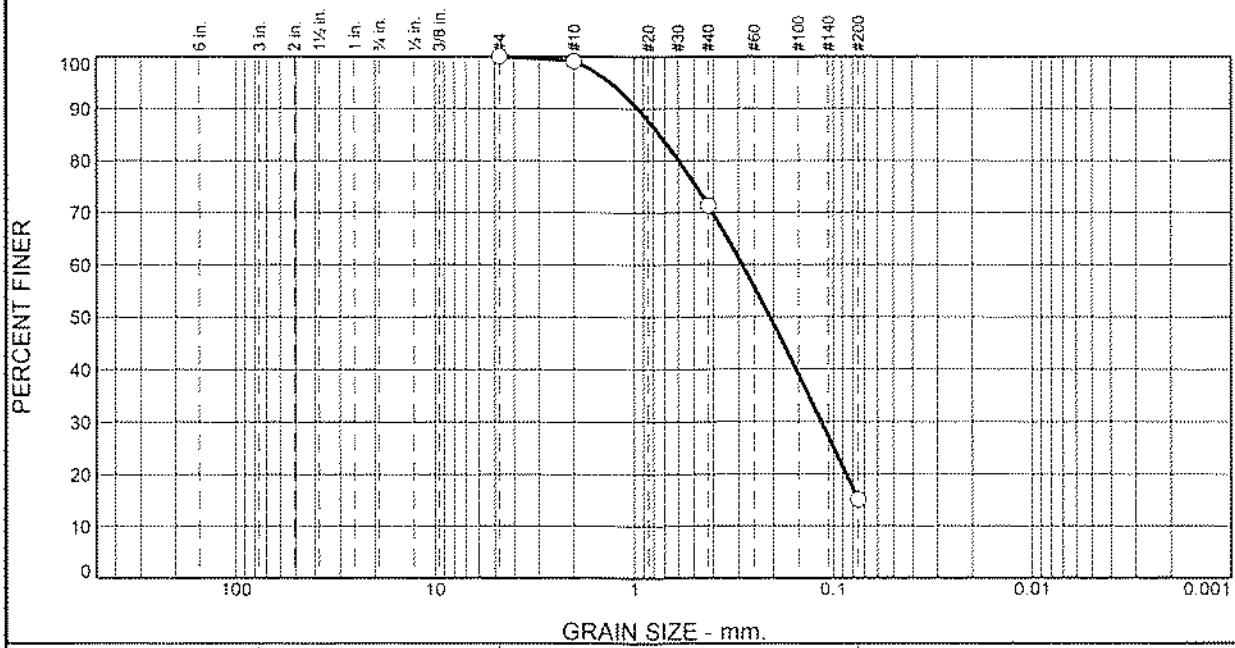
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-131.6, S-7 **Source of Sample:** Boring Sample

Location: In-place **Elev./Depth:** 19-21'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	28	56	15	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	99		
#40	71		
#200	15		

Soil Description

Grey c-mf+ SAND; little SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.7456 D_{60}= 0.2874 D_{50}= 0.2089
D_{30}= 0.1151 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 22.6%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 02/18/22

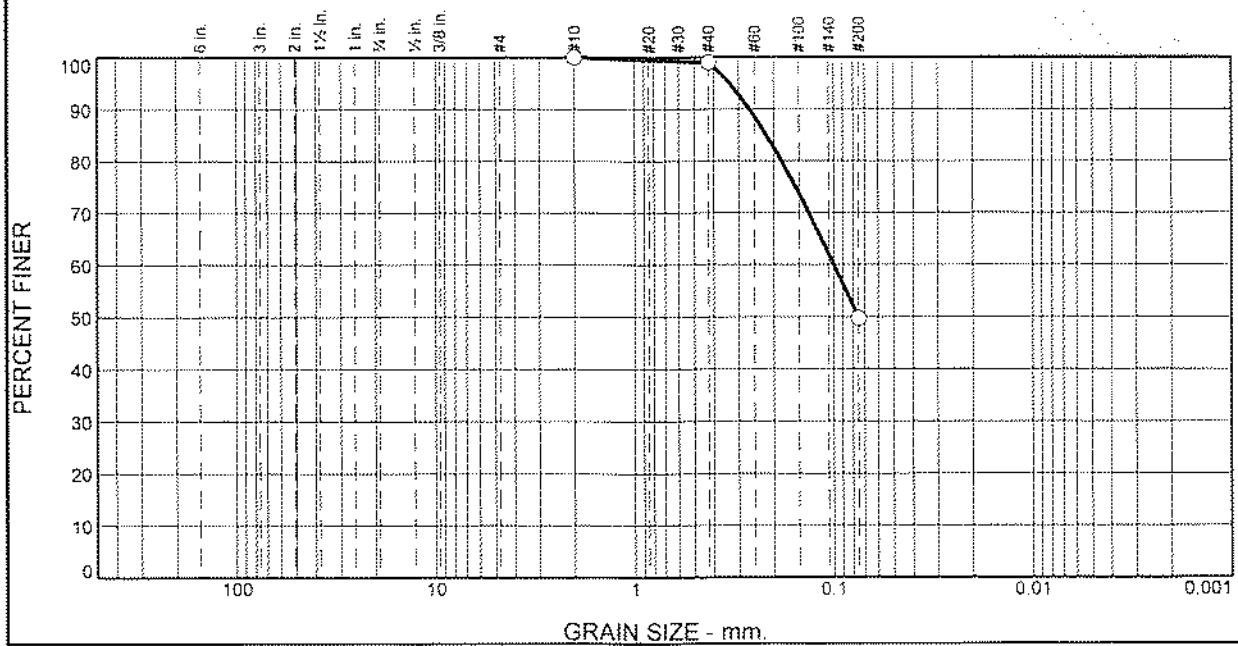
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-03-02-22

Client: Kiewit Intrastructure Co. **Date:** 02/18/22

Sample No: K-131.7A, S-4 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 6-8'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	49	50	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#10	100		
#40	99		
#200	50		

* (no specification provided)

Soil Description

Grey mf+ SAND; and SILT; trace CLAY

Atterberg Limits

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

Coefficients

D_{85}= 0.2188 D_{60}= 0.1001 D_{50}= 0.0756
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 23.3%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 02/18/22

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-03-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 18, 2022
	United Cable Installation	**Test Date:**	February 11, 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-117.6-0.2	S-4	6-8	A	10	205.83	41.7
K-117.6-0.2	S-7	19-21	A	10	220.45	23.5
K-117.6-0.2	S-9	28-30	A	10	273.37	99.7
K-117.6-2.1	S-6	14-16	A	10	163.54	57.2
K-130.9	S-4	6-8	A	10	144.29	85.8
K-131.6	S-4	6-8	A	10	138.58	96.9
K-131.6	ST-1	35-37	A	10	227.62	99.9
K-131.7A	S-7	19-21	A	10	175.90	78.3
K-131.7A	ST-1	45-47	A	10	221.28	86.6
K-131.7B	S-6	14-16	A	10	147.24	3.1
K-131.7B	ST-1	45-47	A	10	239.55	99.8
K-131.9	S-5	8-10	A	10	133.26	2.0
K-131.9	ST-1	35-37	A	10	194.65	99.0
K-132.1	S-6	14-16	A	10	202.17	44.3
K-132.1	ST-1	35-37	A	10	299.54	99.4

Reviewed By: _____ Date: February 18, 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-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-0.2	S-4	NP	NP	NP
K-117.6-0.2	S-7	NP	NP	NP
K-117.6-0.2	S-9	65	26	39
K-117.6-2.1	S-6	41	19	22
K-130.9	S-4	39	18	21
K-131.6	S-4	41	20	21
K-131.6	ST-1	62	25	37
K-131.7A	S-7	53	21	32
K-131.7A	ST-1	53	25	28
K-131.7B	S-6	NP	NP	NP
K-131.7B	ST-1	55	19	36
K-131.9	S-5	NP	NP	NP
K-131.9	ST-1	51	20	31
K-132.1	S-6	NP	NP	NP
K-132.1	ST-1	44	19	25

SAMPLE INFORMATION

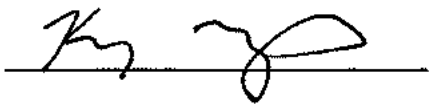
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-0.2	S-4	6.35	15	25.3
K-117.6-0.2	S-7	2.38	30	18.3
K-117.6-0.2	S-9	0.595	1	55.0
K-117.6-2.1	S-6	2	5	47.9
K-130.9	S-4	2	5	46.6
K-131.6	S-4	0.595	2	48.7
K-131.6	ST-1	0.841	1	55.9
K-131.7A	S-7	2	2	43.6
K-131.7A	ST-1	9.51	10	66.4
K-131.7B	S-6	9.51	30	178.4
K-131.7B	ST-1	0.595	1	58.7
K-131.9	S-5	4.76	20	411.1
K-131.9	ST-1	2	1	70.9
K-132.1	S-6	4.76	10	121.0
K-132.1	ST-1	2	1	37.7

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-0.2	S-4	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-7	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-9	Air Dry	Pulverizing and Screening
K-117.6-2.1	S-6	Air Dry	Pulverizing and Screening
K-130.9	S-4	Air Dry	Pulverizing and Screening
K-131.6	S-4	Air Dry	Pulverizing and Screening
K-131.6	ST-1	Air Dry	Pulverizing and Screening
K-131.7A	S-7	Air Dry	Pulverizing and Screening
K-131.7A	ST-1	Air Dry	Pulverizing and Screening
K-131.7B	S-6	Air Dry	Pulverizing and Screening
K-131.7B	ST-1	Air Dry	Pulverizing and Screening
K-131.9	S-5	Air Dry	Pulverizing and Screening
K-131.9	ST-1	Air Dry	Pulverizing and Screening
K-132.1	S-6	Air Dry	Pulverizing and Screening
K-132.1	ST-1	Air Dry	Pulverizing and Screening

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: 02/18/22

Kiewit

MEMORANDUM

DATE: December 16, 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 3 - Package 2 - HDD Crossings 21 and 21A – Revision 1
Champlain Hudson Power Express Project
Fort Ann, 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. HDD crossings 21 and 21A are located south of Fort Ann, New York. The approximate station for the start of HDD crossing Number 21 is STA 20756+00 (43.3011° N, 73.5482° W). The approximate station for the start of HDD crossing Number 21A is STA 20780+00 (43.2969° N, 73.5546° W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by AECOM, the recent investigations by Atlantic Testing Laboratories and Terracon, and a geophysical investigation by Schnabel Engineering, referenced below.

- AECOM, Geotechnical Data Report, Upland Segments: Putnam Station, Washington County, to Cementon, Green County, NY, Champlain Hudson Power Express, dated May 28, 2021.
- Atlantic Testing Laboratories, Subsurface Investigation Services, Champlain Hudson Power Express, Design Package 2, Whitehall to Glens Falls, New York, dated June 15, 2022.
- Schnabel Engineering, Geophysical Services Report, Champlain Hudson Power Express Upland Cable Installation Project, Wetland Crossing, Near Hudson Falls (HDD21), Whitehall, Washington County, New York, dated June 14, 2022.
- Terracon, Results of Field Exploration, Champlain-Hudson Power Express – Additional HDD Borings – Phase 3, Fort Ann to Coxsackie, NY, dated November 3, 2022.

Contact us if you have questions or require additional information.

HDD 21 and 21A
Borings WFE-19, WFE-19A,
K-131.9, K-132.1, K-132.2,
K-132.4, K-132.5, K-132.6,
KB-132.1A, KB-132.3A, KB-132.5A
Package 2 - Segment 3

CHPE Segment 3 - Package 2
HDD Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B122.4-1	1673988.1	762589.1	134.0
	B123.1-1	1670533.1	761581.7	134.0
	B127.6-1	1650236.9	759369.7	143.0
	B130.8-1	1633732.2	749229.1	144.0
	B131.5-1	1630565.5	746543.8	148.0
AECOM**	WFE-2	1693039.7	776227.9	125.9
	WFE-6	1683884.0	771830.6	128.7
	WFE-6A	1683645.5	771707.7	129.0
	WFE-7	1683295.0	771591.2	128.7
	WFE-9	1677994.3	769427.4	133.9
	WFE-9A	1678043.5	769246.8	140.2
	WFE-9B	1676842.4	767745.7	141.7
	WFE-12	1657680.6	760822.6	135.3
	WFE-16	1645866.1	757602.8	145.2
	WFE-18	1637293.5	752138.0	143.6
	WFE-18A	1630756.2	746790.9	144.9
	WFE-19	1628651.1	745226.2	139.1
	WFE-19A	1625848.4	743218.4	139.0

Notes:

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

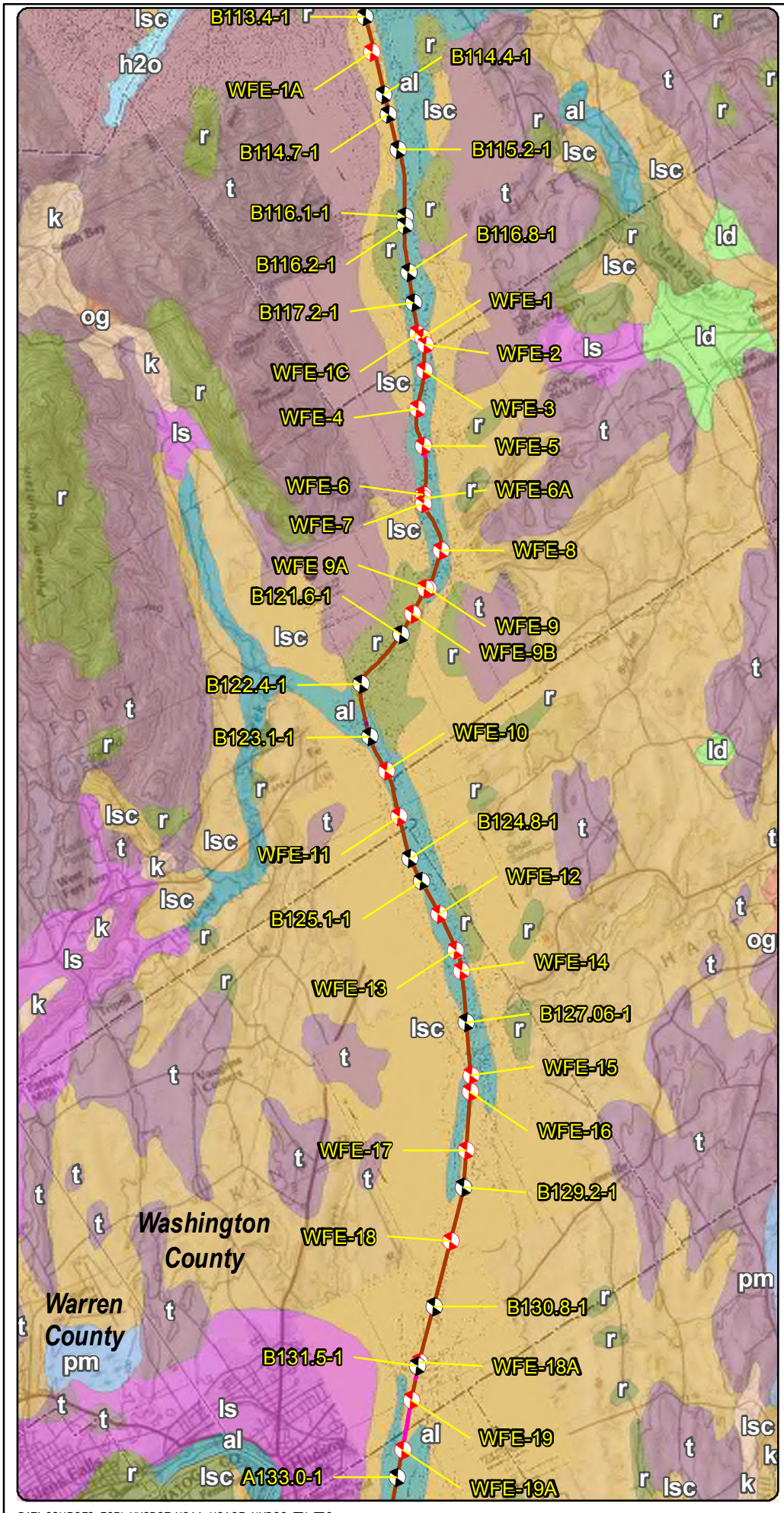
* TRC boring coordinates as shown in Table 1-6 in AECOM report (reference below). Boring elevations estimated from November 2021 topographic survey by Williams Aerial.

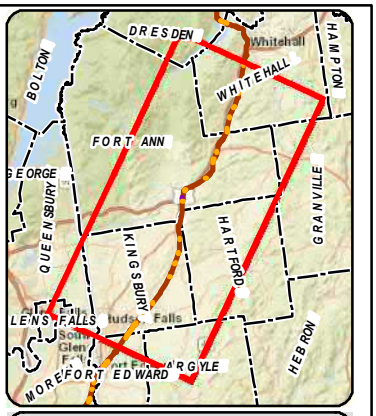
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** 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
- h2o - Water
- k - Kame deposits
- 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

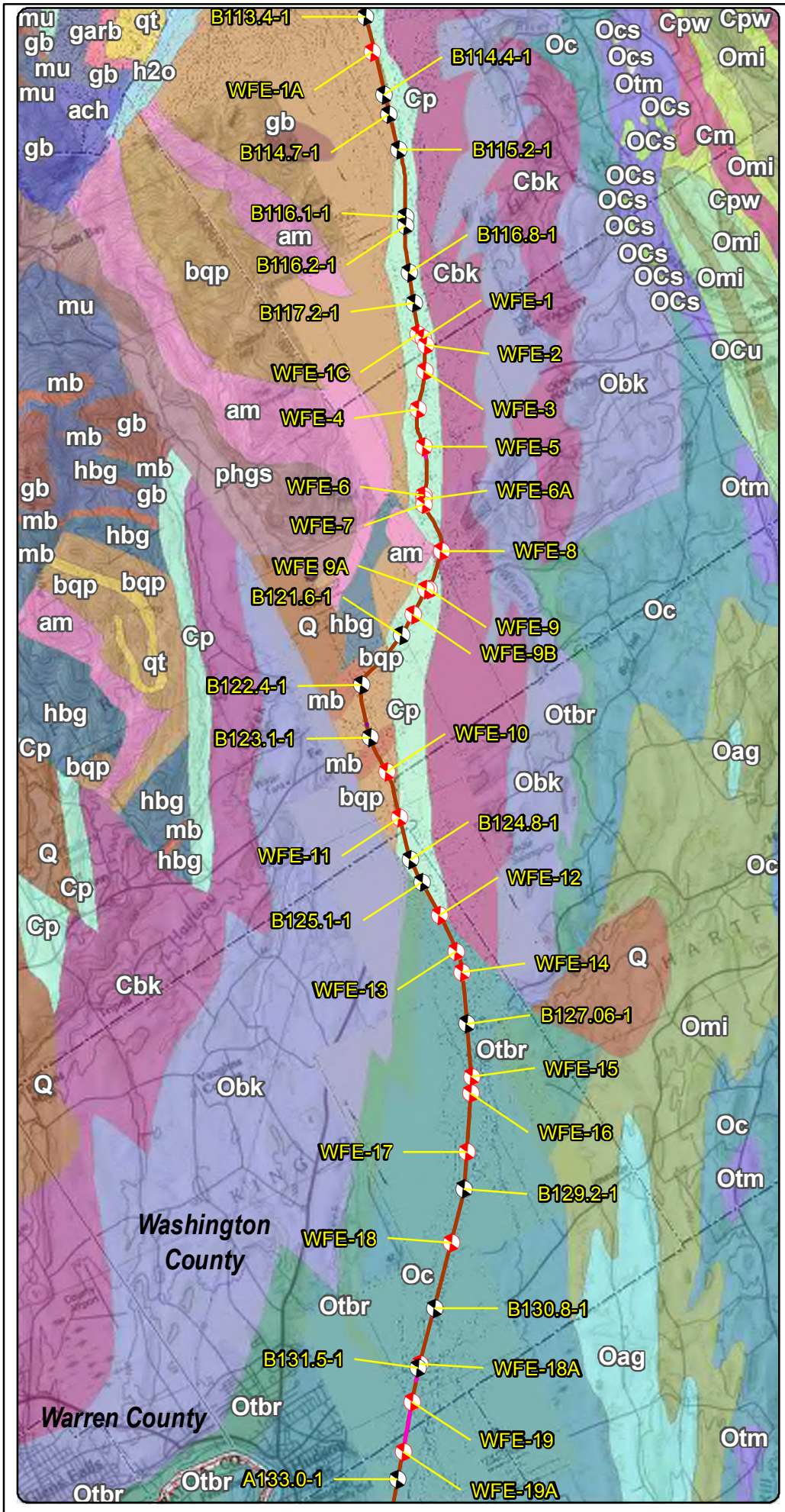
Champlain Hudson Power Express Inc.

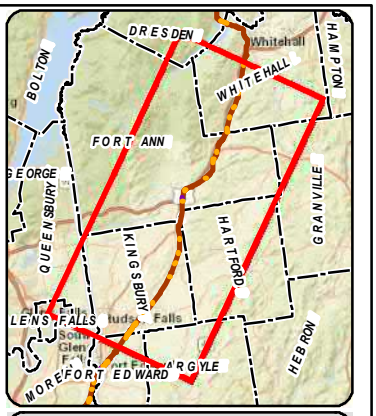
Surficial Geology and Geotechnical Borings Whitehall to Fort Edward
Figure 3-3

Prepared on 5/5/2021
by: AECOM

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt 5_Routes_DZ_20190\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Ft_Ed_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
- Cm - Mettawee Formation
- Cp - Potsdam Sandstone
- Cpw - Poultney Formation ("A" Member)
- No Label
- OCs - Cambrian-Middle Ordovician carbonate
- OCu - Undivided Ordovician and Cambrian
- Oag - Austin Glen Formation
- Obk - Beekmantown Group
- Oc - Canajoharie Shale
- Omi - Mount Merino Formation
- Op - Poultney Formation ("B" and "C")
- Otbr - Dolgeville Formation
- Otm - Taconic Melange
- Q - Glacial and Alluvial Deposits
- ach - metanorthosite and anorthosite
- am - Amphibolite, pyroxenic amphibolite
- bqp - Biotite-quartz-plagioclase
- garb - Quartz-feldspar paragneiss
- gb - Olivine metagabbro
- h2o - Water
- hbg - Biotite and or hornblende granite gneiss
- mb Calcitic and dolomitic marble
- mu - Undivided metased rock and migmatite
- 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 Whitehall to Fort Edward Figure 4-3

Prepared on 5/5/2021

by: AECOM

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

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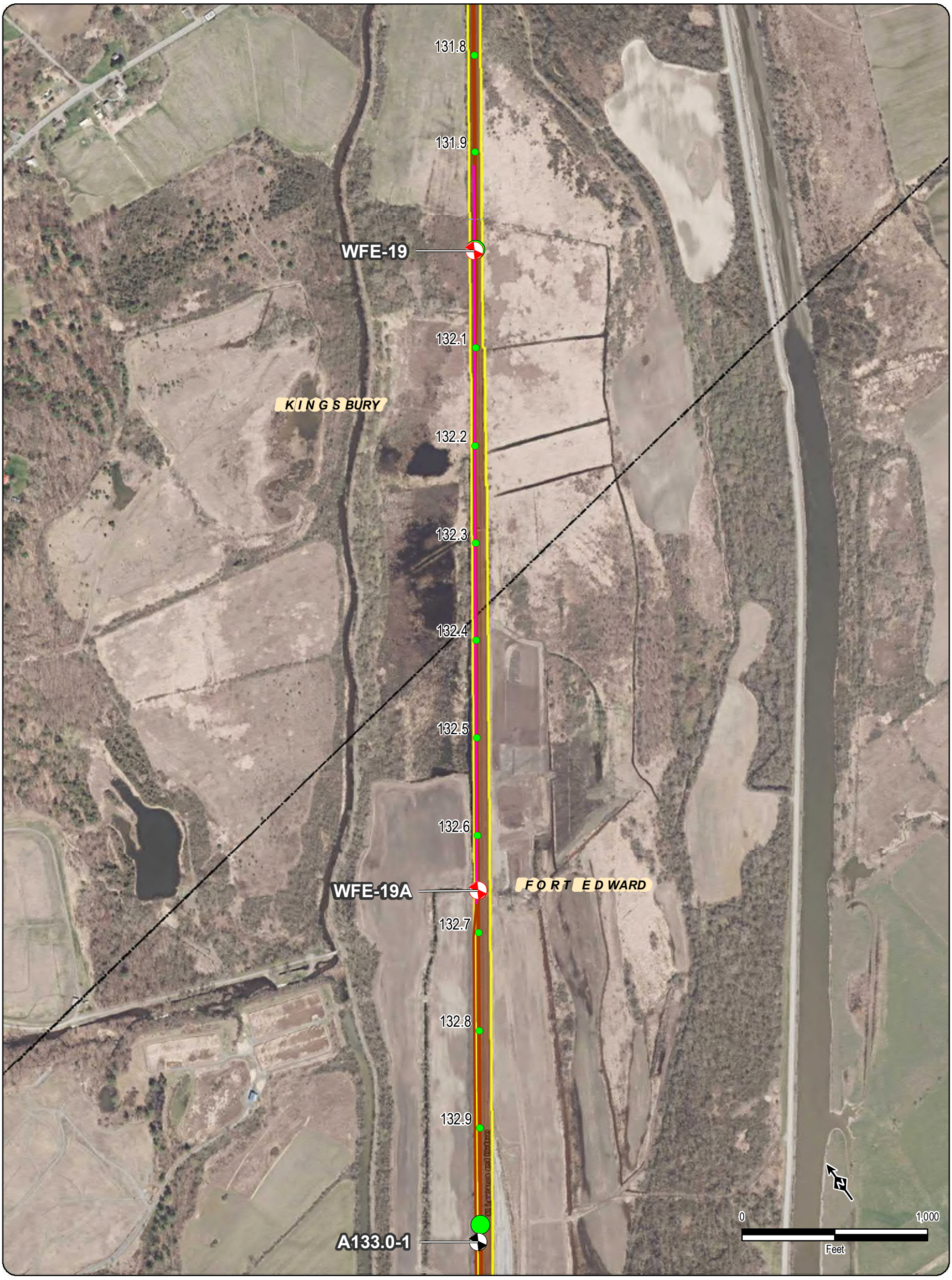
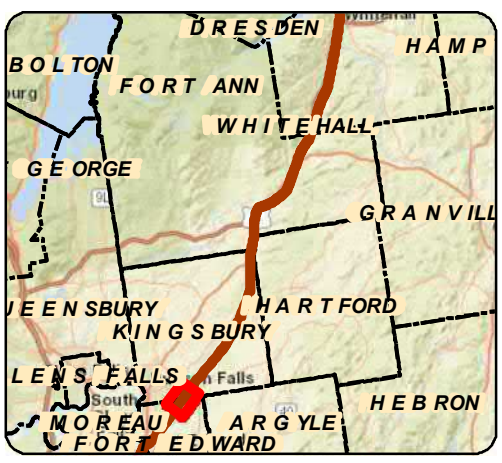




LEGEND

- 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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Whitehall to Fort Edward

Figure A-3

Sheet 16 of 16

Prepared by: AECOM 5/19/2021

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

Y:\Projects\CHPE\Route\Consensus_Alternative_Routes\MXD\Alt_5_Routes_DZ_201909\Boring_Locations\Maps_for_May_2021_Report\Whitehall_to_Edward_Boring_Locations_M

BORING CONTRACTOR: ADT

DRILLER: Chris Chaillou

SOILS ENGINEER/GEOLOGIST: Chris French

LOCATION: M.P. - 132.0 (CP Rail)

BORING LOG

SHEET 1 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-19**

START DATE: 1/12/21

FINISH DATE: 1/12/21

OFFSET: N/A

DRILL RIG: CME LC-55

BORING TYPE: SPT

BORING O.D.: 4.5"

SURFACE ELEV.:

LONGITUDE:

LATITUDE:

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL
7' (inferred)	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	
	SIZE I.D.	4"	2.5"	- -	
	SIZE O.D.	4.5"	3"	3 7/8"	
	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							0.0'-1.0'; Black fine-coarse SAND, some angular gravel, little silt; frozen 0'-0.5', loost, moist 0.5'-1'
1.0													1.0'-5.0'; Dark gray fine-coarse SAND, little subrounded gravel; very loose, moist
2.0													
3.0													TR-1; (3.0'-5.0')
		3'-5'	S-1								SP		
4.0												SAND and Silt	
5.0													
		5'-7'	S-2	24"	2"	15	14	11	12	16	ML		Gray SILT, some fine-coarse sand; stiff, moist
6.0													
7.0													
		7'-9'	S-3	24"	12"	4	6	6	7	8	SP		Gray/brown fine-medium SAND, little coarse sand; loose, saturated
8.0													TR-2; (8.0'-8.5')
9.0													
		9'-11'	S-4	24"	18"	9	7	8	8	10	OL		Brown organic SILT and docomposing organics; loose, moist
10.0													
11.0													TR-3; (10.0'-10.5')
		11'-13'	S-5	24"	16"	12	10	12	8	14	OL		SAA
12.0													
13.0													
		13'-15'	S-6	24"	18"	13	11	12	13	15	OL		Brown organic SILT, little decomposing organics; loose, moist
14.0													
15.0													
		15'-17'	S-7	24"	10"	5	2	2	3	3	OL		SAA
16.0												SILT, with organics	
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.

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: M.P. - 132.0 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-19**

START DATE: 1/12/21

FINISH DATE: 1/12/21

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"	18"	1	2	3	2	3	OL	SILT, with organics	SAA
21.0													
22.0													
23.0													
													23.5' *(inferred)*
24.0											SP	SAND & Gravel	
25.0													
		25'-27'	S-9	24"	8"	9	11	8	6	12	SP	SAND & Gravel	Gray fine-coarse SAND, little angular-subrounded gravel; very loose, saturated
26.0													
27.0													
													28.5' *(inferred)*
28.0											CH	Silty CLAY	
29.0													
30.0													
		30'-32'	S-10	24"	24"	WOH	WOH	WOH	3	0	CH		Gray silty CLAY; very soft, wet
31.0													TR-4; (31.0'-31.5')
32.0													
33.0													
34.0													
35.0													
		35'-37'	S-11	24"	24"	1	2	3	2	3	CH		SAA
36.0													
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOR	WOH	2	3	1	CH		SAA
39.0													TR-5; (39.0'-39.5')
40.0													
													WFE-19 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 CONTRACTOR: ADT	AECOM	PROJECT NAME: CHPE -
DRILLER: Chris Chaillou		PROJECT NO.: 60323056
		HOLE NO.: **WFE-19A**
SOILS ENGINEER/GEOLOGIST: Chris French	**BORING LOG**	START DATE: 1/13/21
		FINISH DATE: 1/13/21
LOCATION: M.P. - 132.49 (CP Rail)		OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: CME LC-55
Water at 7' (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)	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							0.0'-5.0'; Black fine-coarse SAND, little gravel (subrounded subangular), trace silt; loose (0'-1' frozen), moist
1.0													
2.0													
3.0		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0		5'-7'	S-2	24"	4"	4	3	4	4	5			SAA (minimal recovery)
6.0													
7.0		7'-9'	S-3	24"	5"	4	3	4	5	5			Dark brown fine-coarse SAND, some silt, little subangular gravel; very loose, saturated
8.0													
9.0		9'-11'	S-4	24"	8"	7	11	12	16	15	SP		Gray fine-medium SAND, trace silt; loose, saturated
10.0												SAND	
11.0		11'-13'	S-5	24"	0"	16	14	18	20	21			No Recovery
12.0													
13.0		13'-15'	S-6	24"	19"	15	16	17	16	21	SP		Gray fine SAND, some medium sand, trace silt; loose, saturated TR-2; (14.0'-14.5')
14.0													
15.0		15'-17'	S-7	24"	0"	10	9	12	5	14			No Recovery
16.0													
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: 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: M.P. - 132.49 (CP Rail)

AECOM

BORING LOG

SHEET 2 OF 2

PROJECT NAME: CHPE -

PROJECT NO.: 60323056

HOLE NO.: **WFE-19A**

START DATE: 1/13/21

FINISH DATE: 1/13/21

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"	15"	18	9	10	12	12	SP		Gray fine SAND, trace silt, trace medium sand; very loose, saturated
21.0													TR-3; (21.0'-21.5')
22.0													
23.0													
24.0													
25.0													
		25'-27'	S-9	24"	13"	10	11	12	12	15	SP		Gray fine-medium SAND, trace silt; very loose, saturated
26.0												SAND	
27.0													
28.0													
29.0													
30.0													
		30'-32'	S-10	24"	16"	13	16%	14	14	20	SP		Dark Gray medium-coarse SAND, some fine sand, trace subrounded gravel; very loose, saturated
31.0													
32.0													TR-4; (31.0'-31.5')
33.0													33.5' (*inferred*)
34.0													
35.0													
		35'-37'	S-11	24"	24"	WOH	3	5	8	5	CH	Silty CLAY	Gray silty CLAY; soft, moist-wet
36.0													
37.0													
38.0													
		38'-40'	S-12	24"	24"	WOH	WOH	3	4	2	CH		SAA
39.0													TR-5; (39.0'-39.5')
40.0													
													WFE-19A 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.

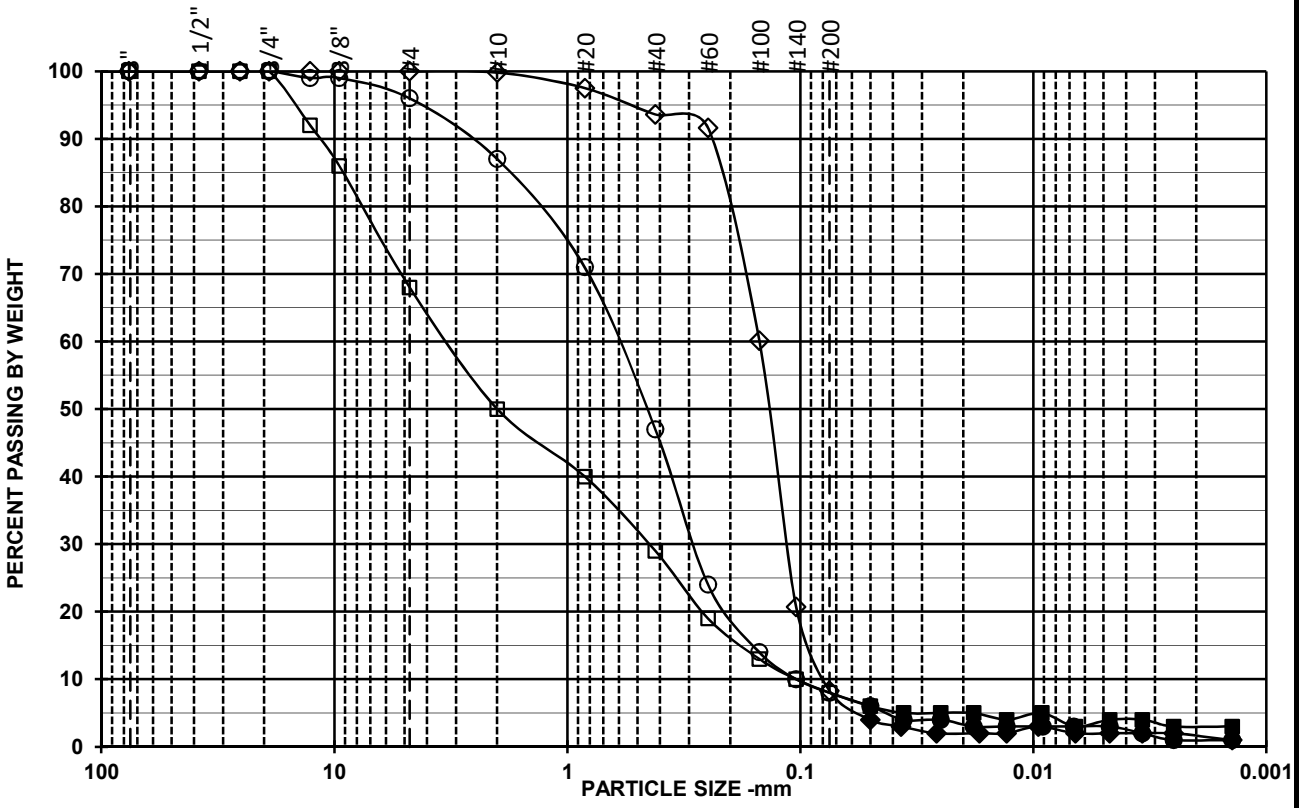
SAMPLE TYPE: S= SPLIT SPOON U=SHELBY TUBE R=ROCK CORE

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

Aquifer
CHPE- Whitehall-Ft. Edward 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 (%)	ORGANIC CONTENT (burnoff) (%)	
WFE-1A	S-2	5-7	24.4	44	17	27	CL	93	39		
WFE-1A	S-5	11-13	43.0	68	23	45	CH	99.8	84		
WFE-1C	S-3	7-9	44.5				CH	99.3	86		
WFE-1C	S-7	15-17	44.5	78	27	51	CH	100	94		
WFE-1C	S-10	30-32	45.7	61	23	38	CH	100	87		
WFE-2	S-2	5-7	7.3				SW-SM	10.7	3		
WFE-2	S-7	15-17	26.0				SC	28.5	13		
WFE-2	S-9	25-27	66.0	71	26	45	CH	100	90		
WFE-4	S-2	5-7	18.0				SC	34	13		
WFE-4	S-4	9-11	18.3				SM	17	5		
WFE-5	S-2	5-7	19.9				SM	19	3		
WFE-5	S-4	9-11	18.6	28	15	13	CL	91	28		
WFE-6A	S-2	5-7	13.6				SP-SC	9	3		
WFE-6A	S-4	9-11	17.4				SP-SM	7	2		
WFE-8	S-3	6-8	24.9				SC	48.5	12		
WFE-8	S-4	8-10	88.5	128	53	75	MH	94	43		
WFE-10	S-2	5-7	38.0	71	24	47	CH	94	76		
WFE-10	S-4	9-11	22.5				CL	83.9	32		
WFE-12	S-2	5-7	23.5	49	20	29	CL	62.5	35		
WFE-12	S-4	9-11	28.3				CL	95.8	37		
WFE-14	S-3	7-9	25.7				CL	75.7	44		
WFE-14	S-5	13-15	22.5				ML	53.9	17		
WFE-16	S-3	7-9	36.7	75	25	50	CH	100	90		
WFE-16	S-9	25-27	37.1	73	24	49	CH	100	80		
WFE-18	S-3	7-9	229.7	293	93	200	OH	58	43	34.1	
WFE-18	S-8	20-22	34.3	30	21	9	CL	95	26		
WFE-18	S-10	30-32	64.3	56	21	35	CH	100	87		
WFE-18A	S-2	5-7	19.9	30	13	17	CL	88.5	29		
WFE-18A	S-7	15-17	18.9				SM	14.3	1		
WFE-18A	S-10	30-32	62.9	62	22	40	CH	99	86		
WFE-19A	S-3	7-9	38.1				SP-SM	8	3		
WFE-19A	S-8	20-22	31.8				SP-SM	8.3	2		
WFE-19A	S-10	30-32	17.6				SW-SM	8	1		

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
□	38.1				SP-SM		Gray, Poorly graded sand with silt and gravel, Insufficient sample size	04/19/21
◇	31.8				SP-SM		Gray, Poorly graded sand with silt	04/19/21
○	17.6				SW-SM		Gray, Well-graded sand with silt	04/19/21

Aquifer

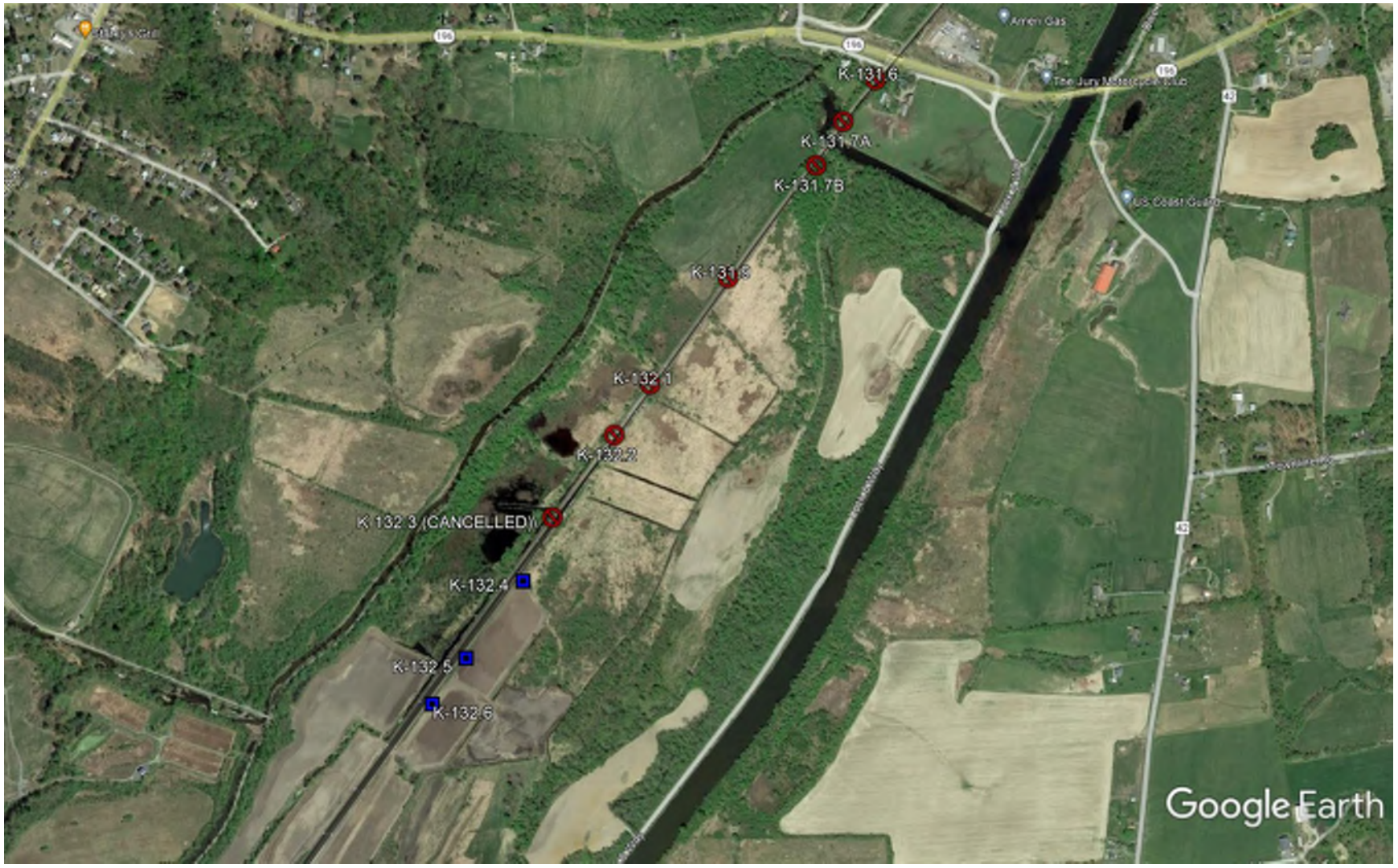
TerraSense, LLC #7853-21003

CHPE- Whitehall-Ft. Edward Borings

Symbol	□	◇	○
Boring	WFE-19A	WFE-19A	WFE-19A
Sample	S-3	S-8	S-10
Depth	7-9	20-22	30-32
% +3"	0	0	0
% Gravel	32	0	4
% SAND	60	91.7	88
%C SAND	18	0.2	9
%M SAND	21	6.2	40
%F SAND	21	85.3	39
% FINES	8	8.3	8
D_{100} (mm)	19.1	4.75	19.1
D_{60} (mm)	3.23	0.15	0.611
D_{30} (mm)	0.45	0.11	0.29
D_{10} (mm)	0.1	0.078	0.1
Cc	0.6	1	1.4
Cu	32.3	1.9	6.1

Sieve Size/ID #	Percent Finer Data		
6"	100	100.0	100
4"	100	100.0	100
3"	100	100.0	100
1 1/2"	100	100.0	100
1"	100	100.0	100
3/4"	100	100.0	100
1/2"	92	100.0	99
3/8"	86	100.0	99
#4	68	100.0	96
#10	50	99.8	87
#20	40	97.5	71
#40	29	93.6	47
#60	19	91.6	24
#100	13	60.1	14
#140	10	20.7	10
#200	8	8.3	8
5μ m	4	2	3
2μ m	3	2	1
1μ m	3	0	1

PARTICLE SIZE DISTRIBUTION
ASTM D6913 & ASTM D7928



Boring Location Plans Page 12 of 12	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: March 2022

Champlain Hudson Power Express
Design Package 2
Whitehall to Glens Falls, 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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/3/2022** Finish Date: **2/3/2022**

Boring No.: **K-131.9** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/3/2022	AM	*11.2'	10.0'

Coordinates
Northing **745460.937**
Easting **1628984.873**

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

Ground Elev.: **140.11**

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	17 16 10 6		Blackish-Grey cmf GRAVEL; and cmf SAND; trace CLAY; trace SILT (moist, very slightly plastic) GW FILL	14
2									
3		2	2.0	4.0	SS	3 3 3 4		Grey cmf GRAVEL; some cmf SAND; trace CLAY; trace SILT (moist, very slightly plastic) GW FILL	6
4							4.0		
5		3	4.0	6.0	SS	1 1 2 1		Grey c-m SAND; little mf GRAVEL; trace SILT; trace CLAY (moist, very slightly plastic) SP Possible FILL	6
6							6.0		
7		4	6.0	8.0	SS	3 1 1 1		Black-Dark Grey SILT; little ORGANIC MATERIAL (peat, root hairs); little mf SAND (moist, non-plastic) OH	10
8									
9		5	8.0	10.0	SS	1 WH/12" 1		Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT (saturated, non-plastic) PT w = 411.1%	16
10	WET ROTARY							LL = NP, PL = NP, PI = NP % Fines = 2.0%	
11									
12								Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
13									
14		6	14.0	16.0	SS	WH/24"		NO RECOVERY	0
15									
16									
17									
18									
19		7	19.0	21.0	SS	WH/24"		Black ORGANIC MATERIAL (peat, root hairs); little mf SAND; little SILT (wet, non-plastic) PT	1
20									
21									
22							22.0		
23									
24		8	24.0	26.0	SS	6 6 7 9		Grey c-m SAND; trace CLAY; trace SILT (moist, very slightly	10
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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-131.9** Report No.: **CD10279D-01-03-22** 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)
26								plastic) SC w = 62.8%	
27							27.0		
28									
29		9	29.0	31.0	SS	WH/24"		Grey CLAY; trace SILT; trace f SAND (wet, plastic) CH	24
30									
31									
32									
33									
34									
35		ST-1	35.0	37.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace f	24
36								SAND (wet, plastic) CH w = 70.9%, LL = 51, PL = 20, PI = 31	
37								% Fines = 99.0%	
38		10	38.0	40.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
39									
40							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 classifications.	
46								3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/3/2022** Finish Date: **2/3/2022**

Boring No.: **K-132.1** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/3/2022	**PM**	***6.9'**	**10.0'**

Coordinates
Northing **744949.351**
Easting **1628269.008**

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

Ground Elev.: **138.278**

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)
0	CASING	1	0.0	2.0	SS	15 22 13 6		Blackish-Greyish-Brown cmf GRAVEL; some cmf SAND; trace CLAY; trace SILT (moist, very slightly plastic) GW-GC FILL	20
2	CASING	2	2.0	4.0	SS	3 5 6 7		Blackish-Grey cmf SAND; and cmf GRAVEL; trace CLAY; trace SILT (moist, very slightly plastic) SW-SC Possible FILL	10
4		3	4.0	6.0	SS	2 2 1 1		Grey cmf GRAVEL; little CLAY; little m-f SAND; trace SILT (moist, slightly plastic) GW-GC Possible FILL	6
6		4	6.0	8.0	SS	1 1 1 1	6.0	Greyish-Brown CLAY; and mf SAND; little ORGANIC MATERIAL (peat, root hairs), trace SILT (moist, plastic) OH OC = 14.1%	4
8		5	8.0	10.0	SS	1 WH/18"	8.0	Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT (wet, non-plastic) PT	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.	
12							12.0		
14		6	14.0	16.0	SS	WH/24"		Black/Dark Brown mf SAND; and SILT; little ORGANIC MATERIAL (peat, root hairs) (saturated, non-plastic) SM w = 121.0%, LL = NP, PL = NP, PI = NP % Fines = 44.3%	8
16							17.0		
18		7	19.0	21.0	SS	7 6 6 4		NO RECOVERY	0
20							22.0		
22									
24		8	24.0	26.0	SS	4 1 1 1		Grey CLAY; little cmf SAND; trace SILT; trace ORGANIC	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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-132.1** Report No.: **CD10279D-01-03-22** 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%	
								MATERIAL (root hairs) (wet, plastic) OH w = 44.8%	
29		9	29.0	31.0	SS	WH/24"		Grey CLAY; little cmf SAND; trace SILT (wet, plastic) CL	24
35		ST-1	35.0	37.0	SS	WH/24"		(3" Brass Lined Split Spoon) Grey CLAY; trace SILT; trace f SAND (wet, plastic) CL w = 37.7%, LL = 44, PL = 19, PI = 25 % Fines = 99.4%	24
38		10	38.0	40.0	SS	WH/24"		Grey CLAY; little SILT; trace f SAND (wet, plastic) CL	24
							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 classifications. 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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **2/4/2022** Finish Date: **2/4/2022**

Boring No.: **K-132.2** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
2/4/2022	PM	*12.1'	10.0'

Coordinates
Northing **744717.276**
Easting **1627946.6**

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

Ground Elev.: **138.045**

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)
0	CASING	1	0.0	2.0	SS	30 18 8 3		Black/Light Brown cmf SAND; and cmf GRAVEL; little SILT (frozen, non-plastic) SW-SM FILL	14
2	CASING	2	2.0	4.0	SS	2 1 4 5		Grey cmf SAND; little mf GRAVEL; trace SILT; trace CLAY (moist, very slightly plastic) SW-SC FILL	8
4		3	4.0	6.0	SS	1 1 1 1		Grey mf GRAVEL; and c-m SAND; trace SILT (moist, non-plastic) GP FILL	2
6		4	6.0	8.0	SS	1 1 1/12"	6.0	Brown ORGANIC MATERIAL (peat); trace CLAY; trace f SAND; trace SILT (moist, very slightly plastic) PT OC = 90.7%	12
8		5	8.0	10.0	SS	1 1 1 2	8.0	Grey CLAY; some f SAND; trace SILT (moist, plastic) CL	14
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.	
12							12.0		
14		6	14.0	16.0	SS	3 4 3 3		Grey c-mf SAND; trace SILT (wet, non-plastic) SP-SM w = 22.7% % Fines = 6.0%	10
18									
19		7	19.0	21.0	SS	4 5 4 5		Grey mf GRAVEL; trace mf SAND; trace SILT; trace CLAY (wet, very slightly plastic) GP-GC	1
24		8	24.0	26.0	SS	3 4 5 7		Grey cm+f SAND; trace mf GRAVEL; trace SILT (moist,	10

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 2).GPJ ATL4-08.GDT 4/12/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-132.2** Report No.: **CD10279D-01-03-22** 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%	
								non-plastic) SW-SM w = 17.0% % Fines = 8.0%	
26									
27								Advanced 3 7/8" tri-cone roller bit to 30.0 feet and began coring.	
28									
29									
30							30.0		
31	NX CORE (WET)		30.0	35.0	NX	RUN 1		Dark Grey SHALE 60" or 100% Recovery 5 Pieces (55") - 8% Chips and Fragments 5 Pieces longer than 4" (55") - RQD = 92%	60
32									
33									
34									
35							35.0		
36			35.0	40.0	NX	RUN 2		Dark Grey SHALE 60" or 100% Recovery 4 Pieces (48") - 20% Chips and Fragments 3 Pieces longer than 4" (43") - RQD = 72%	60
37									
38									
39									
40							40.0		
41								Boring terminated at 40.0 feet.	
42									
43								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.	
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **4/11/2022** Finish Date: **4/12/2022**

Boring No.: **K-132.4** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
4/11/2022	PM	*8.1'	10.0'
4/12/2022	AM	*5.7'	10.0'
4/12/2022	PM	*10.7'	15.0'

Coordinates
Northing **1626953.45**
Easting **744108.1**

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

Ground Elev.: **139.6**

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	1 2 4 2		Black cmf SAND; some mf GRAVEL; trace ORGANIC MATERIAL (moist, non-plastic) FILL SP	15
2									
3		2	2.0	4.0	SS	3 3 3 7		Brown mf SAND; little mf GRAVEL; trace ORGANIC MATERIAL (moist, non-plastic) OC = 6.7% SP	2
4							4.0		
5		3	4.0	6.0	SS	7 5 6 12		Brown mf SAND; trace CLAY; trace ORGANIC MATERIAL (moist, very slightly plastic) COBBLE in split spoon shoe SC	1
6									
7		4	6.0	8.0	SS	9 8 6 7		Similar Soil (wet, very slightly plastic) COBBLE in split spoon shoe SC	3
8							8.0		
9		5	8.0	10.0	SS	8 9 6 5		Brown cmf+ SAND; some SILT; little f GRAVEL (moist, non-plastic) w = 18.3% SM	18
10									
11	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.	
12							12.0		
13									
14		6	14.0	16.0	SS	1 1 1		Brownish-Grey mf SAND; little SILT (wet, non-plastic) SM	5
15									
16									
17									
18									
19		7	19.0	21.0	SS	4 3 3 2		Grey cmf SAND; trace SILT (wet, non-plastic) SM	
20									
21									
22									
23									
24		8	24.0	25.0	SS	5 5 4 5		Similar Soil (wet, non-plastic) SM	
25									

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

Drillers: **Jeffrey Donovan; Chase Bertrand**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 6/15/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-132.4** Report No.: **CD10279D-01-03-22** 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									
27							27.0		
28									
29		9	29.0	31.0	SS	WH/24"		Grey CLAY; trace f SAND; trace SILT (wet, plastic) CH	24
30									
31		TR-1	31.0	33.0	SS	1 1 1 1		(3" Brass Lined Split Spoon) Grey CLAY; trace f SAND; trace SILT (wet, plastic)	24
32								w = 43.4%, LL = 45, PL = 19, PI = 26, % Fines = 93.3% CH	
33									
34		10	34.0	36.0	SS	WH/24"		Similar Soil (wet, plastic) CH	24
35									
36									
37									
38									
39		11	39.0	41.0	SS	WH/24"		Similar Soil (wet, plastic) w = 31.3%, LL = 39, PL = 18, PI = 21,	24
40								% Fines = 98.7% CH	
41							41.0		
42								Boring terminated at 41.0 feet.	
43									
44								Notes:	
45								1. Borehole backfilled with cement-bentonite grout.	
46								2. Soil classifications based on ATL Field Engineer's field classification.	
47								3. Borehole was advanced with ATL's Geoprobe 7822D7 (Rig Unit No. CDGV706) drill rig.	
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **4/12/2022** Finish Date: **4/12/2022**

Boring No.: **K-132.5** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
4/12/2022	AM	*6.1'	10.0'
4/12/2022	PM	*8.8'	10.0'

Coordinates
Northing **1626455.08**
Easting **743760.08**

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

Ground Elev.: **141.3**

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	6 6 7 8		Brown cmf SAND; little mf GRAVEL; little SILT (moist, non-plastic) SM	18
2									
3		2	2.0	4.0	SS	5 8 9 9		Similar Soil (moist, non-plastic) SM	12
4							4.0		
5		3	4.0	6.0	SS	6 11 13 16		Brown cmf SAND; some SILT (moist, non-plastic) SM	18
6									
7		4	6.0	8.0	SS	10 33 36 29		Brown cmf SAND; little mf GRAVEL; little SILT (moist, non-plastic) SM	24
8									
9		5	8.0	10.0	SS	18 16 21 17		Brown c-mf+ SAND; some SILT (moist, non-plastic) w = 19.6% SM	18
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							12.0		
13									
14		6	14.0	16.0	SS	5 4 4 6		Grey cmf SAND; trace SILT (wet, non-plastic) SM	7
15									
16									
17									
18									
19		7	19.0	21.0	SS	5 6 6 5		Grey cmf SAND; little SILT; trace mf GRAVEL (wet, non-plastic) SM	8
20									
21									
22									
23									
24		8	24.0	26.0	SS	4 6 6 5		Grey cmf SAND; little SILT (wet, non-plastic) w = 24.3% SM	10
25									

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

Drillers: **Jeffrey Donovan; Chase Bertrand**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 6/15/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-132.5** Report No.: **CD10279D-01-03-22** 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	3 3 5 6		Similar Soil (wet, non-plastic) SM	7
31							31.0		
33		ST-1	33.0	35.0	SS	WH/12" 1 2		(3" Brass Lined Split Spoon) Grey CLAY; trace f SAND; trace SILT (wet, plastic) w = 61.3%, LL = 62, PL = 21, PI = 41, % Fines = 95% CH	24
38		10	38.0	40.0	SS	WH/18" 1		Similar Soil (wet, plastic) CH	24
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-01-03-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 2
Various Locations, New York

Start Date: **4/13/2022** Finish Date: **4/13/2022**

Boring No.: **K-132.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
4/13/2022	PM	*10.7'	10.0'

Coordinates
Northing **1626102.85**
Easting **743497.62**

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

Ground Elev.: **140.3**

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	4 5 6 11	2.0	Brown cmf SAND; some SILT (moist, non-plastic) SM	24
2	CASING	2	2.0	4.0	SS	10 12 8 9		Brown cm SAND; little mf GRAVEL; little SILT (moist, non-plastic) SM	14
4		3	4.0	6.0	SS	8 10 7 26		Brown c SAND; little mf GRAVEL; little SILT (moist, non-plastic) SM	12
6		4	6.0	8.0	SS	24 19 16 15		Grey cmf SAND; some SILT; some mf GRAVEL (moist, non-plastic) w = 8.5% SM	18
8		5	8.0	10.0	SS	17 15 13 12		Grey mf SAND; some mf GRAVEL; little SILT (moist, non-plastic) SM	12
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.	
12							12.0		
14		6	14.0	16.0	SS	6 4 3 6		Grey cmf SAND; trace SILT; trace f GRAVEL (wet, non-plastic) SM	12
19		7	19.0	21.0	SS	5 4 3 5		Grey c-mf SAND; trace SILT; trace f GRAVEL (wet, non-plastic) w = 18.6% SM	10
23		TR-1	23.0	25.0	SS	4 9 13 19		(3" Brass Lined Split Spoon) Grey cmf SAND; little SILT; trace f GRAVEL (wet, non-plastic) SM	18
25									

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

Drillers: **Jeffrey Donovan; Chase Bertrand**

Inspector: **James LaMarco (ATL)**

ATL-LOG1 NE CD10279 KIEWIT INFRASTRUCTURE CO - VARIOUS LOCATIONS (PACKAGE 2).GPJ ATL4-08.GDT 6/15/22

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-132.6** Report No.: **CD10279D-01-03-22** 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)
		TR-1	25.0	27.0	SS	6 10 12 13		(3" Brass Lined Split Spoon) Similar Soil (wet, non-plastic) SM	14
		8	28.0	30.0	SS	6 7 10 7		Similar Soil (wet, non-plastic) SM	12
							30.0	Boring terminated at 30.0 feet.	

f - fine; m - medium; c - course

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

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 2).GPJ ATL4-08.GDT 6/15/22

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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-129.9B	S-4	6.0 - 8.0	Brown CLAY; some ORGANIC MATERIAL (root hairs); trace SILT	--	--	--	--	--	34.9	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey CLAY; little SILT; trace f SAND	--	88.0	96	49	47	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey c-mf SAND; trace SILT; trace f GRAVEL	7.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	27.0 - 29.0	Grey CLAY; trace SILT	100.0	51.2	55	20	35	--	--	--	--	--	--	--	--
	S-10	34.0 - 36.0	Grey CLAY; trace SILT	--	50.8	--	--	--	--	--	--	--	--	--	--	--
K-130.9	S-4	6.0 - 8.0	Grey CLAY; little SILT; little mf SAND	85.8	46.6	39	18	21	--	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey c-mf+ SAND; some SILT; trace CLAY	35.0	65.2	--	--	--	--	--	--	--	--	--	--	--
	RC-2	30.5 - 31.5	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	--	1,153	2.75
	RC-2	31.5 - 31.8	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	7,220	--	--
K-131.6	S-4	6.0 - 8.0	Grey CLAY; trace mf SAND; trace SILT	96.9	48.7	41	20	21	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey c-mf+ SAND; little SILT	15.0	22.6	--	--	--	--	--	--	--	--	--	--	--
	ST-1	35.0 - 37.0	Grey CLAY; trace f SAND; trace SILT	99.9	55.9	62	25	37	--	--	--	--	--	--	--	--
K-131.7A	S-3	4.0 - 6.0	Blackish-Brown cmf SAND; some mf GRAVEL; trace SILT	--	--	--	--	--	--	500	35	7.69	42,570	--	--	--
	S-4	6.0 - 8.0	Grey mf+ SAND; and SILT; trace CLAY	50.0	23.3	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0 - 21.0	Grey SILT; some CLAY; little f SAND; trace ORGANIC MATERIAL (root hairs, wood fragments)	78.3	43.6	53	21	32	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; little SILT; trace f SAND	--	70.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; little mf SAND; trace SILT	86.6	66.4	53	25	28	--	--	--	--	--	--	--	--
K-131.7B	S-5	8.0 - 10.0	Brownish-Grey CLAY; little SILT; little ORGANIC MATERIAL (root hairs); trace mf SAND	--	--	--	--	--	10.5	--	--	--	--	--	--	--
	S-6	14.0 -16.0	Black ORGANIC MATERIAL (peat, root hairs); trace SILT	3.1	178.4	NP	NP	NP	--	--	--	--	--	--	--	--
	S-9	29.0 - 31.0	Grey CLAY; trace SILT	--	60.9	--	--	--	--	--	--	--	--	--	--	--
	ST-1	45.0 - 47.0	Grey CLAY; trace SILT; trace f SAND	99.8	58.7	55	19	36	--	--	--	--	--	--	--	--
K-131.9	S-5	8.0 - 10.0	Black ORGANIC MATERIAL (peat, root hairs); trace mf SAND; trace SILT	2.0	411.1	NP	NP	NP	--	--	--	--	--	--	--	--
	S-8	24.0 - 36.0	Grey c-m SAND; trace CLAY; trace SILT	--	62.8	--	--	--	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

LABORATORY TEST SUMMARY TABLE

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

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								
	ST-1	35.0 - 37.0	Grey CLAY; trace SILT; trace f SAND	99.0	70.9	51	20	31	--	--	--	--	--	--	--	--
K-132.1	S-4	6.0 - 8.0	Greyish-Brown CLAY; and mf SAND; little ORGANIC MATERIAL (peat, root hairs), trace SILT	--	--	--	--	--	14.1	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Black/Dark Brown mf SAND; and SILT; little ORGANIC MATERIAL (peat, root hairs)	44.3	121.0	NP	NP	NP	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey CLAY; little cmf SAND; trace SILT; trace ORGANIC MATERIAL (root hairs) (wet, plastic)	--	44.8	--	--	--	--	--	--	--	--	--	--	--
	ST-1	35.0 - 37.0	Grey CLAY; trace SILT; trace f SAND	99.4	37.7	44	19	25	--	--	--	--	--	--	--	--
K-132.2	S-4	6.0 - 8.0	Brown ORGANIC MATERIAL (peat); trace CLAY; trace f SAND; trace SILT	--	--	--	--	--	90.7	--	--	--	--	--	--	--
	S-6	14.0 - 16.0	Grey c-mf SAND; trace SILT	6.0	22.7	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0 - 26.0	Grey cm+f SAND; trace mf GRAVEL; trace SILT	8.0	17.0	--	--	--	--	--	--	--	--	--	--	--
	R-1	31.73	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	--	898	1.33
	R-1	33.0 - 33.3	Dark Grey SHALE	--	--	--	--	--	--	--	--	--	--	7,920	--	--
K-132.4	S-2	2.0-4.0	Brown mf SAND; little m GRAVEL; trace OM	--	--	--	--	--	6.7	--	--	--	--	--	--	--
	S-5	8.0-10.0	Brown cmf+ SAND; some SILT; little f GRAVEL	24.0	18.3	--	--	--	--	--	--	--	--	--	--	--
	TR-1	31.0-33.0	Grey CLAY; trace f SAND; trace SILT	93.3	43.4	45	19	26	--	--	--	--	--	--	--	--
	S-11	39.0-41.0	Grey CLAY; trace f SAND; trace SILT	98.7	31.3	39	18	21	--	--	--	--	--	--	--	--
K-132.5	S-3	4.0-6.0	Brown cmf SAND; some SILT	--	--	--	--	--	--	7600	35.0	11.5	5,805	--	--	--
	S-5	8.0-10.0	Brown c-mf+ SAND; some SILT	35.0	19.6	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Grey cmf SAND; little SILT	--	24.3	--	--	--	--	--	--	--	--	--	--	--
	ST-1	33.0-35.0	Grey CLAY; trace f SAND; trace SILT	95	61.3	62	21	41	--	--	--	--	--	--	--	--
K-132.6	S-4	6.0-8.0	Grey cmf SAND; some SILT; some mf GRAVEL	27.0	8.5	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey c-mf SAND; trace SILT; trace f GRAVEL	8.5	18.6	--	--	--	--	--	--	--	--	--	--	--

TEST DATA (continued)

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-131.9	S-5	8-10	411.1
	S-8	24-26	62.8
	ST-1	35-37	70.9
K-132.1	S-6	14-16	121.0
	S-8	24-26	44.8
	ST-1	35-37	37.7

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

Reviewed By: _____ Date: 02/18/22

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-04-03-22
Report Date: March 1, 2022
Date Received: February 18, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-117.6-1.6B	S-4 [1]	6-7.2	10.0
	S-7	19-21	18.2
	S-9	28-30	26.7
K-117.6-1.6C	S-4	8-9.3	17.6
	S-6 [1]	19-21	12.4
	S-8	28-30	35.1
K-132.2	S-6	14-16	22.7
	S-8 [1]	24-26	17.0
[redacted]			

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-13-04-22
Report Date: April 26, 2022
Date Received: April 18, 2022

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-132.4	S-5	8-10	18.3
	TR-1 [1]	31-33	43.4
	S-11	39-41	31.3
K-132.5	S-5	8-10	19.6
	S-8	24-26	24.3
	ST-1	33-35	61.3
K-132.6	S-4 [1]	6-8	8.5
	S-7	19-21	18.6

Remarks

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

Reviewed By: _____ Date: 04/26/22

ATLANTIC TESTING LABORATORIES

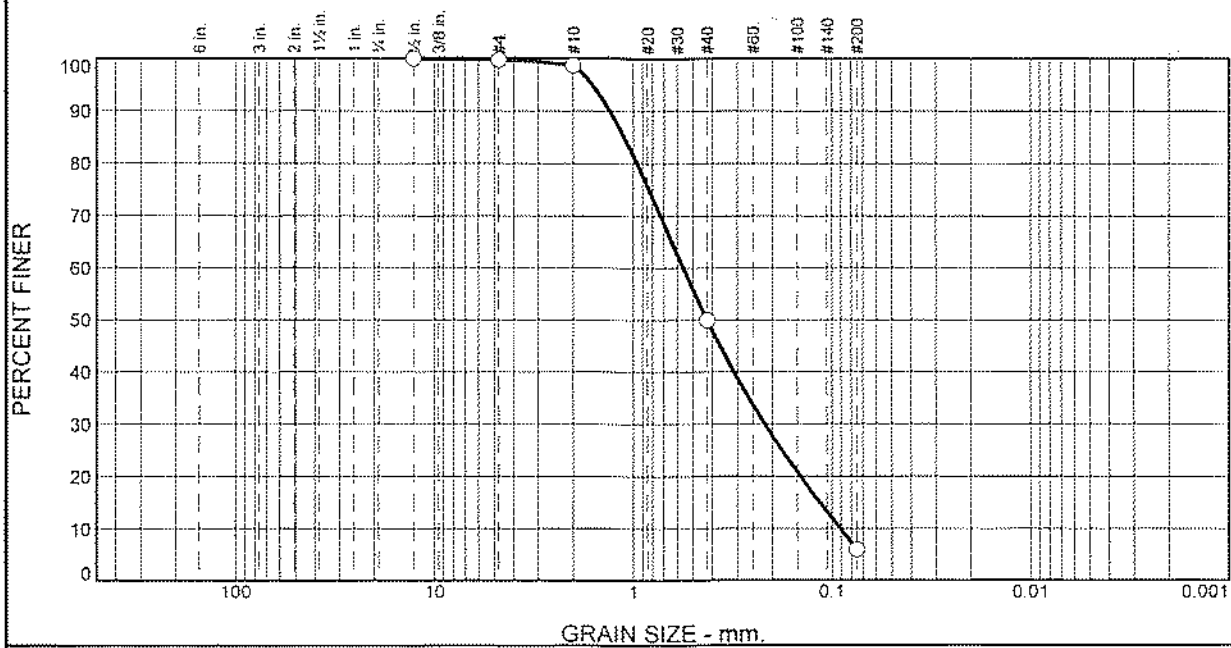
Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-04-03-22

Client: Kiewit Intrastructure Co. **Date:** 03/01/22

Sample No: K-132.2, 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	1	49	44	6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	100		
#10	99		
#40	50		
#200	6.0		

* (no specification provided)

Soil Description

Grey c-mf SAND; trace SILT

Atterberg Limits

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

Coefficients

D_{85}= 1.1130 D_{60}= 0.5603 D_{50}= 0.4258
D_{30}= 0.2186 D_{15}= 0.1152 D_{10}= 0.0909
C_u= 6.16 C_c= 0.94

Classification

USCS= AASHTO=

Remarks

Moisture Content= 22.7%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 03/01/22

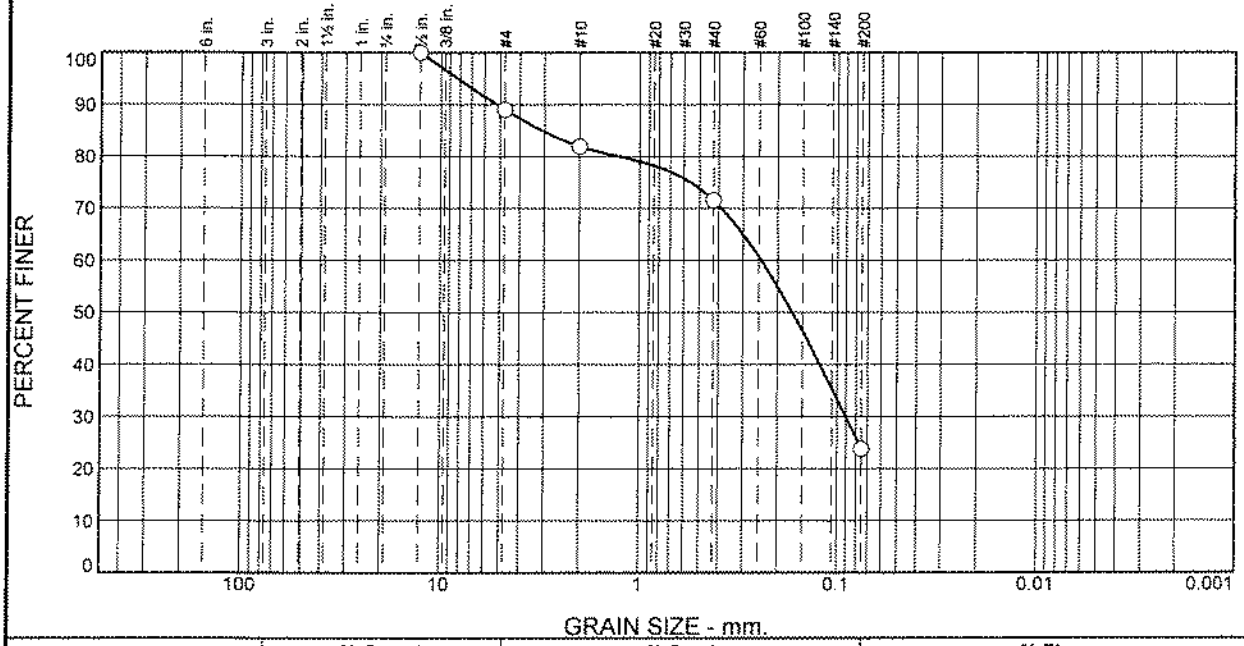
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-13-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/26/22

Sample No: K-132.4, S-5 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 8-10'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	11	7	10	48	24	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	89		
#10	82		
#40	72		
#200	24		

Soil Description

Brown cmf+ SAND; some SILT; little f GRAVEL

Atterberg Limits

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

Coefficients

D_{85}= 3.0960 D_{60}= 0.2428 D_{50}= 0.1689
D_{30}= 0.0902 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 18.3%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: _____ Date: 04/26/22

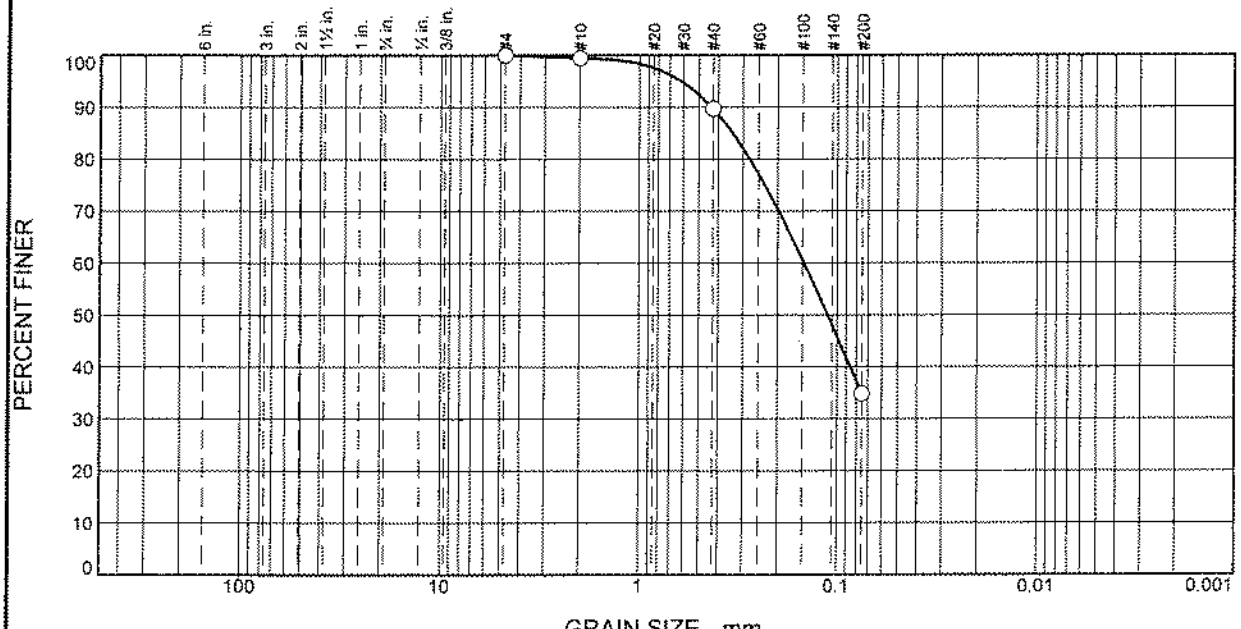
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-13-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/26/22

Sample No: K-132.5, S-5 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 8-10'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	9	55	35	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	99		
#40	90		
#200	35		

Soil Description

Brown c-mf+ SAND; some SILT

Atterberg Limits

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

Coefficients

D_{85}= 0.3389 D_{60}= 0.1472 D_{50}= 0.1119
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 19.6%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 04/26/22

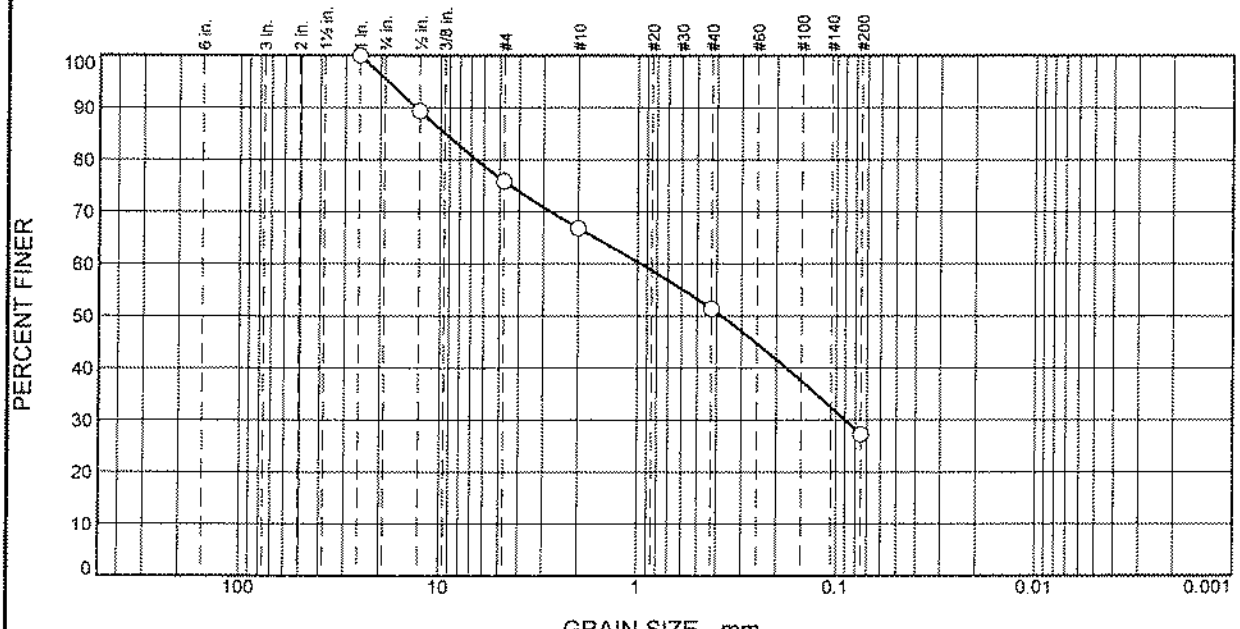
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-13-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/26/22

Sample No: K-132.6, S-4 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 6-8'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	20	9	16	24	27	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1"	100		
1/2"	89		
#4	76		
#10	67		
#40	51		
#200	27		

Soil Description

Grey cmf SAND; some SILT; some mf GRAVEL

Atterberg Limits

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

Coefficients

D_{85}= 9.4554 D_{60}= 0.9677 D_{50}= 0.3787
D_{30}= 0.0900 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 8.5%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 04/26/22

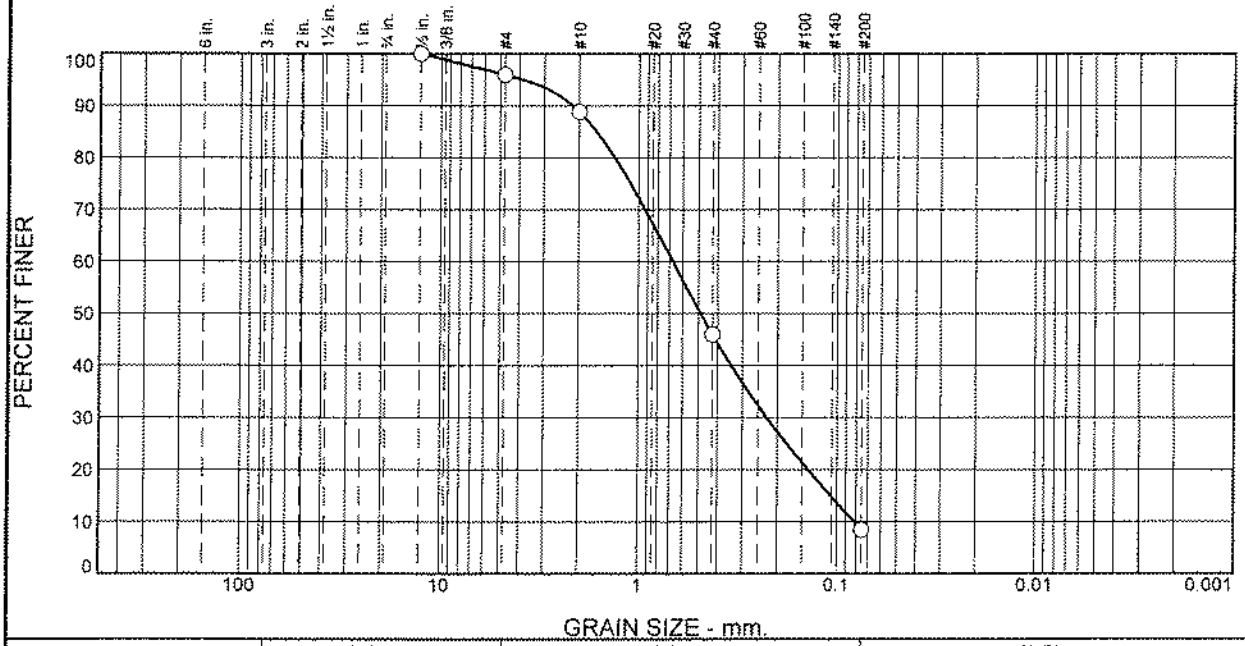
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-13-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/26/22

Sample No: K-132.6, S-7 **Source of Sample:** Boring Sample
Location: In-place **Elev./Depth:** 19-21'



% Cobbles	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	7	43	38	8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	96		
#10	89		
#40	46		
#200	8.5		

Soil Description

Grey c-mf SAND; trace SILT; trace f GRAVEL

Atterberg Limits

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

Coefficients

D_{85}= 1.6359 D_{60}= 0.6735 D_{50}= 0.4878
D_{30}= 0.2260 D_{15}= 0.1072 D_{10}= 0.0816
C_u= 8.26 C_c= 0.93

Classification

USCS= AASHTO=

Remarks

Moisture Content= 18.6%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: Date: 04/26/22

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-03-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 18, 2022
	United Cable Installation	**Test Date:**	February 11, 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-117.6-0.2	S-4	6-8	A	10	205.83	41.7
K-117.6-0.2	S-7	19-21	A	10	220.45	23.5
K-117.6-0.2	S-9	28-30	A	10	273.37	99.7
K-117.6-2.1	S-6	14-16	A	10	163.54	57.2
K-130.9	S-4	6-8	A	10	144.29	85.8
K-131.6	S-4	6-8	A	10	138.58	96.9
K-131.6	ST-1	35-37	A	10	227.62	99.9
K-131.7A	S-7	19-21	A	10	175.90	78.3
K-131.7A	ST-1	45-47	A	10	221.28	86.6
K-131.7B	S-6	14-16	A	10	147.24	3.1
K-131.7B	ST-1	45-47	A	10	239.55	99.8
K-131.9	S-5	8-10	A	10	133.26	2.0
K-131.9	ST-1	35-37	A	10	194.65	99.0
K-132.1	S-6	14-16	A	10	202.17	44.3
K-132.1	ST-1	35-37	A	10	299.54	99.4

Reviewed By: _____ Date: February 18, 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-13-04-22
Project:	Champlain Hudson Power Express	**Report Date:**	April 26, 2022
	United Cable Installation	**Test Date:**	April 22, 2022
	Various Locations, New York	**Performed By:**	E. Hannon

TEST DATA

Boring No.	Sample No.	Depth (ft)	Method (A or B)	Soak Time (min)	Initial Dry Weight (g)	% Finer than #200
K-132.4	TR-1	31-33	A	10	92.01	93.3
K-132.4	S-11	39-41	A	10	44.75	98.7
K-132.5	ST-1	33-35	A	10	161.78	95.0

Reviewed By: _____ Date: 04/26/22

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-03-02-22
Report Date: February 18, 2022
Date Received: February 7, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-117.6-0.2	S-4	NP	NP	NP
K-117.6-0.2	S-7	NP	NP	NP
K-117.6-0.2	S-9	65	26	39
K-117.6-2.1	S-6	41	19	22
K-130.9	S-4	39	18	21
K-131.6	S-4	41	20	21
K-131.6	ST-1	62	25	37
K-131.7A	S-7	53	21	32
K-131.7A	ST-1	53	25	28
K-131.7B	S-6	NP	NP	NP
K-131.7B	ST-1	55	19	36
K-131.9	S-5	NP	NP	NP
K-131.9	ST-1	51	20	31
K-132.1	S-6	NP	NP	NP
K-132.1	ST-1	44	19	25

SAMPLE INFORMATION

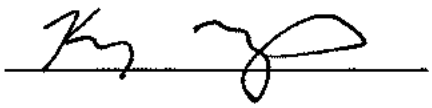
Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-117.6-0.2	S-4	6.35	15	25.3
K-117.6-0.2	S-7	2.38	30	18.3
K-117.6-0.2	S-9	0.595	1	55.0
K-117.6-2.1	S-6	2	5	47.9
K-130.9	S-4	2	5	46.6
K-131.6	S-4	0.595	2	48.7
K-131.6	ST-1	0.841	1	55.9
K-131.7A	S-7	2	2	43.6
K-131.7A	ST-1	9.51	10	66.4
K-131.7B	S-6	9.51	30	178.4
K-131.7B	ST-1	0.595	1	58.7
K-131.9	S-5	4.76	20	411.1
K-131.9	ST-1	2	1	70.9
K-132.1	S-6	4.76	10	121.0
K-132.1	ST-1	2	1	37.7

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-117.6-0.2	S-4	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-7	Air Dry	Pulverizing and Screening
K-117.6-0.2	S-9	Air Dry	Pulverizing and Screening
K-117.6-2.1	S-6	Air Dry	Pulverizing and Screening
K-130.9	S-4	Air Dry	Pulverizing and Screening
K-131.6	S-4	Air Dry	Pulverizing and Screening
K-131.6	ST-1	Air Dry	Pulverizing and Screening
K-131.7A	S-7	Air Dry	Pulverizing and Screening
K-131.7A	ST-1	Air Dry	Pulverizing and Screening
K-131.7B	S-6	Air Dry	Pulverizing and Screening
K-131.7B	ST-1	Air Dry	Pulverizing and Screening
K-131.9	S-5	Air Dry	Pulverizing and Screening
K-131.9	ST-1	Air Dry	Pulverizing and Screening
K-132.1	S-6	Air Dry	Pulverizing and Screening
K-132.1	ST-1	Air Dry	Pulverizing and Screening

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: 02/18/22

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-13-04-22
Report Date: April 26, 2022
Date Received: April 18, 2022

TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-132.4	TR-1	45	19	26
K-132.4	S-11	39	18	21
K-132.5	ST-1	62	21	41

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-132.4	TR-1	4.76	1	43.4
K-132.4	S-11	0.25	0	31.3
K-132.5	ST-1	4.76	2	61.3

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-132.4	TR-1	Air Dry	Pulverizing and Screening
K-132.4	S-11	Air Dry	Not Necessary
K-132.5	ST-1	Air Dry	Pulverizing and Screening

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: 04/26/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-03-02-22
Project:	Champlain Hudson Power Express	**Report Date:**	February 18, 2022
	United Cable Installation	**Date Received:**	February 7, 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-131.7B	S-5	10.5	89.5	97.7	A	440
K-132.1	S-4	14.1	85.9	84.6	A	440

Reviewed By: _____ Date: 02/18/22

ATLANTIC TESTING LABORATORIES

WBE certified company

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	**Date Received:**	February 18, 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-132.2	S-4	90.7	9.3	633.7	A	440

Reviewed By: _____ Date: 03/01/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-13-04-22
Project:	Champlain Hudson Power Express	**Report Date:**	April 26, 2022
	United Cable Installation	**Date Received:**	April 18, 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-132.4	S-2	6.7	93.3	15.2	A	440

Reviewed By: _____ Date: 04/26/22

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-13-04-22
Report Date: April 26, 2022
Date Received: April 18, 2022

Sample: K-132.5, 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	22.5	11.44	11.45	11.45	11.45

pH of calibration standards used: 7.00

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

Test Date: 04/18/22 Performed by: E. Hannon
Meter Used: Miller 400A Soil Box Factor: 1.29

Date Collected	Temperature at Collection (°C)	Measured Resistance (Ω)	Calculated Resistivity (Ω/cm)
Not Provided	Not Provided	4,500	5,805

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)
0.76	7600

Reviewed By: Date: 04/26/22

ATLANTIC TESTING LABORATORIES

WBE certified company

PROJECT INFORMATION

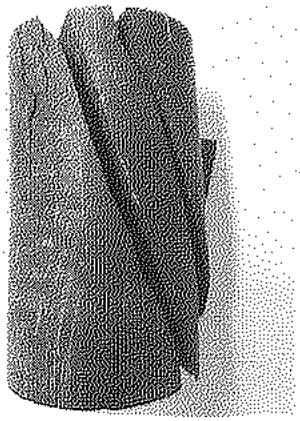
Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-04-03-22
Project:	Champlain Hudson Power Express	**Report Date:**	March 1, 2022
	United Cable Installation	**Date Received:**	February 18, 2022
	Various Locations, New York		

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-132.2	R-1	33.0-33.3	1.98	4.04	300	24,410	3.08	7,920
[redacted]								

Failure Pictures

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



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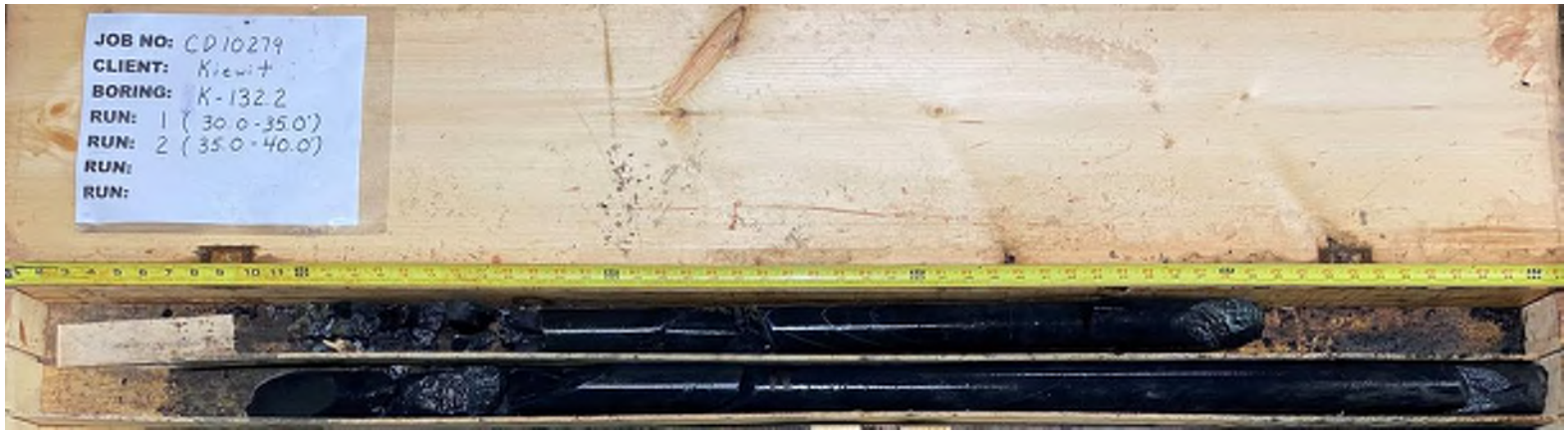
Reviewed By: _____ Date: March 1, 2022

Champlain Hudson Power Express
Kiewit Engineering (NY) Corp.

K-130.9 - Runs 1 and 2

K-132.2 - Runs 1 and 2



Terracon GeoReport

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOG NO. KB-132.1A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.299380° Longitude: -73.552075°

Surface Elev.: 148.3701 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.2	148.2									
TOPSOIL										
FILL - POORLY GRADED SAND WITH SILT AND GRAVEL, orange and brown						8	5-5-4-4 N=9			
						14	3-4-5-6 N=9			
			5			10	4-4-4-5 N=8	27.5	NP	10
6.0	142.4									
FAT CLAY (CH), varved silt and clay, brown, soft to stiff						20	2-3-4-5 N=7			
grades gray						24	5-5-7-7 N=12			
			10			24	3-4-5-6 N=9			
			15			24	4-4-4-5 N=8	38.1	52-25-27	97
			20			24	2-2-3-4 N=5			
			25			24	WH-WH-3-3 N=3			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-23-2022 | Boring Completed: 08-24-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.1A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.299380° Longitude: -73.552075°

Surface Elev.: 148.3701 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), varved silt and clay, brown, soft to stiff *(continued)*					
30.0	118.4	**LEAN CLAY (CL)**, varved silt and clay, gray, very soft	24	WH-WH-WH-WH	34.0	31-20-11	100
37.0	111.4	**WEATHERED SHALE**, black	24	WH-WH-WH-WH			
40.0	108.4	**SHALE**, slightly weathered, very close to moderate fractured, good RQD, black		REC = 91% RQD = 83%			
45.0	103.4	**SHALE**, slightly weathered, close to moderate fractured, good RQD, black		REC = 91% RQD = 84%			
50.0	98.4	**SHALE**, slightly weathered, very close to moderate fractured, good RQD, black		REC = 100% RQD = 85%			
55.0	93.4						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-23-2022 | Boring Completed: 08-24-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.1A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.299380° Longitude: -73.552075°

Surface Elev.: 148.3701 (Ft.)

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS		WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	60.0	88.4									
	SHALE, slightly weathered, very close to moderate fractured, good RQD, black *(continued)*						REC = 100% RQD = 89%				
	Boring Terminated at 60 Feet		60								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-23-2022 | Boring Completed: 08-24-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.3A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.297623° Longitude: -73.554393°

Surface Elev.: 147.7460 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	147.5									
TOPSOIL										
FILL - SILTY SAND, trace gravel, dark brown						18	12-31-14-7 N=45			
						14	5-8-10-7 N=18			
			5			8	5-7-7-7 N=14	12.1	NP	32
6.0	141.7									
FAT CLAY (CH), varved silt and clay, brown with gray mottling, medium stiff to very stiff						20	2-4-4-6 N=8			
						24	5-7-9-9 N=16			
			10			24	4-5-6-8 N=11			
			15			18	4-3-4-4 N=7	45.2	60-27-33	89
			20			24	3-4-4-5 N=8			
grades gray			25			24	WH-4-3-5 N=7			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022 | Boring Completed: 08-25-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.3A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.297623° Longitude: -73.554393°

Surface Elev.: 147.7460 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FAT CLAY (CH), varved silt and clay, brown with gray mottling, medium stiff to very stiff *(continued)*							
30.0	117.7		30						
		SANDY SILT WITH GRAVEL (ML), varved silt and clay, gray, very soft			24	WH-WH-WH-WH	37.2	NP	53
35.0	112.7		35						
		FAT CLAY (CH), varved silt and clay, gray, very soft			24	WH-WH-WH-WH 3" Split Spoon With Ring Samplers			
			40		24	WH-WH-WH-WH			
45.5	102.2		45						
46.5	101.2	**WEATHERED SHALE**, black, very dense			6	WH-50/1"			
		SHALE, slightly weathered, close to moderate fractured, excellent RQD, black				REC = 100% RQD = 93%			
51.5	96.2		50						
		SHALE, slightly weathered, close to wide fractured, excellent RQD, black				REC = 100% RQD = 97%			
			55						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of Hammer

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022 | Boring Completed: 08-25-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.3A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.297623° Longitude: -73.554393° Surface Elev.: 147.7460 (Ft.) DEPTH / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS		WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	56.5 / 91.2									
	Boring Terminated at 56.5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 08-24-2022 | Boring Completed: 08-25-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.5A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.295029° Longitude: -73.556894°

Surface Elev.: 148.7382 (Ft.)

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		FILL - SANDY SILT, brown and gray			20	9-17-15-18 N=32			
					20	17-9-7-5 N=16			
4.0	144.7								
		LEAN CLAY (CL), varved silt and clay, rootlets noted, brown and gray, stiff	5		15	6-6-8-10 N=14	17.4	35-21-14	94
					18	4-4-7-6 N=11			
					24	8-6-8-8 N=14			
10.0	138.7		10		18	2-2-1-1 N=3			
		POORLY GRADED SAND (SP), fine grained, gray, loose to medium dense							
			15		0	6-5-7-4 N=12			
20.0	128.7								
		LEAN CLAY (CL), varved silt and clay, gray, very soft to medium stiff	20		24	3-4-5-5 N=9			
			25		24	WH-4-4-5 N=8			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-25-2022 | Boring Completed: 08-26-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

BORING LOG NO. KB-132.5A

PROJECT: CHPE - Additional HDD Borings - Phase 3

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

SITE: Fort Ann to Coxsackie, NY

LOCATION See Exploration Plan

Latitude: 43.295029° Longitude: -73.556894°

Surface Elev.: 148.7382 (Ft.)

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		LEAN CLAY (CL), varved silt and clay, gray, very soft to medium stiff *(continued)*								
			30			24	WH-WH-WH-4	38.8	40-22-18	99
			35			24	WH-WH-WH-WH			
			40			24	WH-WH-WH-WH			
			45			24	WH-WH-WH-WH	38.2	33-21-12	95
			50			24	WR-WR-WR-WR			
55.0	93.7									
55.2	93.5	**WEATHERED ROCK**, gray, very dense	55			2				
		Boring Terminated at 55.2 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Boring backfilled with bentonite grout upon completion

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were provided by others.

Notes:

Logged by AB
Hammer Efficiency Summary:
Energy Transfer Ratio: 78.6% +/-2.9%
Hammer Efficiency Correction (CE): 1.31
WH = Weight of hammer
WR = Weight of rods

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
30 Corporate Cir Ste 201
Albany, NY

Boring Started: 02-25-2022 | Boring Completed: 08-26-2022

Drill Rig: Diedrich D-50 | Driller: C. Johnston

Project No.: JB215256G

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Water Content (%)	Organic Content (%)
KB-115.5	2-4	13.4	3.4
KB-115.5	15-17	70.8	
KB-117.6-1.6D	3-5	4.0	
KB-117.6-1.6D	20-22	22.7	
KB-117.6-1.6D	35-37	26.2	
KB-117.6-1.6D	49-51	15.3	
KB-122.9	4-6	23.1	
KB-122.9	15-17	18.6	
KB-122.9	25-27	77.9	
KB-122.9	45-47	74.8	
KB-123.0	2-4	10.9	
KB-123.0	20-22	68.3	
KB-123.0	35-37	51.0	
KB-123.0	50-52	45.9	
KB-123.0	65-67	34.5	
KB-132.1A	4-6	27.5	
KB-132.1A	15-17	38.1	
KB-132.1A	30-32	34.0	
KB-132.3A	4-6	12.1	
KB-132.3A	15-17	45.2	
KB-132.3A	30-32	37.2	
KB-132.5A	4-6	17.4	
KB-132.5A	30-32	38.8	
KB-132.5A	45-47	38.2	
KB-135.7	2-4	36.6	
KB-135.7	15-17	41.9	
KB-135.7	30-32	34.8	
KB-135.8	2-4	5.6	
KB-135.8	15-17	42.7	
KB-135.8	30-32	36.8	
KB-135.8	40-42	28.3	
KB-160.6	2-4	12.2	
KB-163.1	4-6	11.7	
KB-163.2	8-10	12.1	
KB-169.0-3.3	6-8	12.0	
KB-169.0-3.3	25-27	11.5	
KB-169.0-3.3	35-37	8.4	
KB-177.1	10-12	8.9	
KB-177.1	25-27	11.5	
KB-177.1	40-42	11.2	
KB-177.1	50-52	5.7	
KB-182.7B	6-8	31.5	

PROJECT: CHPE - Additional HDD Borings - Phase 3

SITE: Fort Ann to Coxsackie, NY

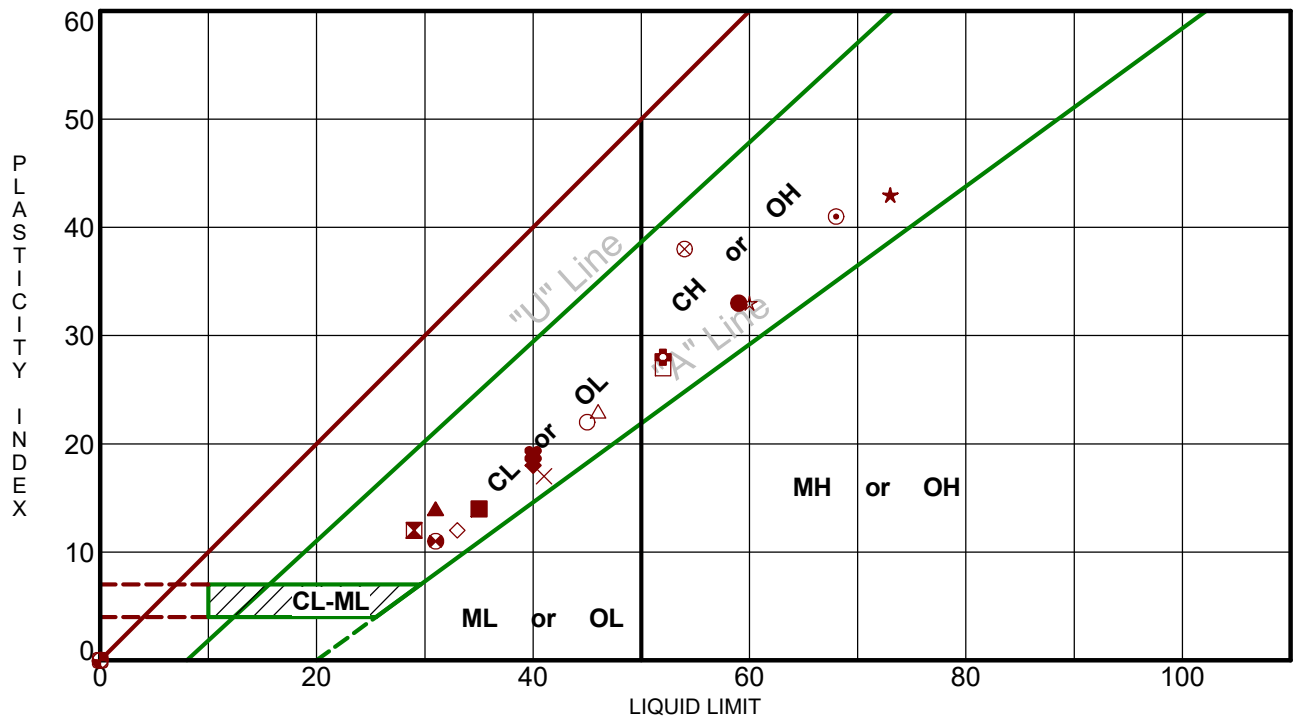
Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256G

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	KB-115.5	15 - 17	59	26	33	86.6	CH	FAT CLAY
⊠	KB-117.6-1.6D	20 - 22	29	17	12	25.5	SC	CLAYEY SAND
▲	KB-117.6-1.6D	35 - 37	31	17	14	48.6	SC	CLAYEY SAND
★	KB-122.9	25 - 27	73	30	43	98.8	CH	FAT CLAY
⊙	KB-122.9	45 - 47	68	27	41	91.5	CH	FAT CLAY
✿	KB-123.0	20 - 22	52	24	28	81.5	CH	FAT CLAY with SAND
○	KB-123.0	35 - 37	45	23	22	75.9	CL	LEAN CLAY with SAND
△	KB-123.0	50 - 52	46	23	23	65.8	CL	SANDY LEAN CLAY
⊗	KB-123.0	65 - 67	54	16	38	91.9	CH	FAT CLAY
⊕	KB-132.1A	4 - 6	NP	NP	NP	10.0	SP-SM	POORLY GRADED SAND with SILT and GRAVEL
□	KB-132.1A	15 - 17	52	25	27	96.9	CH	FAT CLAY
⊛	KB-132.1A	30 - 32	31	20	11	100.0	CL	LEAN CLAY
◕	KB-132.3A	4 - 6	NP	NP	NP	31.7	SM	SILTY SAND
☆	KB-132.3A	15 - 17	60	27	33	88.6	CH	FAT CLAY
❀	KB-132.3A	30 - 32	NP	NP	NP	53.0	ML	SANDY SILT with GRAVEL
■	KB-132.5A	4 - 6	35	21	14	94.3	CL	LEAN CLAY
◆	KB-132.5A	30 - 32	40	22	18	98.7	CL	LEAN CLAY
◇	KB-132.5A	45 - 47	33	21	12	94.9	CL	LEAN CLAY
×	KB-135.7	2 - 4	41	24	17	26.1	GC	CLAYEY GRAVEL with SAND
✖	KB-135.7	15 - 17	40	21	19	91.9	CL	LEAN CLAY

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

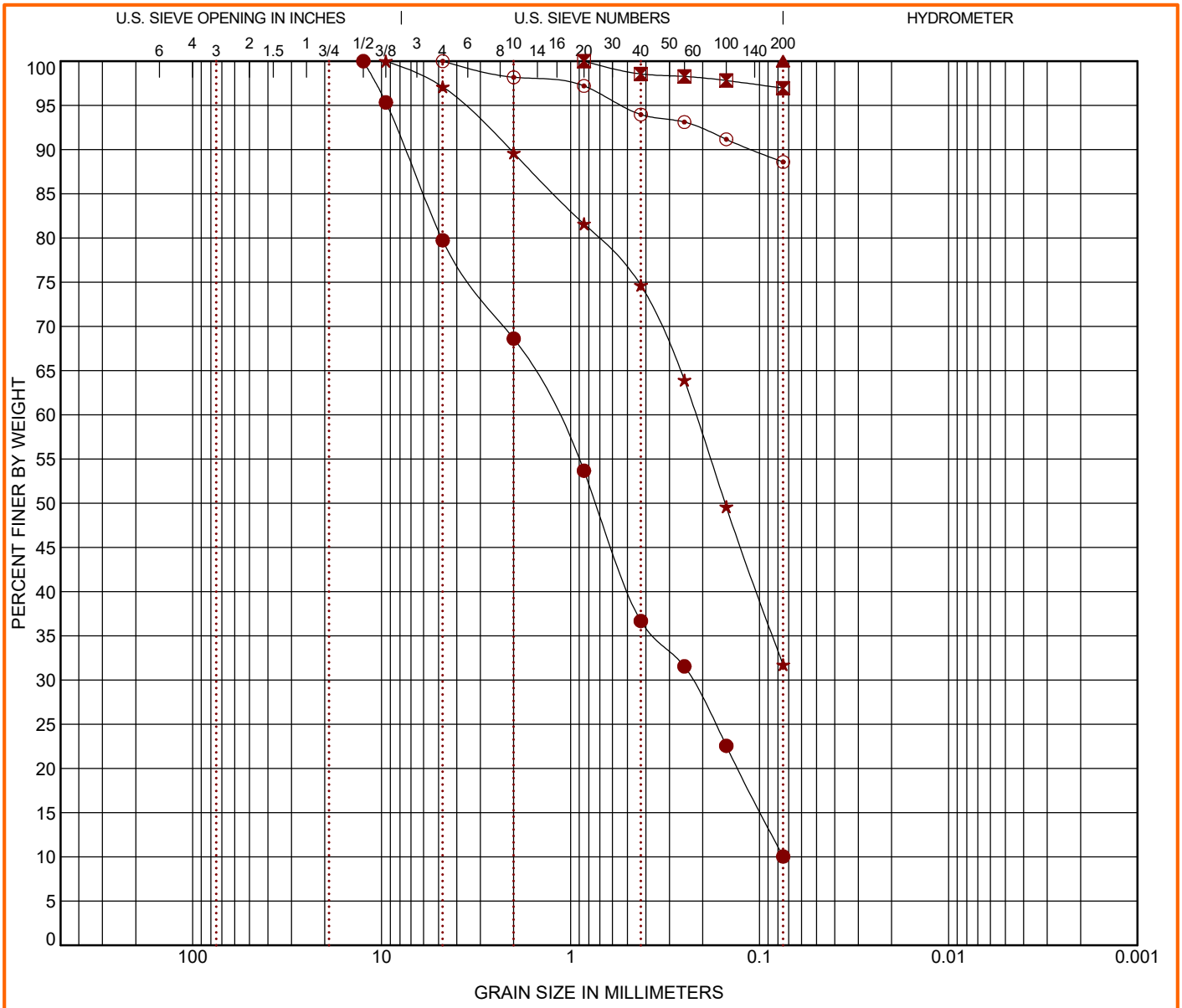
SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-132.1A	4 - 6	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	27.5	NP	NP	NP	0.57	16.31
⊠	KB-132.1A	15 - 17	FAT CLAY (CH)	38.1	52	25	27		
▲	KB-132.1A	30 - 32	LEAN CLAY (CL)	34.0	31	20	11		
★	KB-132.3A	4 - 6	SILTY SAND (SM)	12.1	NP	NP	NP		
⊙	KB-132.3A	15 - 17	FAT CLAY (CH)	45.2	60	27	33		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-132.1A	4 - 6	12.5	1.221	0.229		0.0	20.3	69.7		10.0	
⊠	KB-132.1A	15 - 17	0.85				0.0	0.0	3.1		96.9	
▲	KB-132.1A	30 - 32	0.075				0.0	0.0	0.0		100.0	
★	KB-132.3A	4 - 6	9.5	0.217			0.0	2.9	65.4		31.7	
⊙	KB-132.3A	15 - 17	4.75				0.0	0.0	11.4		88.6	

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

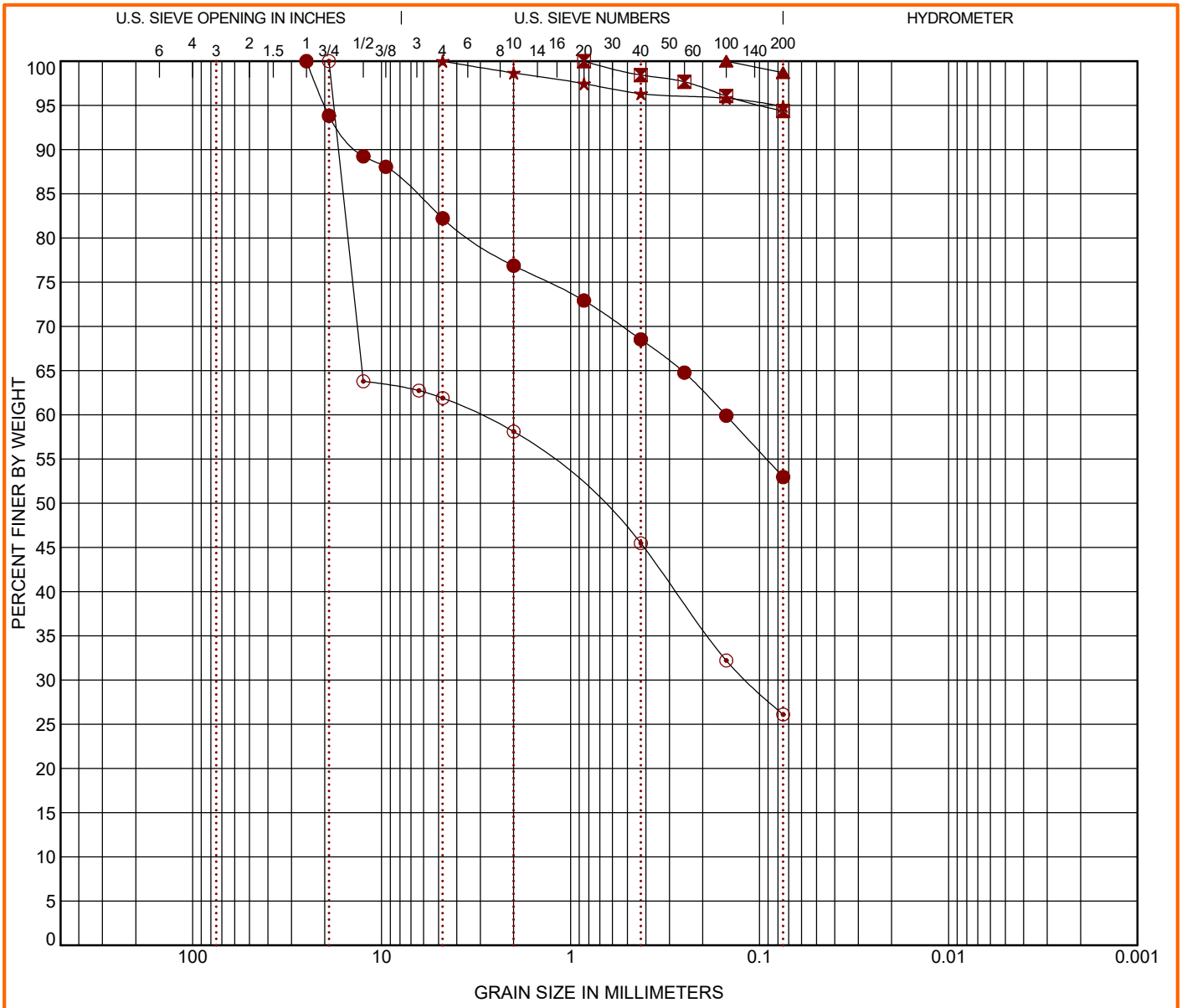
Terracon
30 Corporate Cir Ste 201
Albany, NY

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 JB215256G CHPE - ADDITIONAL.GPJ TERRACON_DATATEMPLATE.GDT 11/2/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-132.3A	30 - 32	SANDY SILT with GRAVEL (ML)	37.2	NP	NP	NP		
⊠	KB-132.5A	4 - 6	LEAN CLAY (CL)	17.4	35	21	14		
▲	KB-132.5A	30 - 32	LEAN CLAY (CL)	38.8	40	22	18		
★	KB-132.5A	45 - 47	LEAN CLAY (CL)	38.2	33	21	12		
⊙	KB-135.7	2 - 4	CLAYEY GRAVEL with SAND (GC)	36.6	41	24	17		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-132.3A	30 - 32	25	0.152			0.0	17.8	29.3		53.0	
⊠	KB-132.5A	4 - 6	0.85				0.0	0.0	5.7		94.3	
▲	KB-132.5A	30 - 32	0.15				0.0	0.0	1.3		98.7	
★	KB-132.5A	45 - 47	4.75				0.0	0.0	5.1		94.9	
⊙	KB-135.7	2 - 4	19	3.082	0.117		0.0	38.1	35.8		26.1	

PROJECT: CHPE - Additional HDD Borings - Phase 3

PROJECT NUMBER: JB215256G

SITE: Fort Ann to Coxsackie, NY

Terracon
30 Corporate Cir Ste 201
Albany, NY

CLIENT: Kiewit Engineering (NY) Corp
Lone Tree, CO

GEOPHYSICAL SERVICES REPORT

Champlain Hudson Power Express Upland Cable Installation Project
Wetland Crossing, Near Hudson Falls (HDD21)
Whitehall, Washington County, New York

Schnabel Reference # 21C25020.040
June 14, 2022

Schnabel ENGINEERING
T 518.348.8575
28 Corporate Drive, Suite 204 / Clifton Park, NY 12065
schnabel-eng.com

June 14, 2022

Mr. Jaren Knighton, PE
Kiewit Engineering Group, Inc.
(Kiewit Engineering (NY) Corp.)
8880 Penrose Ln.
Lenexa, KS 66219

Subject: **Geophysical Services Report – Champlain Hudson Power Express Upland Cable Installation Project (HDD21); Wetland Crossing, near Hudson Falls, Whitehall, Washington County, New York (Schnabel Reference 21C25020.040)**

Dear Mr. Knighton:

SCHNABEL ENGINEERING OF NEW YORK is pleased to submit our geophysical report for this project. This study was performed in accordance with our proposal dated April 29, 2022, and revised May 5, 2022; and by Kiewit Task Assignment Order No. 04 (effective date May 6, 2022) of our Master Service Agreement KEG_MSA_Schnabel_2017 (December 11, 2017, Amended May 21, 2020).

EXECUTIVE SUMMARY

This report presents the results of our geophysical survey performed along the Canadian Pacific Railway south of Whitehall, New York, for Kiewit Engineering (NY) Corp. as part of the Champlain Hudson Power Express project.

Schnabel collected 1,800 linear feet of seismic data between about 200 ft southwest of Borehole K-132.4 and about 100 ft northeast of Borehole K-132.1; refer to Figure A-1 of this report. The data was processed using both multi-channel analysis of surface waves (MASW) and seismic refraction tomography (SRT) methods. The MASW method was unable to produce reliable results, most likely due to the subsurface conditions and geologic setting. The SRT method proved more effective and provided results that show the depth to rock varies between about 25 to 45 ft below the ground surface along the alignment.

We are providing this Executive Summary solely for purposes of overview. Any party that relies on this report must read the full report. This Executive Summary omits several details, any one of which could be important to the proper application of the report.

PROJECT DESCRIPTION

Site Description

The site of this geophysical survey is located along the Canadian Pacific (CP) Railway, about 2 miles east of Hudson Falls, Washington County, New York. A Site Vicinity Map is included as Figure 1.

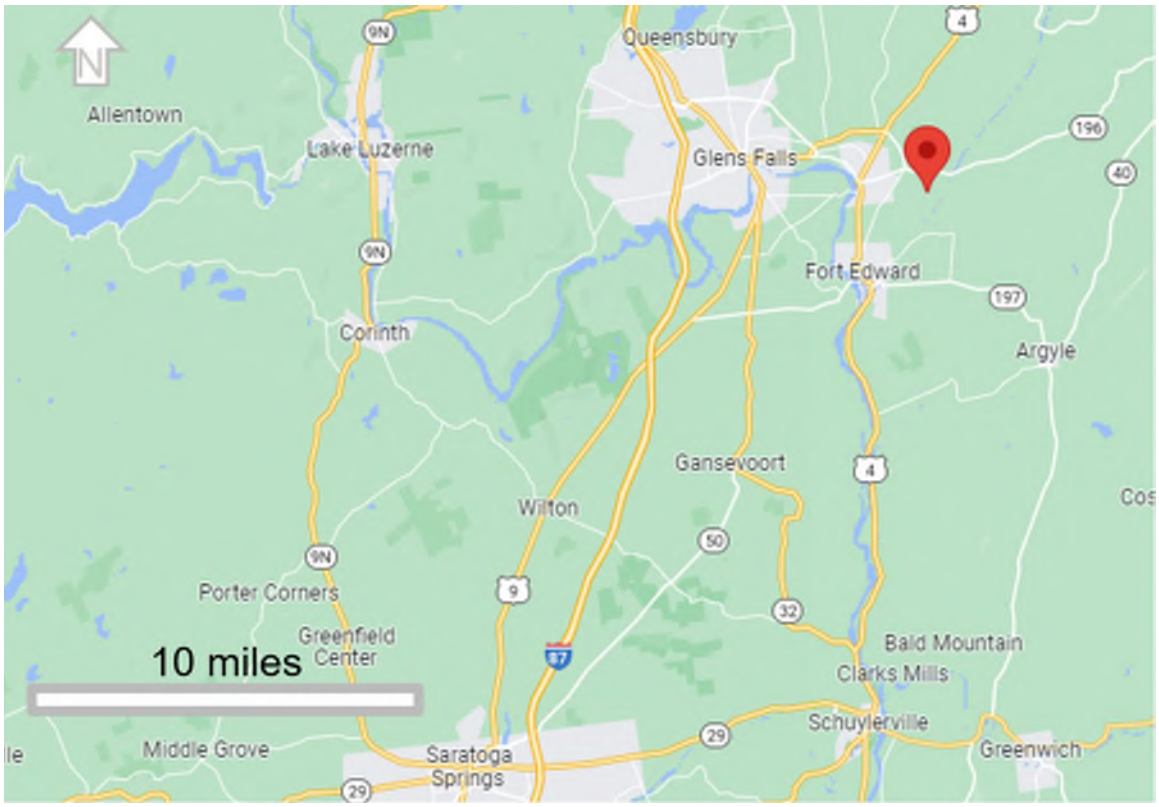


Figure 1: Site Vicinity Map (Site Represented by Red Symbol)

The seismic survey was conducted generally about 10 ft northwest of and parallel to the railroad line, starting about 200 ft southwest of Borehole K-132.4 and extending about 100 ft northeast of Borehole K-132.1. Three existing test borings were located along the seismic line. From the boring logs and data provided by Kiewit, two of the three boreholes were located directly along the line, while one (K-132.4) was about 65 ft to the southeast of the seismic data line. Figure 2 shows the site layout. Photographs 1, 2, and 3 show the site conditions at the time of data collection. Topography was generally flat with little variation. The ground surface was generally comprised of gravel (ballast) and provided effective ground coupling using geophones with 3-inch spikes.

Figure 2: Site Layout (Background Image from Azure Imagery)



Photographs 1,2, and 3: Site Conditions During Data Collection

SURVEY OBJECTIVE AND SCOPE

The objective of this study was to estimate the depth to bedrock between the test borings that were drilled along the proposed HDD21 alignment, and in particular to identify zones where bedrock is shallower than about 40 to 50 ft deep.

Given the available data and expected subsurface conditions, we recommended an MASW survey that would be collected in a manner that P-wave seismic refraction data could also be analyzed from the same data set. MASW measures how surface waves propagate and disperse through the soil, thereby inferring shear-wave velocities in those areas. Shear-wave velocities directly correlate to the stiffness of soil and will, therefore, be used to locate soft soil areas in contrast with stiff materials such as bedrock. Seismic refraction measures the time it takes for a P-wave, or compressional wave, to travel from the source at the ground surface to the soil/bedrock interface and back to geophones placed along the surface. With analysis, the travel times can be calculated to provide estimates of depths to the interface.

We collected 1,800 linear feet of seismic data between about 200 ft southwest of Borehole K-132.4 and about 100 ft northeast of Borehole K-132.1. The data was processed using both MASW and SRT methods. The MASW method was unable to produce reliable results, most likely due to the subsurface conditions and geologic setting; however, the SRT method proved more effective and will be the focus of this report.

Geophysical Methods

Schnabel personnel collected seismic data using two Geometrics, Inc., Geode, 24-channel seismographs and 48 geophones along a linear array on May 17, 2022. The geophones were spaced 10 ft along the array. We collected shot records starting 30 ft off the end of the line and every 30 ft down the line. The energy source was a 16-pound sledgehammer striking a polypropylene plate on the ground surface. Once shot points were collected along the first half of the initial 48-channel (470 ft) spread, the first 24 geophones were picked up and moved to the end of the line, and shot points continued to move up the line. This roll-along method was continued until data was collected for the full 1,800-ft line, at which time the shot points continued through the final spread. The seismic data were recorded digitally directly onto a laptop computer that controlled the seismograph. Sub-meter GPS data was collected along the full

seismic line using a Trimble Geo 7x. The GPS data were used to both located the horizontal location of the geophysical data collected and to generate a topographic surface for data processing and displaying the results.

Multi-Channel Analysis of Surface Waves (MASW)

Schnabel performed analysis on the seismic data using a surface wave recognition and modeling program (SurfSeis Version 6, Kansas Geological Survey). The data for each array location were processed and then modeled using an inversion method to estimate the subsurface shear wave velocities. The inversion models from each source/receiver array location were combined to form a two-dimensional cross-section model of the subsurface shear wave velocity for each MASW traverse; however, the dispersive energy for this dataset was inconsistent and not conducive to reliable modeling. This variability in data quality can be caused by subsurface geologic conditions or high levels of vibrational noise at the site. In this case, the noise levels were not abnormally high, so the geological conditions are expected to be the cause of the ineffectiveness of the MASW method.

Seismic Refraction Tomography (SRT)

Seismic data processing was conducted using Rayfract Version 4, from Intelligent Resources. The processing involved Schnabel personnel manually picking first-arrival times of seismic energy, incorporating elevations into the data, and generating a model that matches the first arrivals. Gradational velocity changes are common in geologic environments with thicker zones of weathered and fractured bedrock, such as at this site; therefore, we performed a tomographic inversion to estimate these gradational changes in the P-wave velocities.

Results and Interpretations

As discussed above, the MASW method did not produce reliable results; therefore, the results from the SRT method, which did produce reliable results that met the project objectives, are discussed below.

The SRT results are shown in Figure A-1, located in Appendix A. The figure shows the P-wave velocity model using a 10:1 vertical to horizontal scaling to enhance the variation on the velocity structure in the top 50 ft below ground surface (bgs). On the bottom left corner of the figure is a Location Plan that shows where the results are, with distances on the base map corresponding to the horizontal axis of the P-wave velocity model. The base map is also color coded to represent ranges of estimated depth to rock, as described below.

The three existing boreholes that were located along the seismic line are represented on the velocity model. Bedrock was not encountered in Boreholes K-132.4 and K-132.1, so we know that rock is deeper than the bottom of those boreholes at those locations. Borehole K-132.2 encountered apparent bedrock at a depth of 30 ft, and this depth is represented by a solid black line perpendicular to the boring stick.

Based on correlation with the limited borehole information and our experience in similar geologic settings, we chose the 7,500 ft/s contour line to represent the top of bedrock. This is shown as a dashed black line on the seismic refraction velocity model on Figure A-1. The black lines on either side represent the zone within 10% of the depth to the 7,500 ft/s contour line. A depth range of ±10% is the typical expected resolution for the seismic refraction method. Additionally, the Location Plan on Figure A-1 shows where

depth to top of bedrock, as indicated by the 7,500 ft/s contour line, is less than 30 ft, between 30 ft and 40 ft, or greater than 40 ft.

Based on these results, the depth to bedrock is shallower than 50 ft for a portion of the 1,800-ft alignment. For the southern 500 ft of the line, the depth to bedrock varies between elevations of 94 and 100 ft, or 35 and 45 ft bgs. From a distance of 420 ft to about 1,220 ft, the bedrock slopes upward from about an elevation of 94 ft (45 ft bgs) to an elevation of 115 ft (25 ft bgs). From 1,220 ft to a distance of about 1,600 ft, the bedrock drops back down to about an elevation of 100 ft (40 ft bgs).

LIMITATIONS

The seismic refraction method is based on subsurface interfaces (boundaries) that refract the seismic waves. The seismic wave energy refracts through interfaces where there is a lower velocity layer above a higher velocity layer. It is not capable of detecting a lower velocity layer beneath a higher velocity layer. Based on the observed soft clay material in the borehole logs and Boring K-132.2 indicating bedrock below the clay, we infer the transition from clay to bedrock is similar below Borings K-132.4 and K-132.1 in comparison to Boring K-132.2; however, this limitation (e.g., a lower velocity layer beneath a higher velocity layer) could affect the results for this project for conditions where lower velocity material underlies higher velocity material along the line of study.

Schnabel based the analyses and recommendations submitted in this report on the information provided by Kiewit and the information revealed by our geophysical exploration. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction.

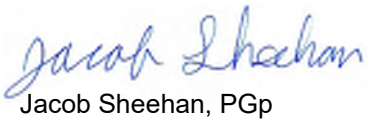
Geophysical data depict a broad estimate of actual subsurface conditions. Correlation of this data with intrusive method data will indicate some variance due to the nature of measured geophysical properties. Also, the resolution of the geophysical methods may be such as to not detect potentially significant smaller features that may appear significant in HDD drilling results or excavations at a particular location. As such, some amount of variation in the actual field conditions should be expected, including possible natural wood/tree material, boulders, and a variable/jagged bedrock surface. Annotations on the results represent our interpretation of the data.

We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,

SCHNABEL ENGINEERING OF NEW YORK



Jacob Sheehan, PGp
Senior Scientist

Mia A. Painter, PG-NY
Associate

JRS:CMM:MAP:MPT:vm

Appendix A: Seismic Refraction Results

APPENDIX A

SEISMIC REFRACTION TOMOGRAPHY RESULTS

South

North

K-132.4

K-132.2

K-132.1

Ground Surface

Depth = 30 ft

Depth = 40 ft

Depth = 50 ft

5000

10000

15000

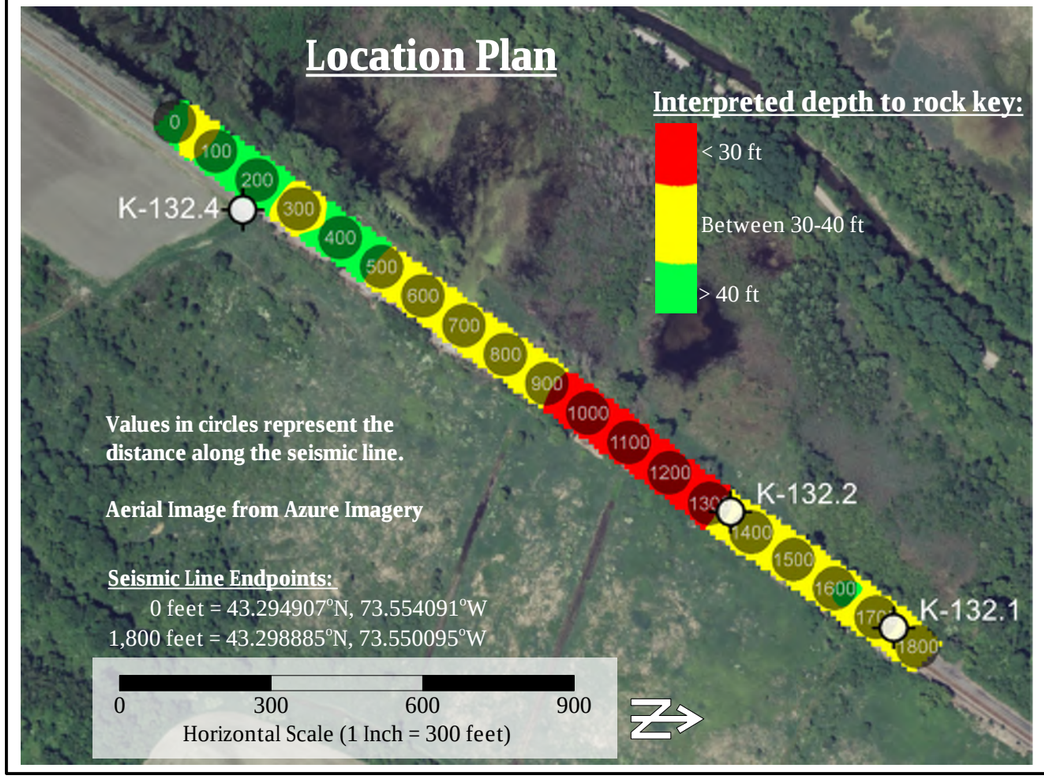
Elevation (feet)

140
130
120
110
100
90

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

Distance (feet)

Location Plan



Estimated Top of Rock

1500 3500 5500 7500 9500 11500

P-wave Velocity (ft/s)

Vertical Scale (ft) (1 in = 12.5 ft)

12.5

0

Velocity Profile Scale (10x V:H)

0 125

Horizontal Scale (ft) (1 in = 125 ft)

Legend

K-132.1

Represents borehole location and depth drilled

Represents the top of rock in borehole log

Dashed line represents top of rock as estimated from seismic results, based on 7,500 ft/s contour line and borehole information with solid lines representing +/- 10% of estimated depth

Note: Seismic and drilling results displayed with a 10 times vertical exaggeration.

Schnabel ENGINEERING

CHAMPLAIN HUDSON POWER EXPRESS UPLAND CABLE INSTALLATION HDD21
WETLAND CROSSING, NEAR HUDSON FALLS, WHITEHALL, NY

PROJECT NO. 21C25020.04

SEISMIC REFRACTION RESULTS

FIGURE A-1

Appendix D

BoreAid HDD Simulation Output

Generated Output

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OSHA CFR 29 1926.651 requires that the estimated location of underground utilities be determined before beginning the excavation or underground drilling operation. When the actual excavation or bore approaches an estimated utility location, the exact location of the underground installation must be determined by a safe, acceptable and dependable method. If the utility cannot be precisely located, it must be shut off by the utility company.

Project Summary

General:	CHPE HDD 9 Conduit 1 P2 Start Date: 02-28-2022 End Date: 02-28-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 9 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 127.18) ft
End Coordinate	(546.00, 0.00, 125.88) ft
Project Length	546.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 5

Soil Layer #1 USCS, Gravel (G), GM
Depth: 2.00 ft
Unit Weight: 120.0000 (dry), 140.0000 (sat) [lb/ft3]
Phi: 37.00, S.M.: 1000.00, Coh: 0.00 [psi]

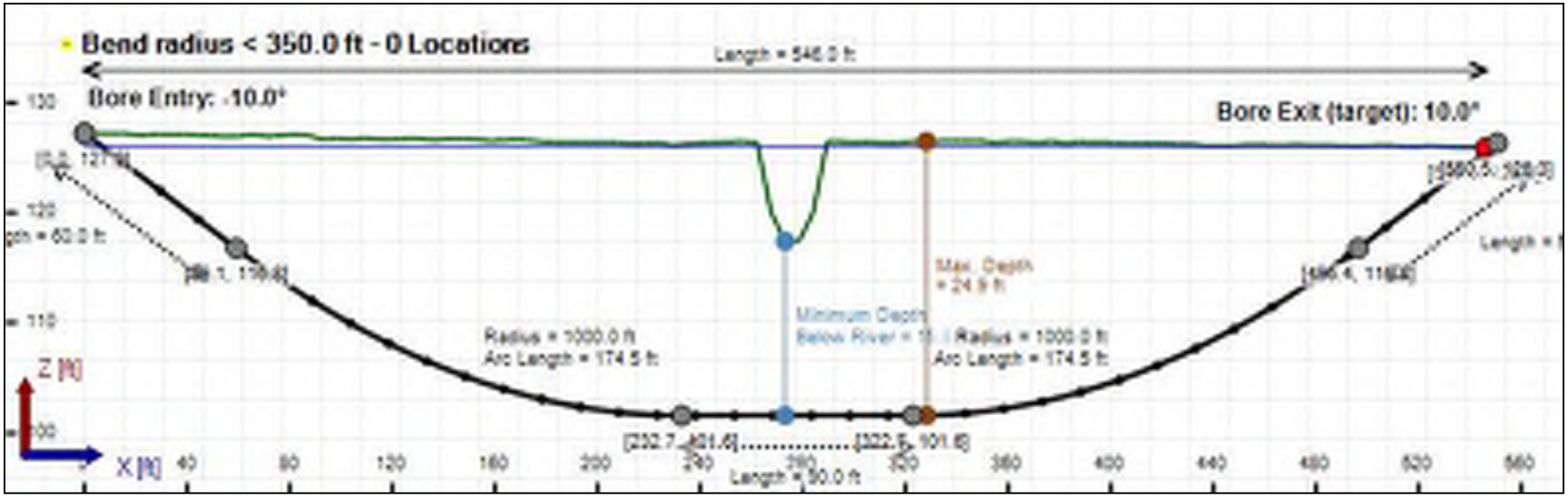
Soil Layer #2 USCS, Sand (S), SW
Depth: 6.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 200.00, Coh: 0.00 [psi]

Soil Layer #3 USCS, Clay (C), CH
Depth: 2.00 ft
Unit Weight: 80.0000 (dry), 110.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 300.00, Coh: 5.60 [psi]

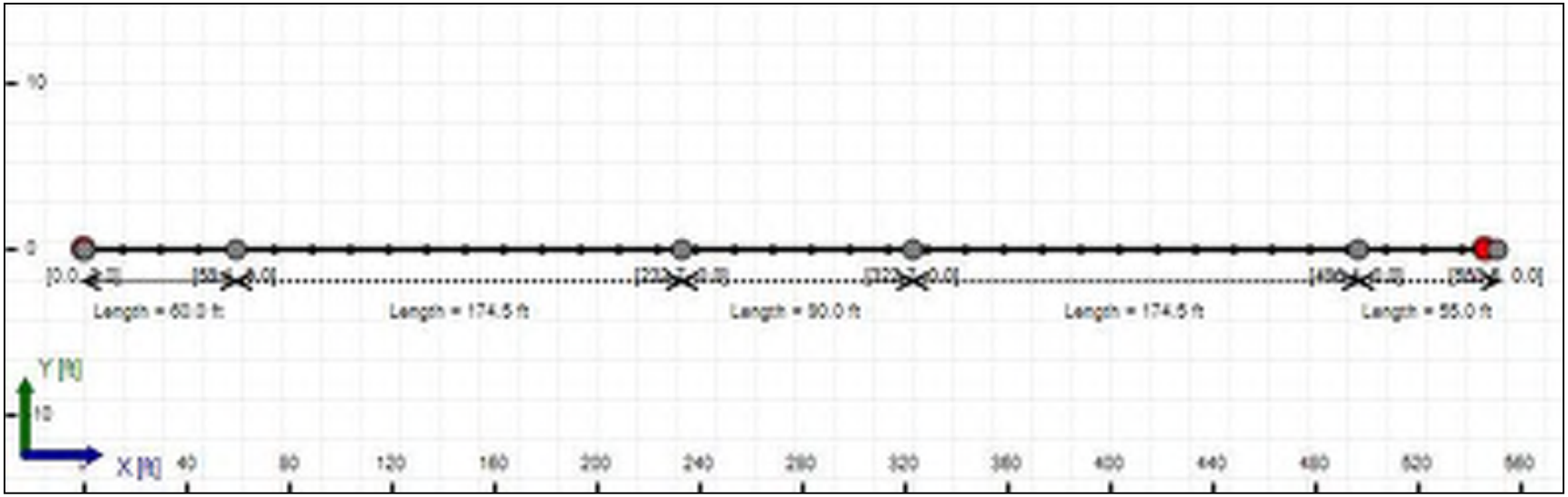
Soil Layer #4 USCS, Sand (S), SC
Depth: 11.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 200.00, Coh: 0.00 [psi]

Soil Layer #5 USCS, Clay (C), CH
Depth: 12.00 ft
Unit Weight: 70.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 200.00, Coh: 3.13 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 555.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.7	9.3
Water Pressure	10.6	10.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.3	19.9
Deflection		
Earth Load Deflection	0.768	2.536
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	0.900	2.668
Compressive Stress [psi]		
Compressive Wall Stress	59.9	89.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	9347.8	9347.8
Pullback Stress [psi]	260.7	260.7
Pullback Strain	4.534E-3	4.534E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	260.7	285.5
Tensile Strain	4.534E-3	5.414E-3

Net External Pressure = 16.8 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.900	7.5	8.3	OK
Unconstrained Collapse [psi]	16.7	127.7	7.7	OK
Compressive Wall Stress [psi]	59.9	1150.0	19.2	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	26.6	240.0	9.0	OK
Tensile Stress [psi]	285.5	1200.0	4.2	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	6.00 in	59.368 psi	52.906 psi
1	6.00 in	12.00 in	58.547 psi	52.184 psi
2	12.00 in	16.13 in	57.787 psi	51.457 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

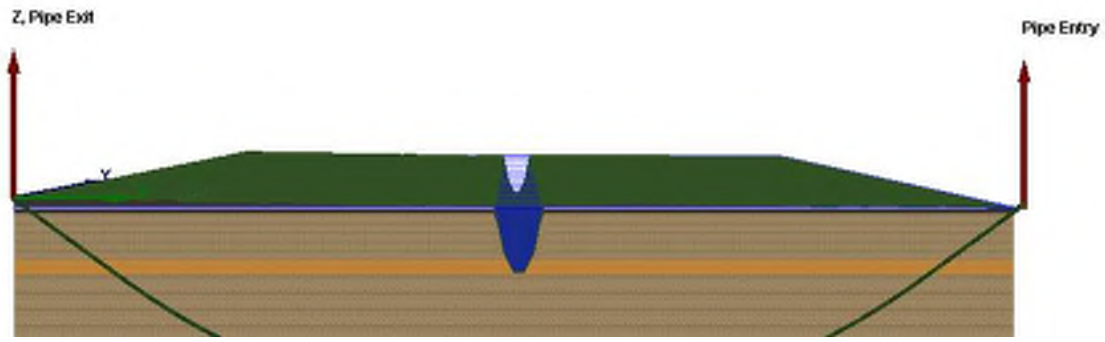
Rheological model: Bingham-Plastic

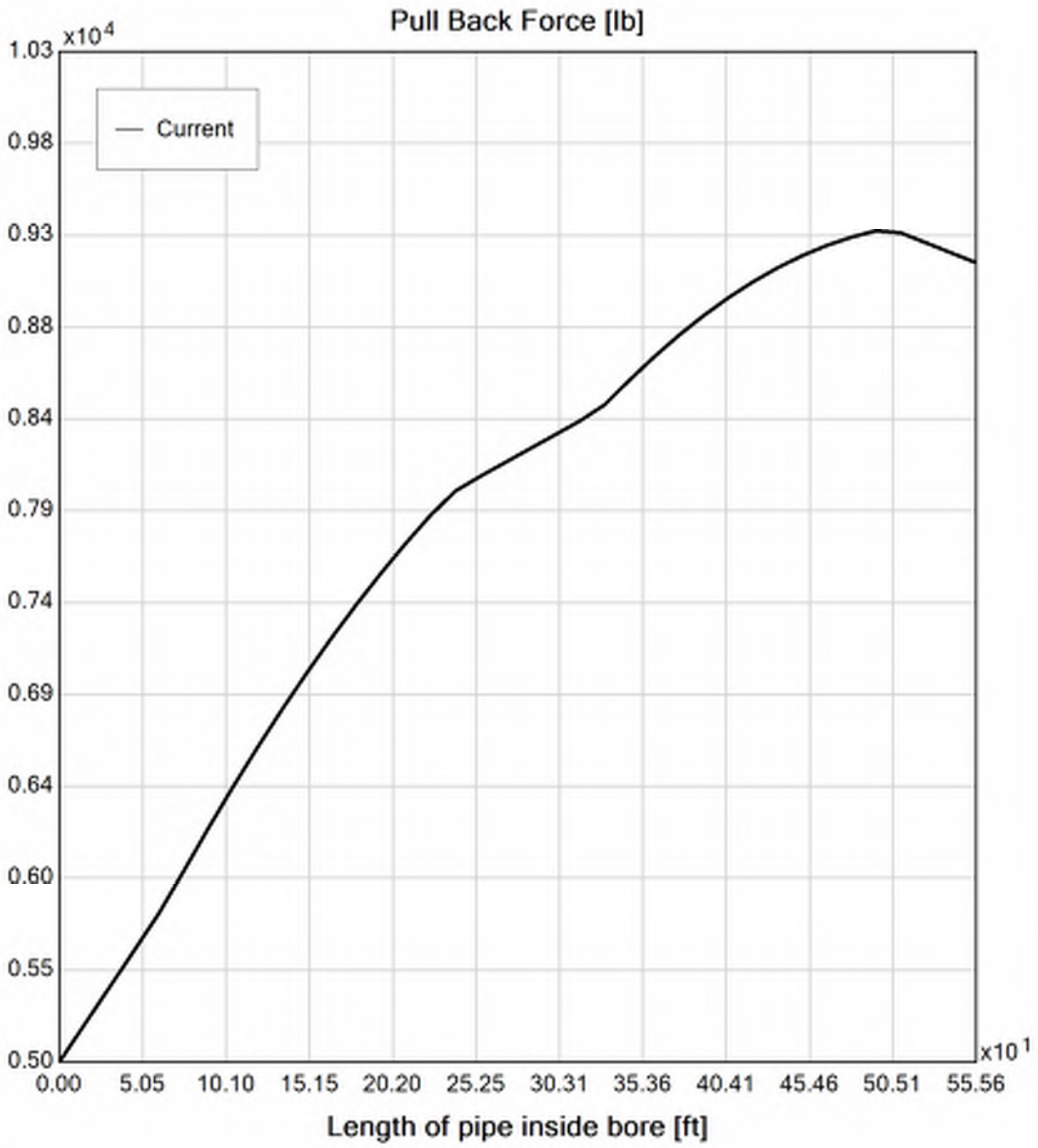
Plastic Viscosity (PV): 25.53

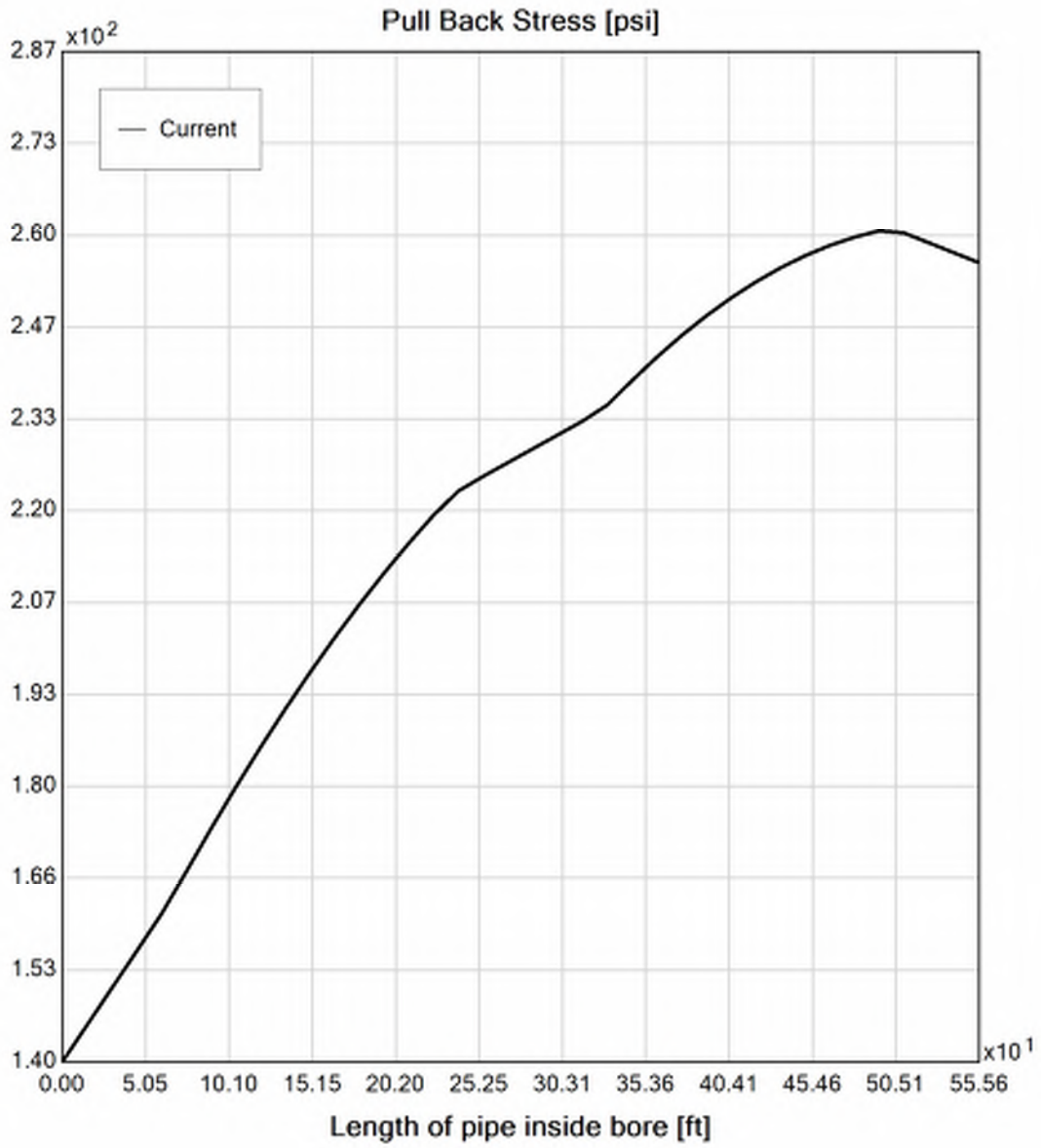
Yield Point (YP): 16.49

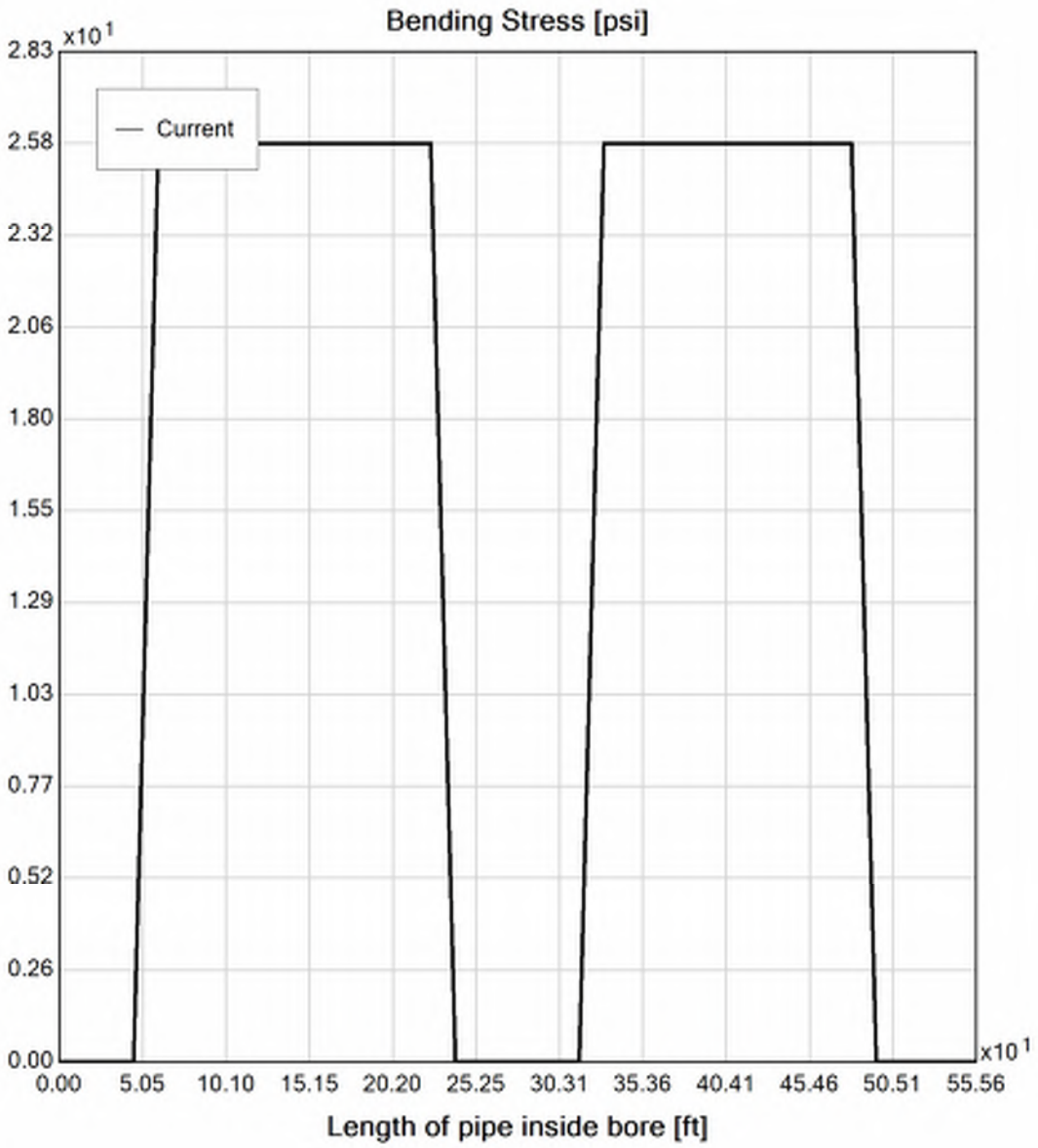
Effective Viscosity (cP): 325.5

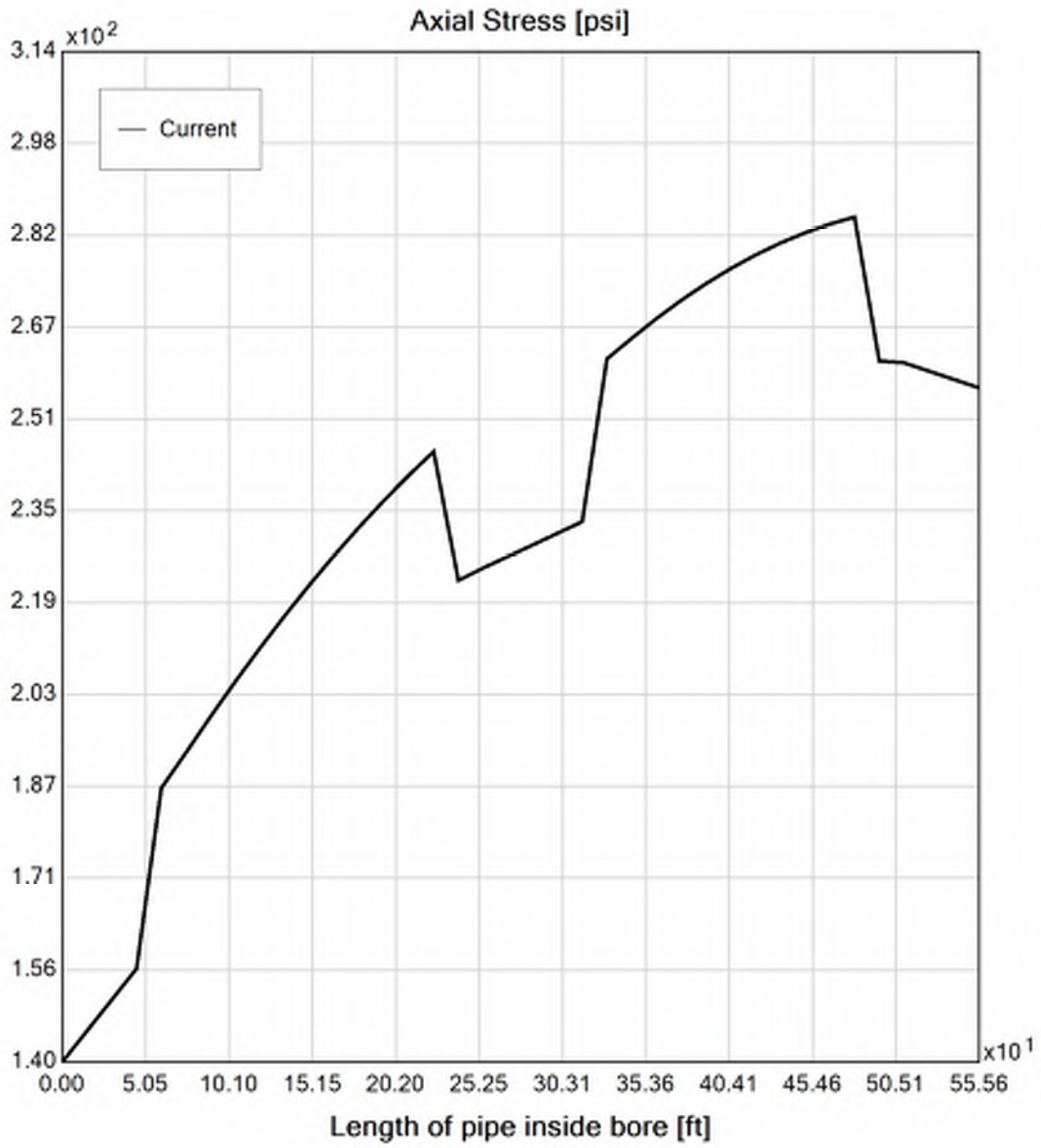
Virtual Site

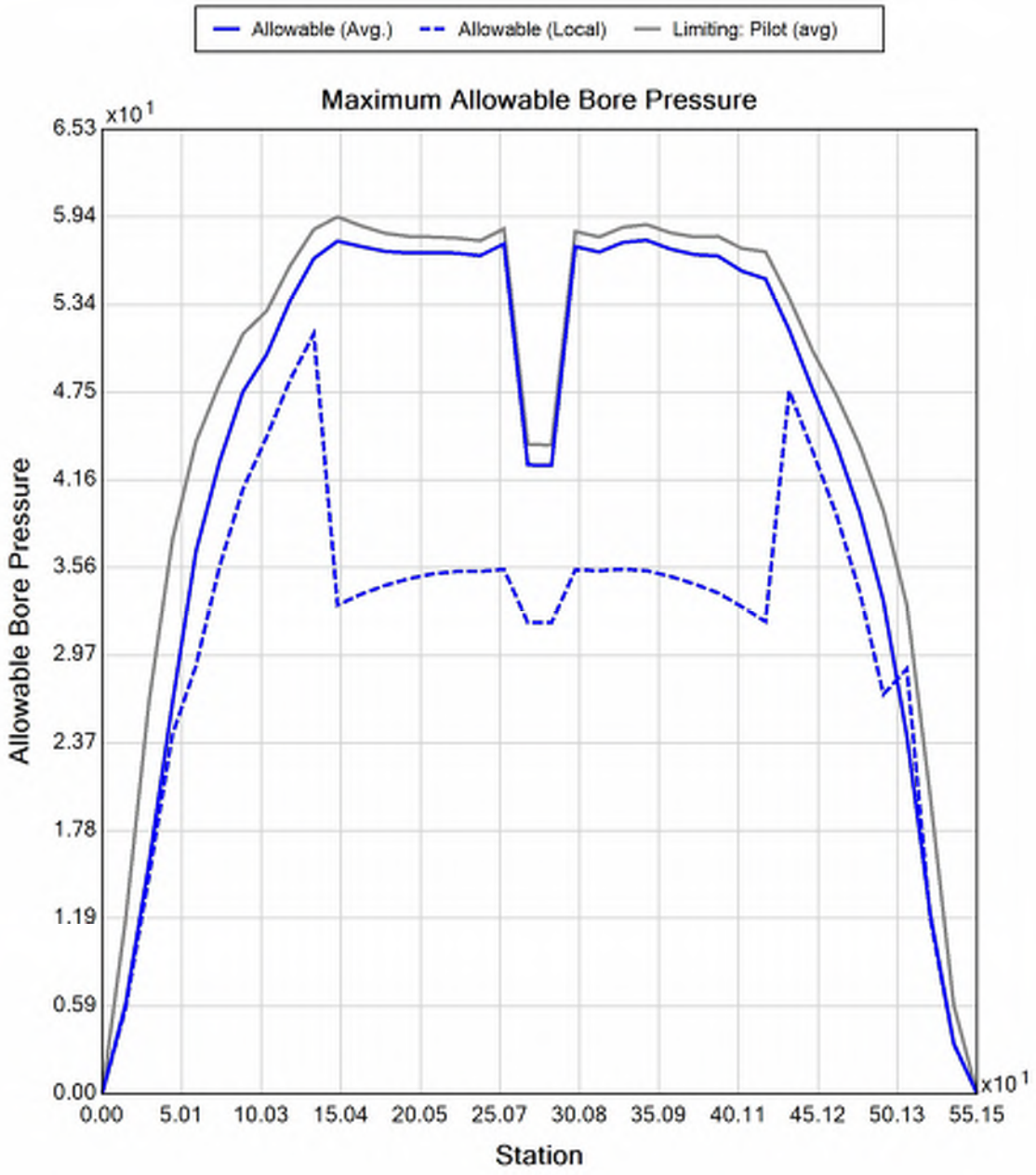


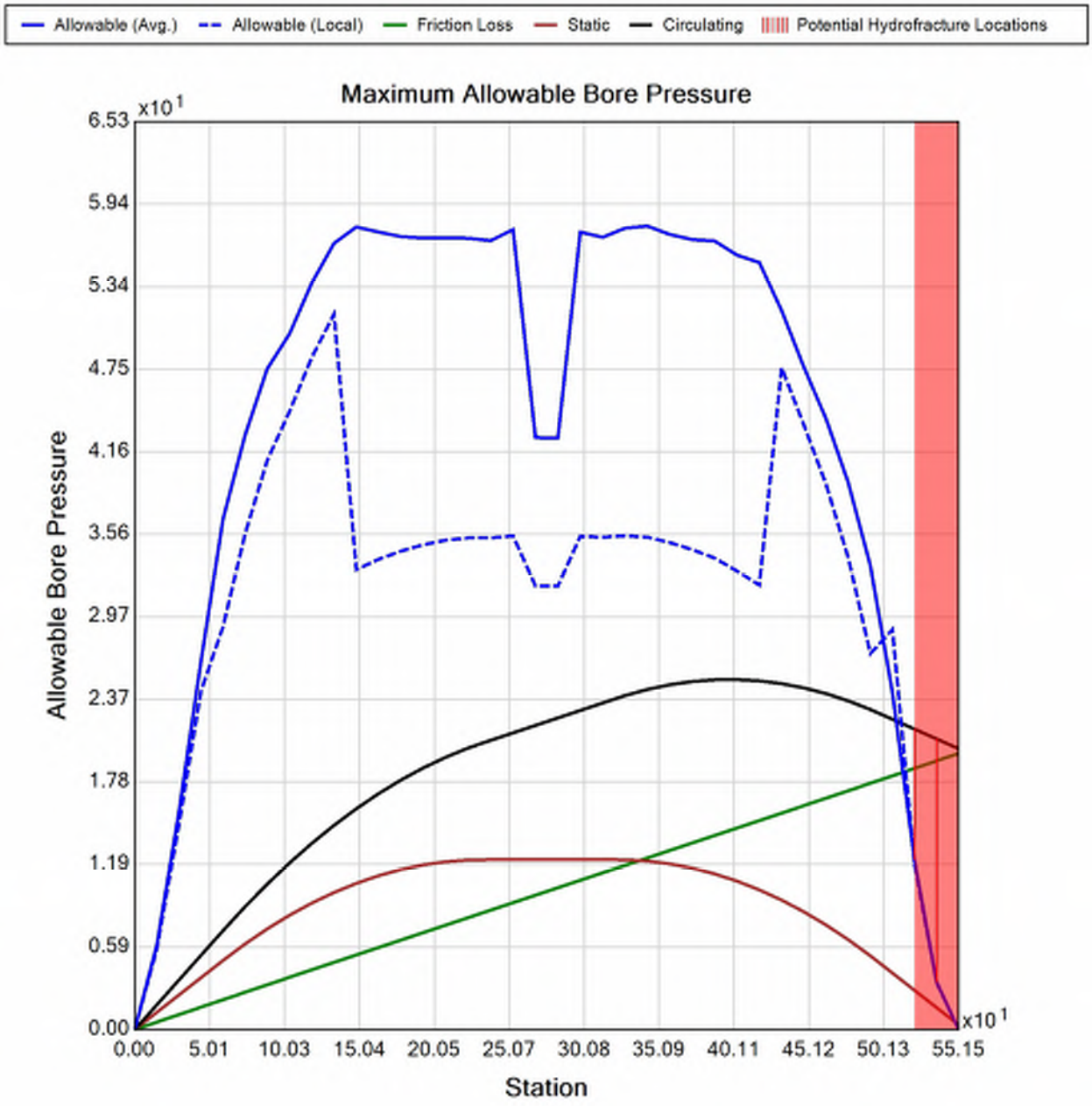












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Input Summary

Start Coordinate	(0.00, 0.00, 127.18) ft
End Coordinate	(546.00, 0.00, 125.88) ft
Project Length	546.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 555.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.1	9.3
Water Pressure	10.6	10.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.7	19.9
Deflection		
Earth Load Deflection	0.385	2.536
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.414	2.565
Compressive Stress [psi]		
Compressive Wall Stress	52.7	89.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	565.9	565.9
Pullback Stress [psi]	323.3	323.3
Pullback Strain	5.623E-3	5.623E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	323.3	328.1
Tensile Strain	5.623E-3	5.805E-3

Net External Pressure = 16.8 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.414	7.5	18.1	OK
Unconstrained Collapse [psi]	16.7	134.1	8.0	OK
Compressive Wall Stress [psi]	52.7	1150.0	21.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	26.6	238.4	9.0	OK
Tensile Stress [psi]	328.1	1200.0	3.7	OK

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Project Summary

General:	CHPE HDD 9 Conduit 2 P2 Start Date: 02-28-2022 End Date: 02-28-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 9 Conduit 2 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 127.18) ft
End Coordinate	(546.00, 0.00, 125.88) ft
Project Length	546.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 5

Soil Layer #1 USCS, Gravel (G), GM
Depth: 2.00 ft
Unit Weight: 120.0000 (dry), 140.0000 (sat) [lb/ft3]
Phi: 37.00, S.M.: 1000.00, Coh: 0.00 [psi]

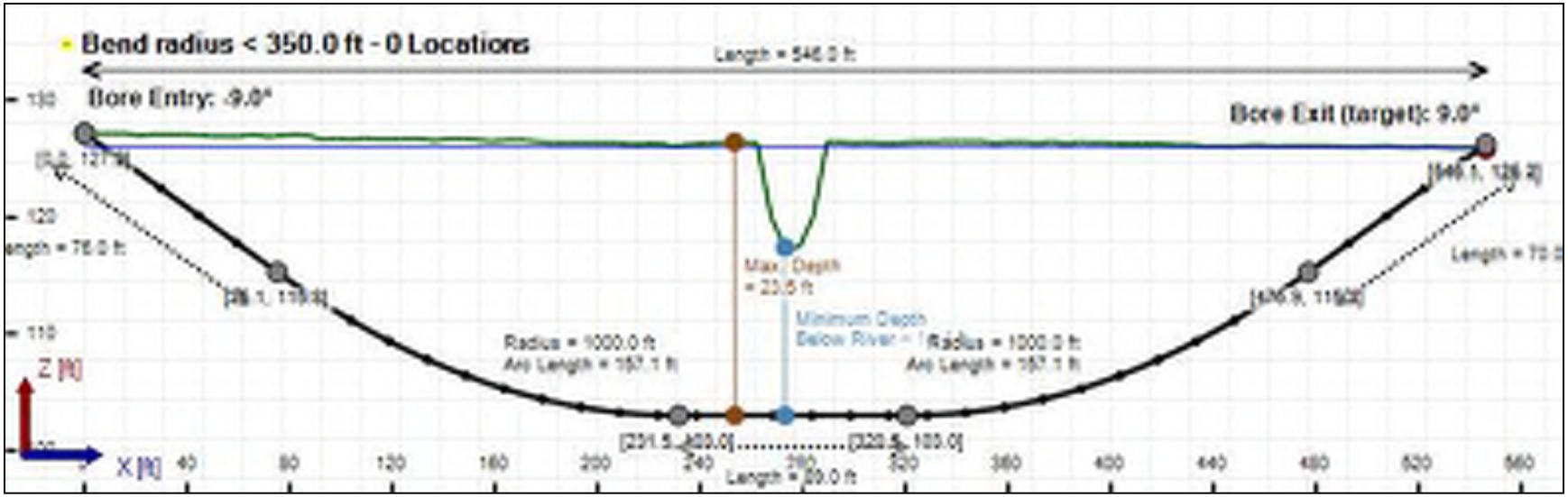
Soil Layer #2 USCS, Sand (S), SW
Depth: 6.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 200.00, Coh: 0.00 [psi]

Soil Layer #3 USCS, Clay (C), CH
Depth: 2.00 ft
Unit Weight: 80.0000 (dry), 110.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 300.00, Coh: 5.60 [psi]

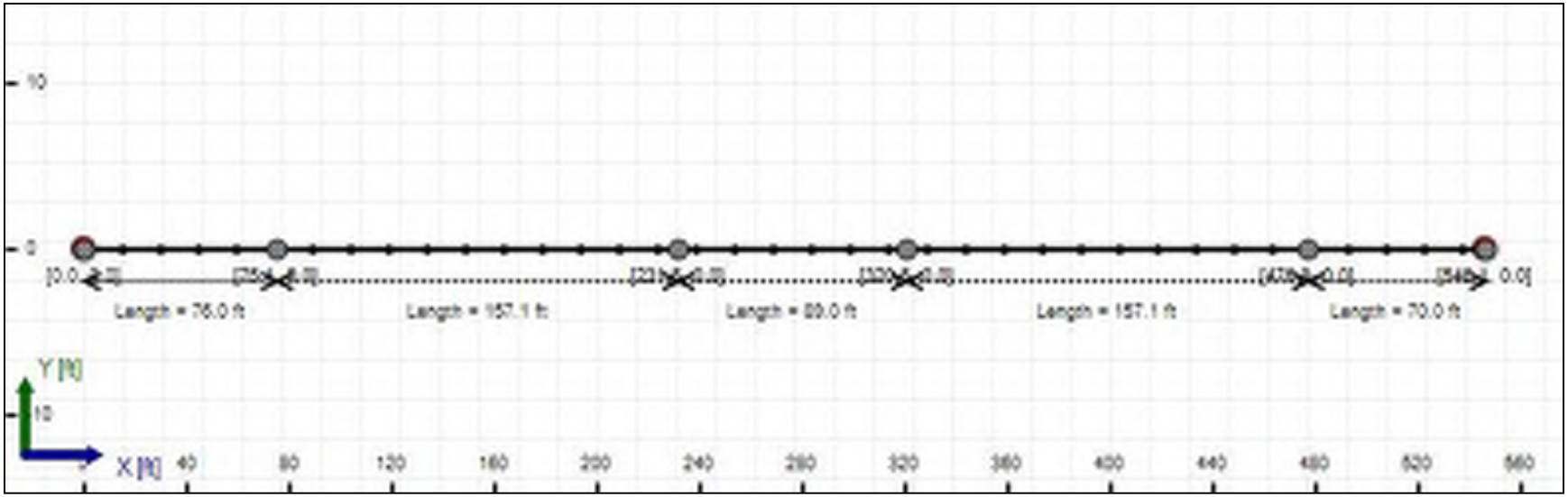
Soil Layer #4 USCS, Sand (S), SC
Depth: 11.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 200.00, Coh: 0.00 [psi]

Soil Layer #5 USCS, Clay (C), CH
Depth: 12.00 ft
Unit Weight: 70.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 200.00, Coh: 3.13 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 555.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.7	8.9
Water Pressure	10.0	10.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.7	18.9
Deflection		
Earth Load Deflection	0.771	2.435
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	0.903	2.567
Compressive Stress [psi]		
Compressive Wall Stress	57.2	85.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	9230.1	9230.1
Pullback Stress [psi]	257.4	257.4
Pullback Strain	4.477E-3	4.477E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	257.4	281.9
Tensile Strain	4.477E-3	5.351E-3

Net External Pressure = 17.6 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.903	7.5	8.3	OK
Unconstrained Collapse [psi]	15.7	127.7	8.1	OK
Compressive Wall Stress [psi]	57.2	1150.0	20.1	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	25.7	240.1	9.3	OK
Tensile Stress [psi]	281.9	1200.0	4.3	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	58.682 psi	53.027 psi
1	8.00 in	12.00 in	57.961 psi	52.504 psi
2	12.00 in	16.13 in	57.305 psi	51.788 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

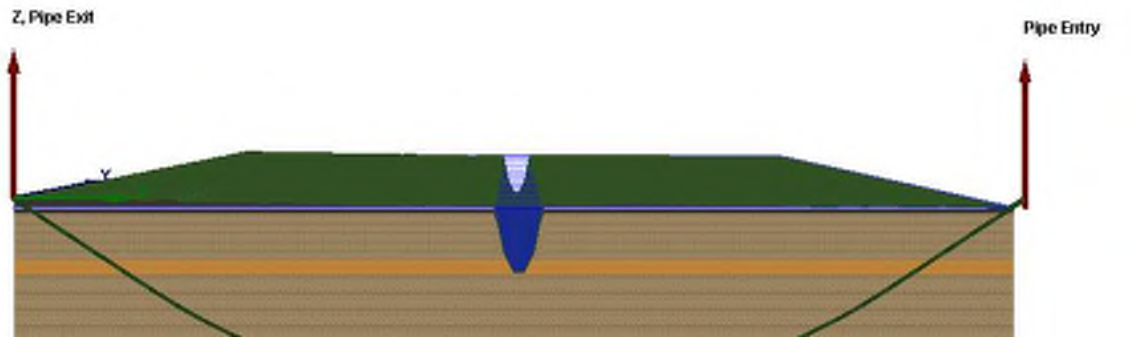
Rheological model: Power-Law

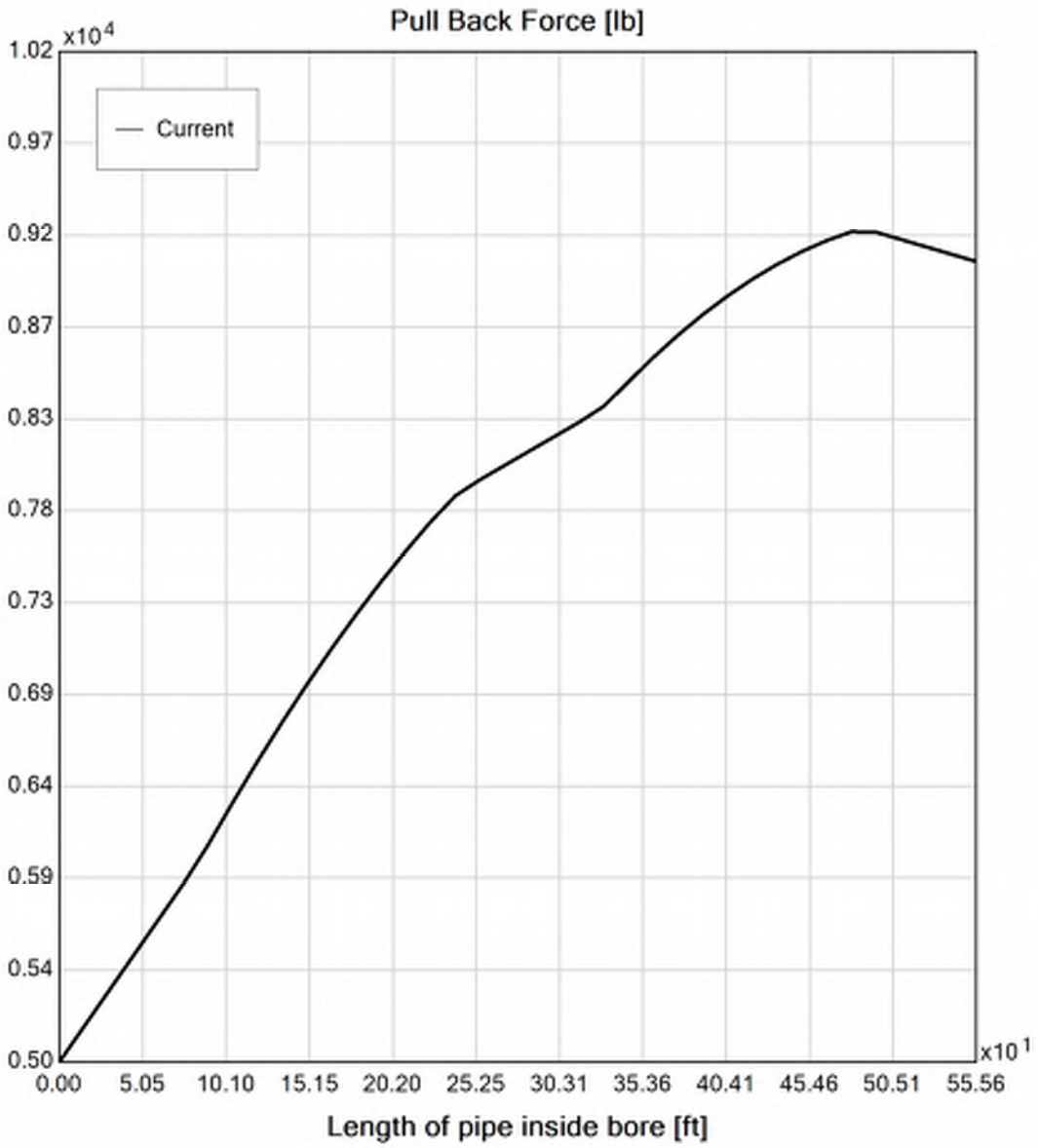
Fluid Consistency Index (K): 63.17

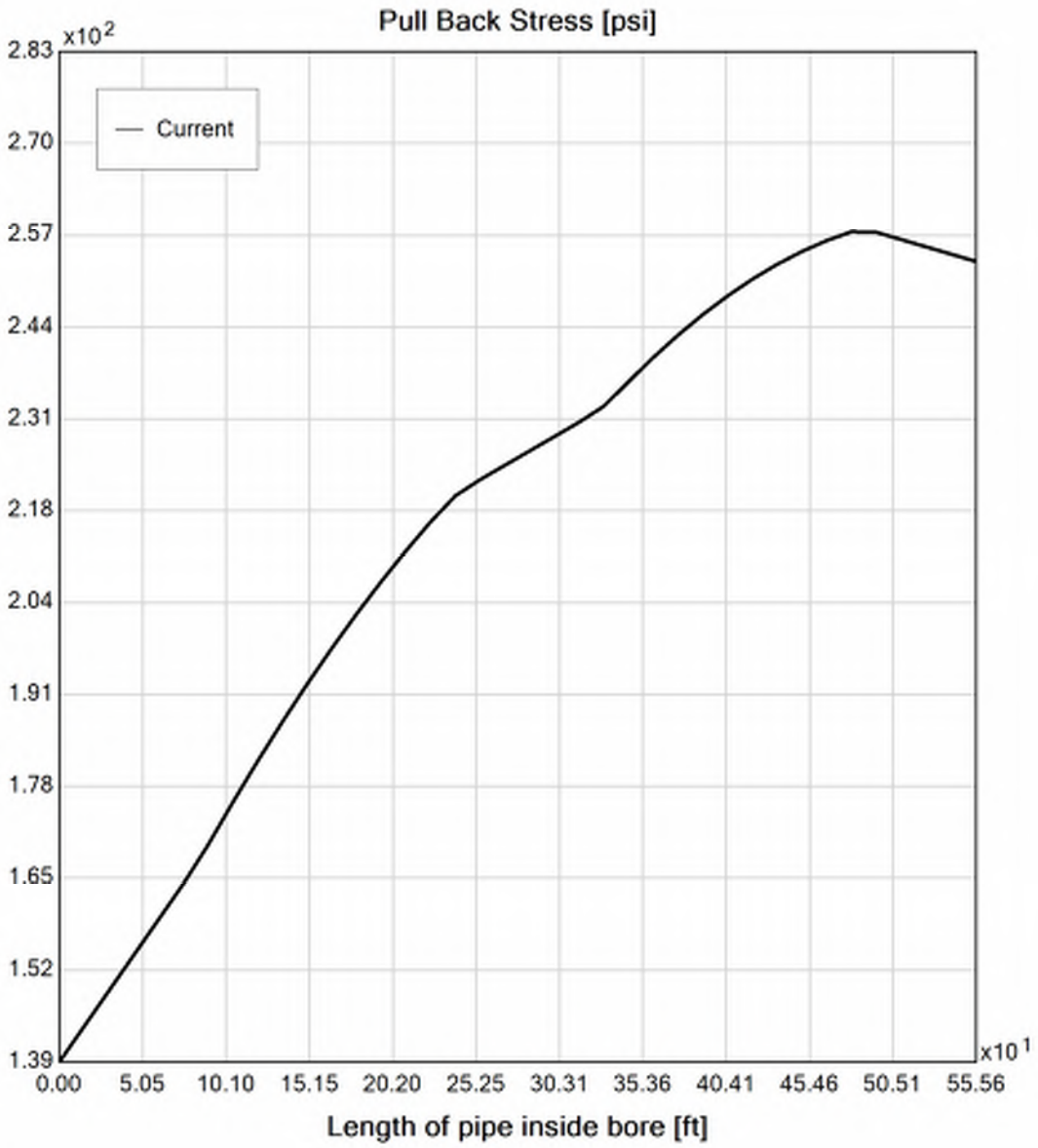
Power Law Exponent (n): 0.14

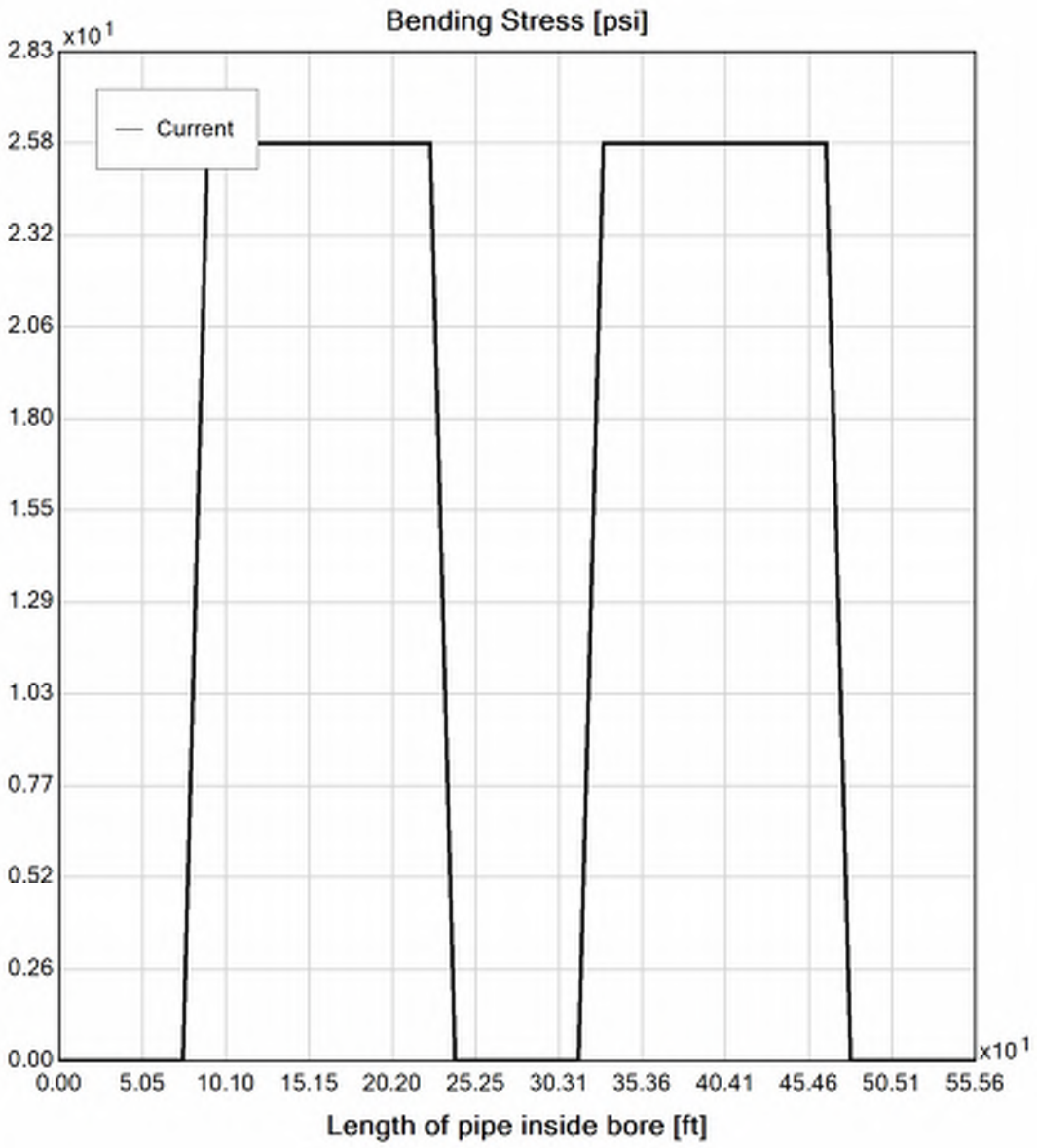
Effective Viscosity (cP): 859.3

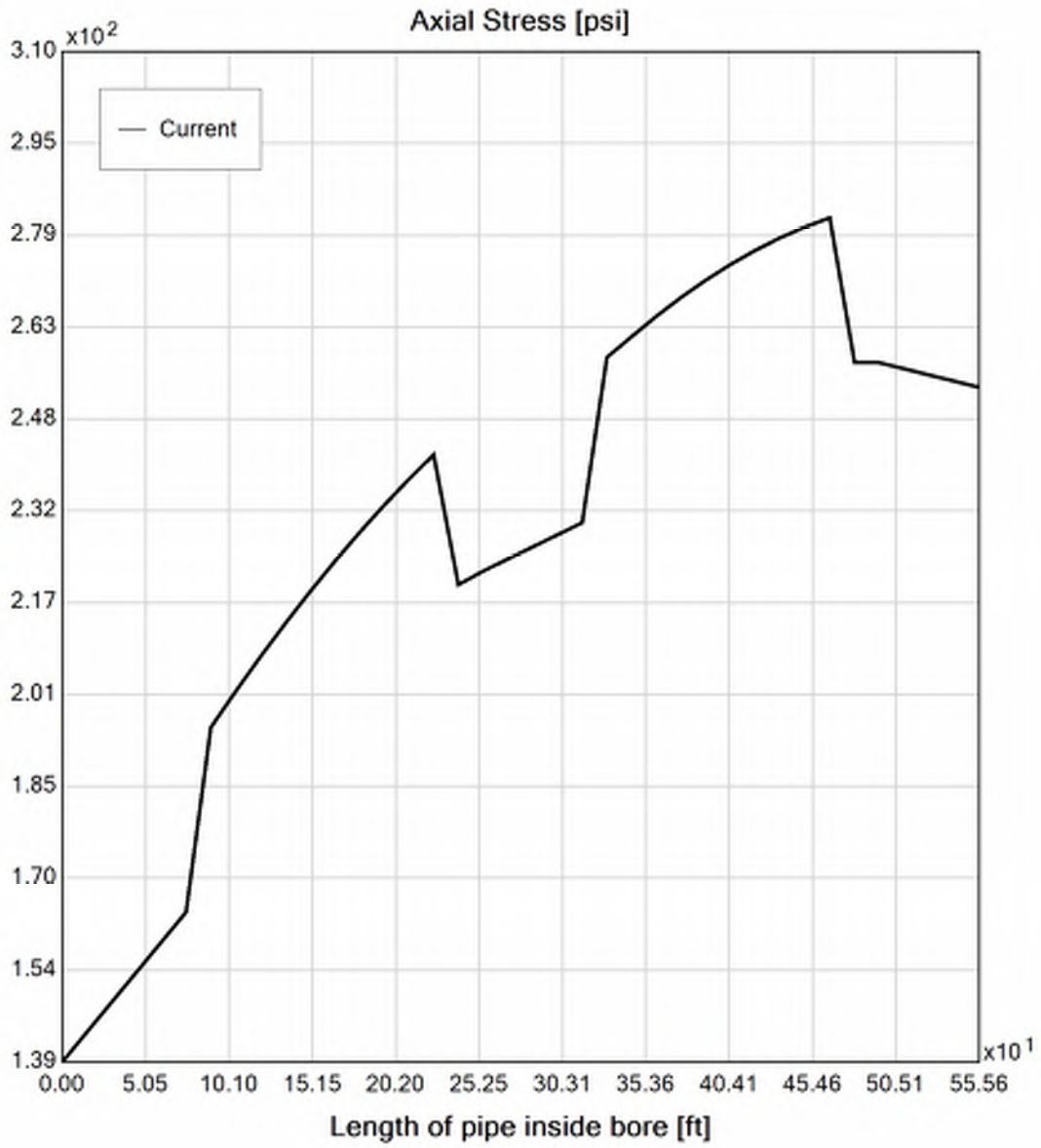
Virtual Site

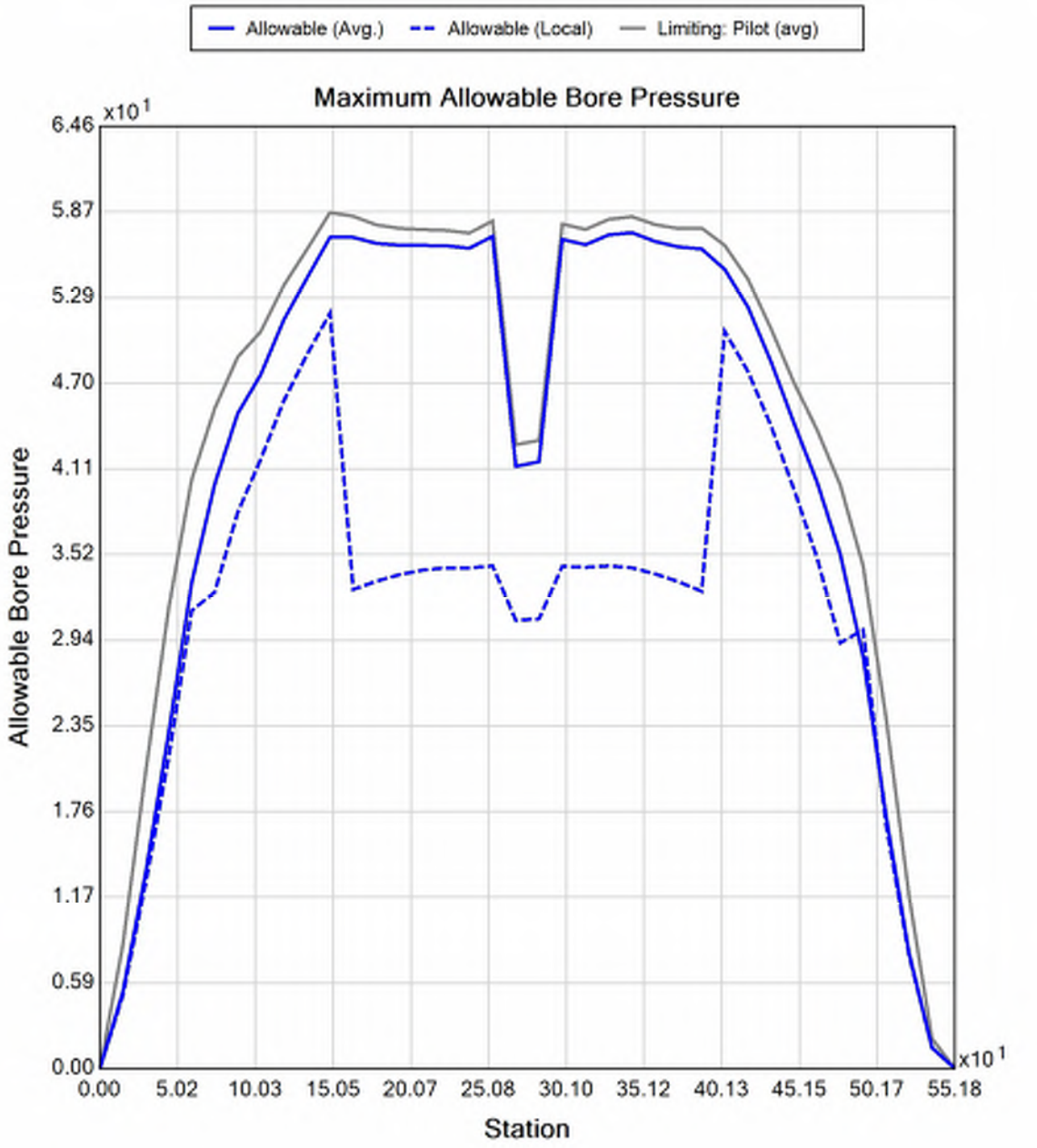


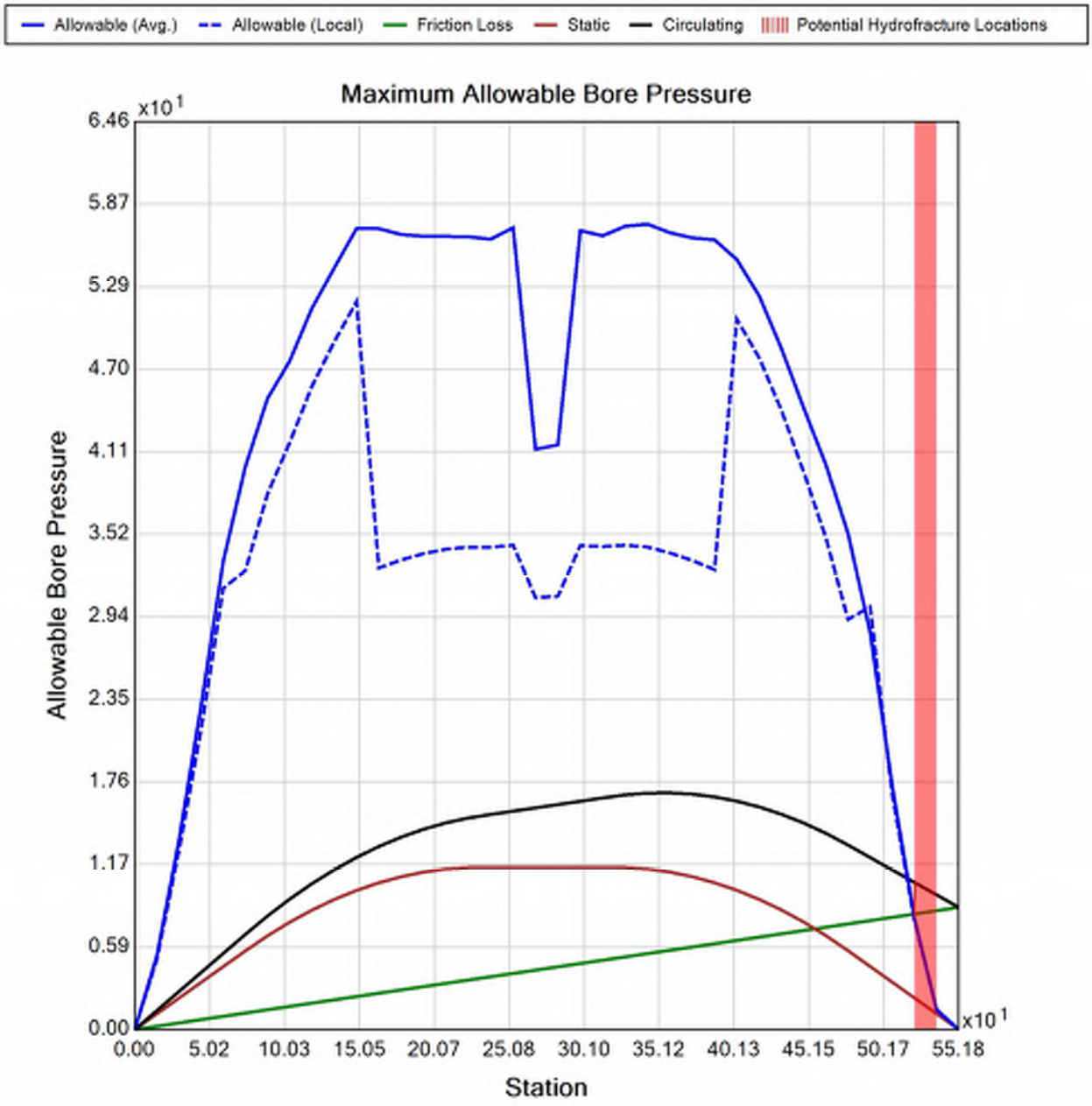












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Input Summary

Start Coordinate	(0.00, 0.00, 127.18) ft
End Coordinate	(546.00, 0.00, 125.88) ft
Project Length	546.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 555.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.1	8.9
Water Pressure	10.0	10.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.1	18.9
Deflection		
Earth Load Deflection	0.381	2.435
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.410	2.464
Compressive Stress [psi]		
Compressive Wall Stress	50.0	85.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	560.1	560.1
Pullback Stress [psi]	320.0	320.0
Pullback Strain	5.566E-3	5.566E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	320.0	324.5
Tensile Strain	5.566E-3	5.742E-3

Net External Pressure = 17.6 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.410	7.5	18.3	OK
Unconstrained Collapse [psi]	15.7	134.0	8.5	OK
Compressive Wall Stress [psi]	50.0	1150.0	23.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	25.7	238.5	9.3	OK
Tensile Stress [psi]	324.5	1200.0	3.7	OK

Generated Output

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Project Summary

General:	CHPE HDD 10 Conduit 1 P2 Start Date: 09-22-2022 End Date: 09-22-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 10 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 129.14) ft
End Coordinate	(1210.00, 0.00, 136.00) ft
Project Length	1210.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

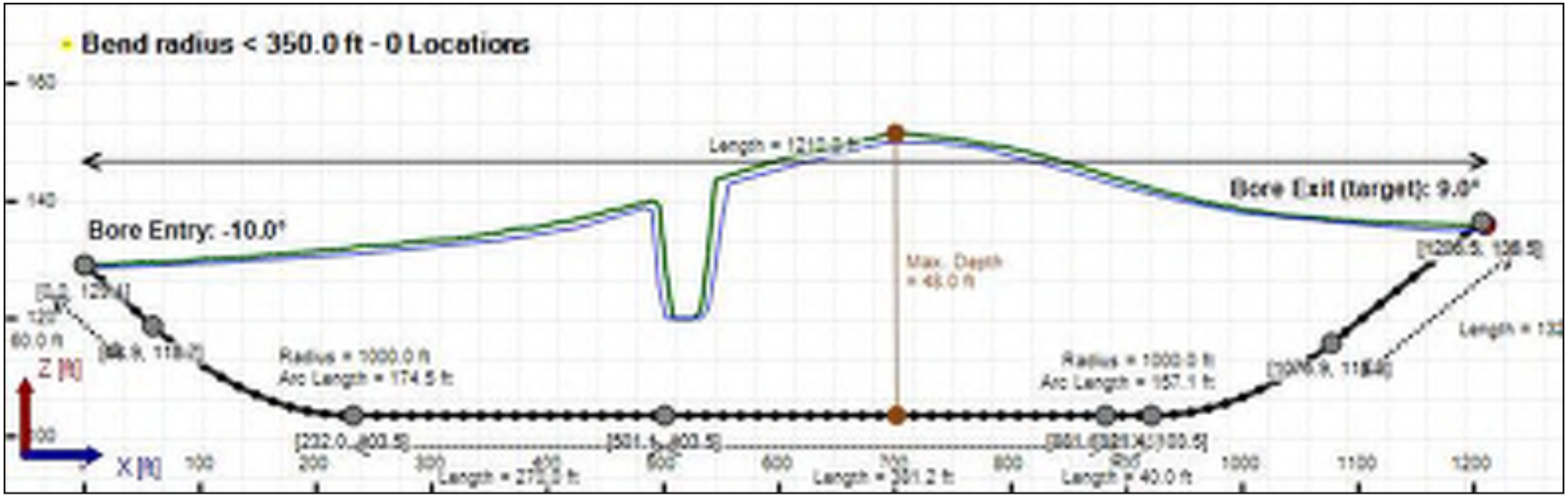
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Clay (C), CL
From Assistant
Unit Weight: 80.0000 (dry), 110.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 300.00, Coh: 5.50 [psi]

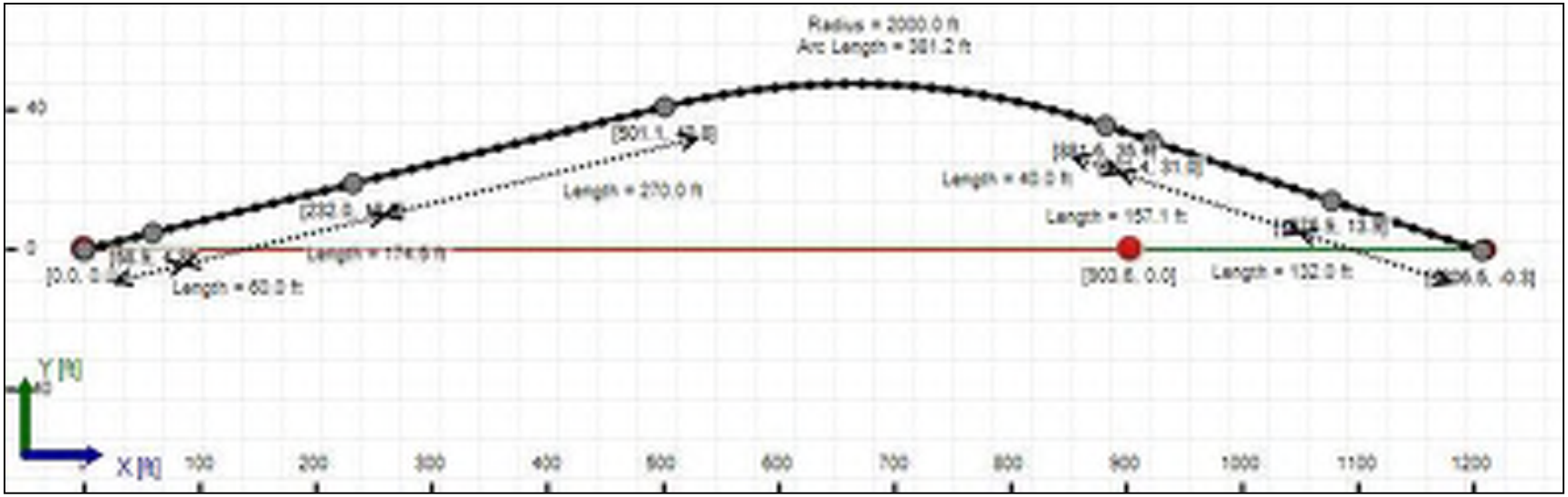
Soil Layer #3 USCS, Clay (C), CL
From Assistant
Unit Weight: 70.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 200.00, Coh: 3.13 [psi]

Soil Layer #4 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 1215.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.1	19.0
Water Pressure	20.1	20.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	23.2	39.2
Deflection		
Earth Load Deflection	1.221	5.178
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.353	5.310
Compressive Stress [psi]		
Compressive Wall Stress	104.5	176.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	20515.2	20515.2
Pullback Stress [psi]	572.1	572.1
Pullback Strain	9.950E-3	9.950E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	572.1	593.4
Tensile Strain	9.950E-3	1.077E-2

Net External Pressure = 19.9 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.353	7.5	5.5	OK
Unconstrained Collapse [psi]	23.2	126.6	5.5	OK
Compressive Wall Stress [psi]	104.5	1150.0	11.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	31.4	221.0	7.0	OK
Tensile Stress [psi]	593.4	1200.0	2.0	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	103.571 psi	60.486 psi
1	8.00 in	12.00 in	103.423 psi	57.148 psi
2	12.00 in	16.13 in	103.210 psi	55.148 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

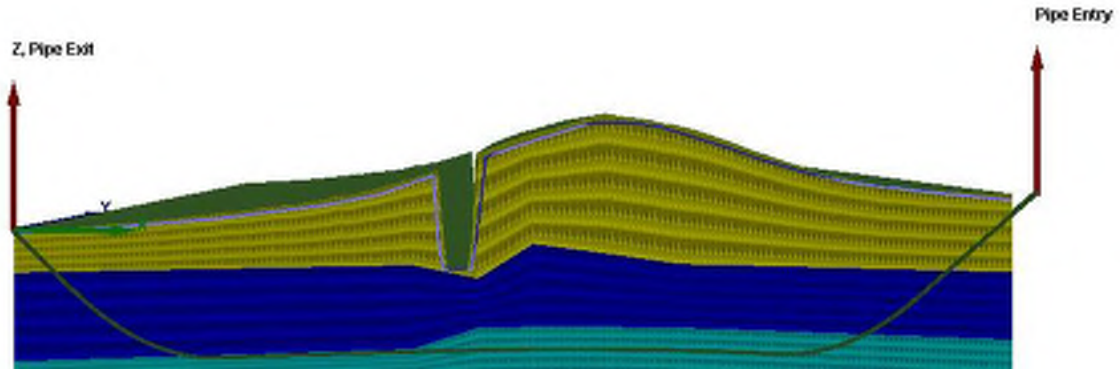
Rheological model: Power-Law

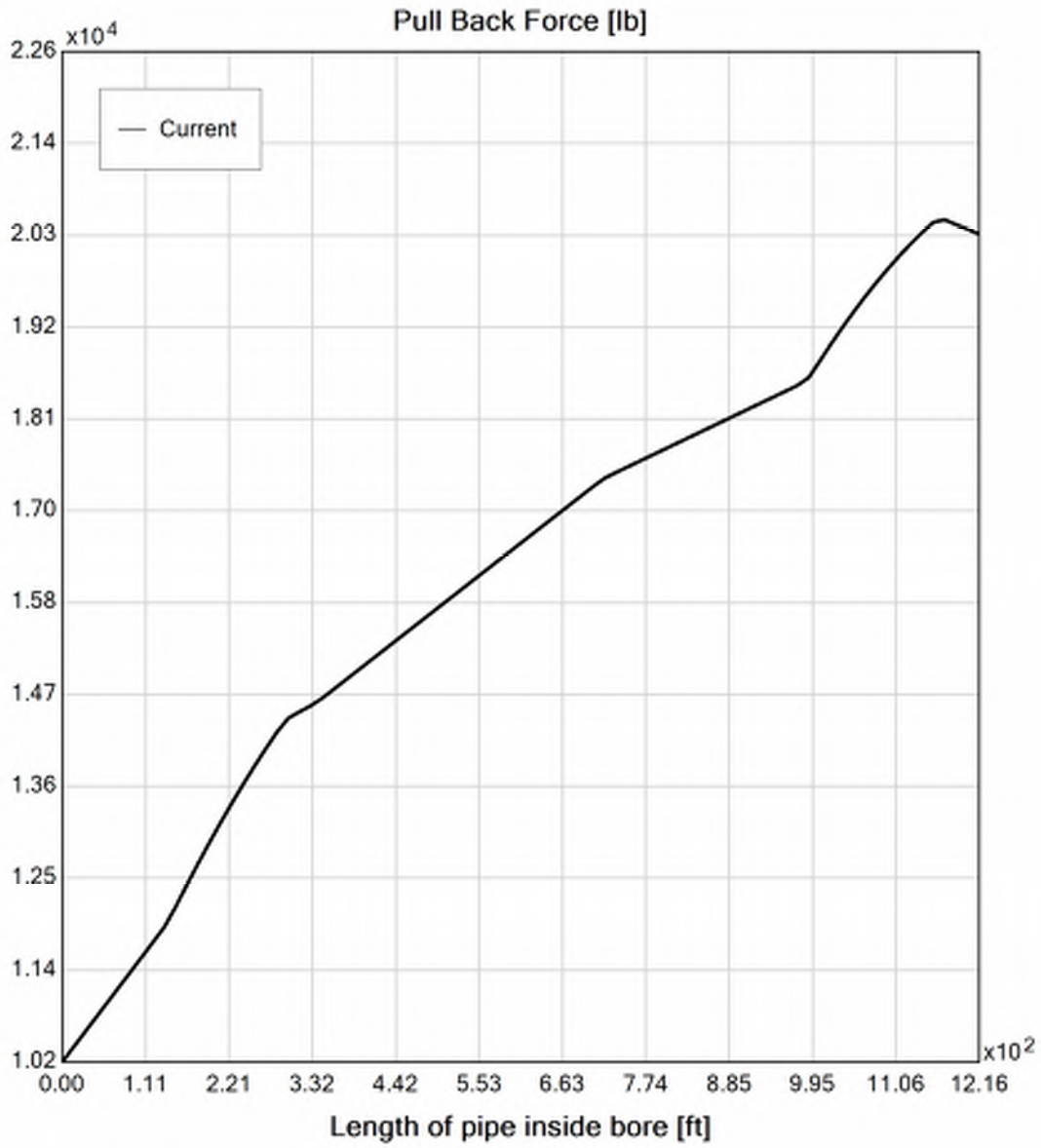
Fluid Consistency Index (K): 63.17

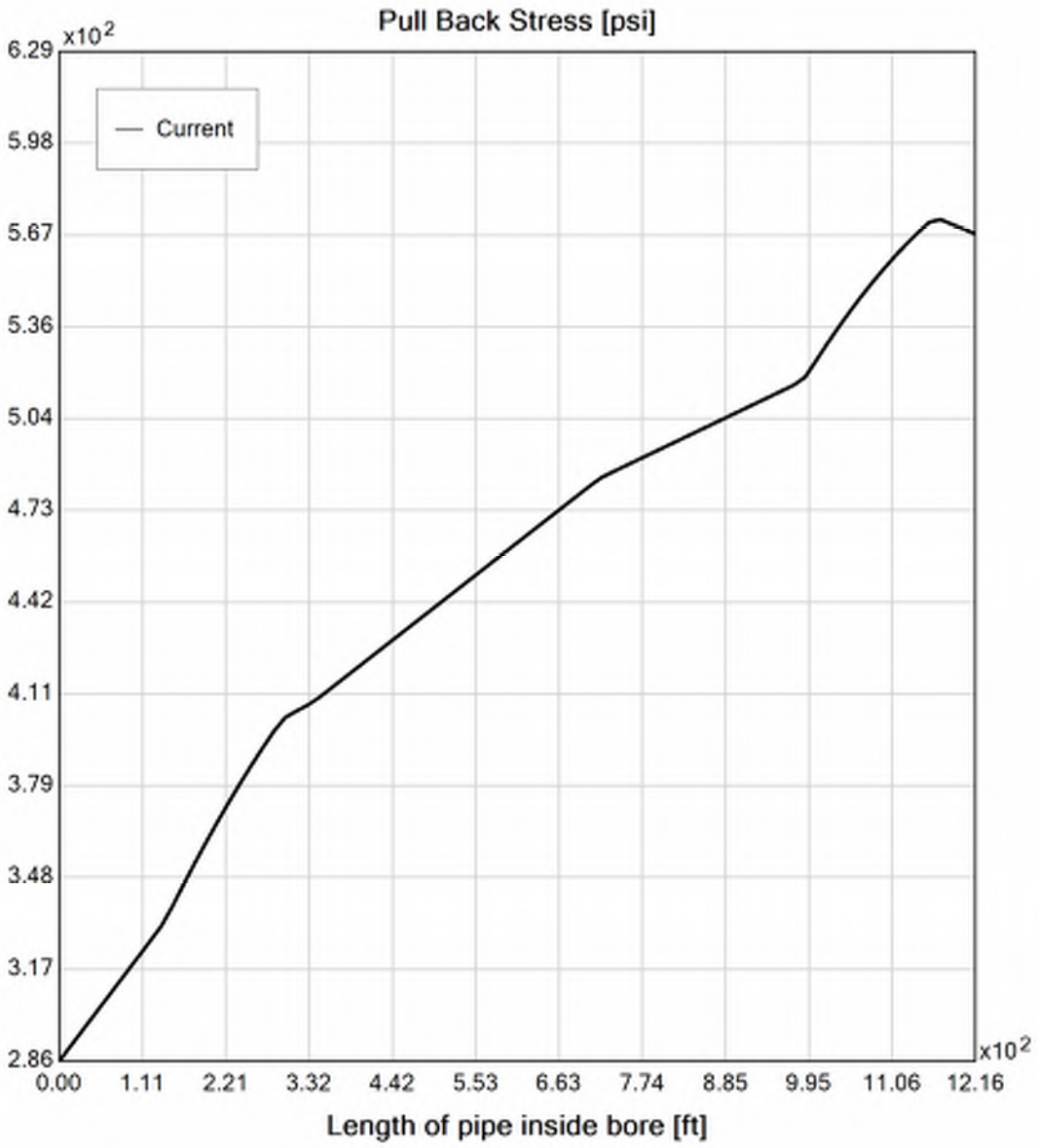
Power Law Exponent (n): 0.14

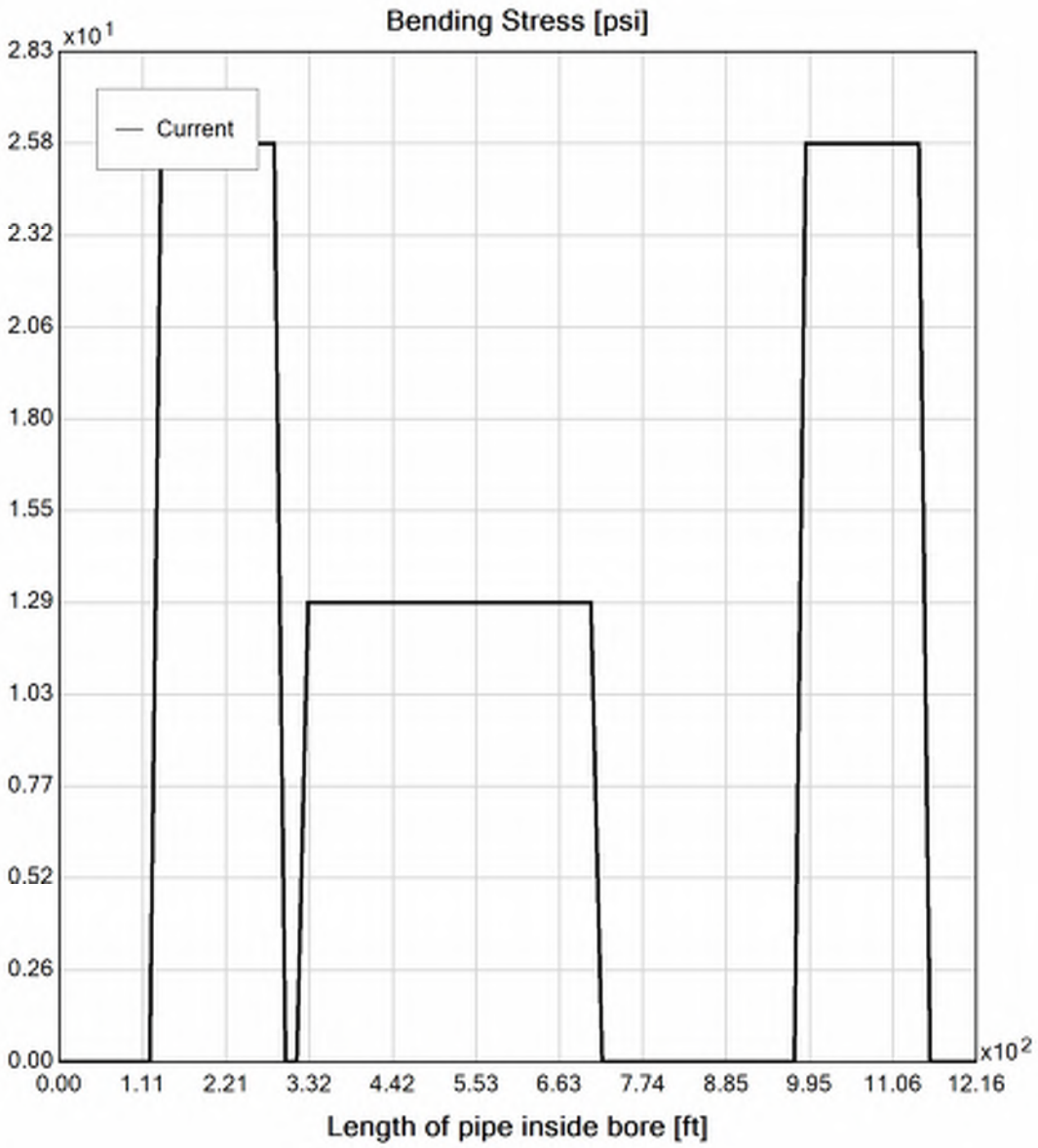
Effective Viscosity (cP): 859.3

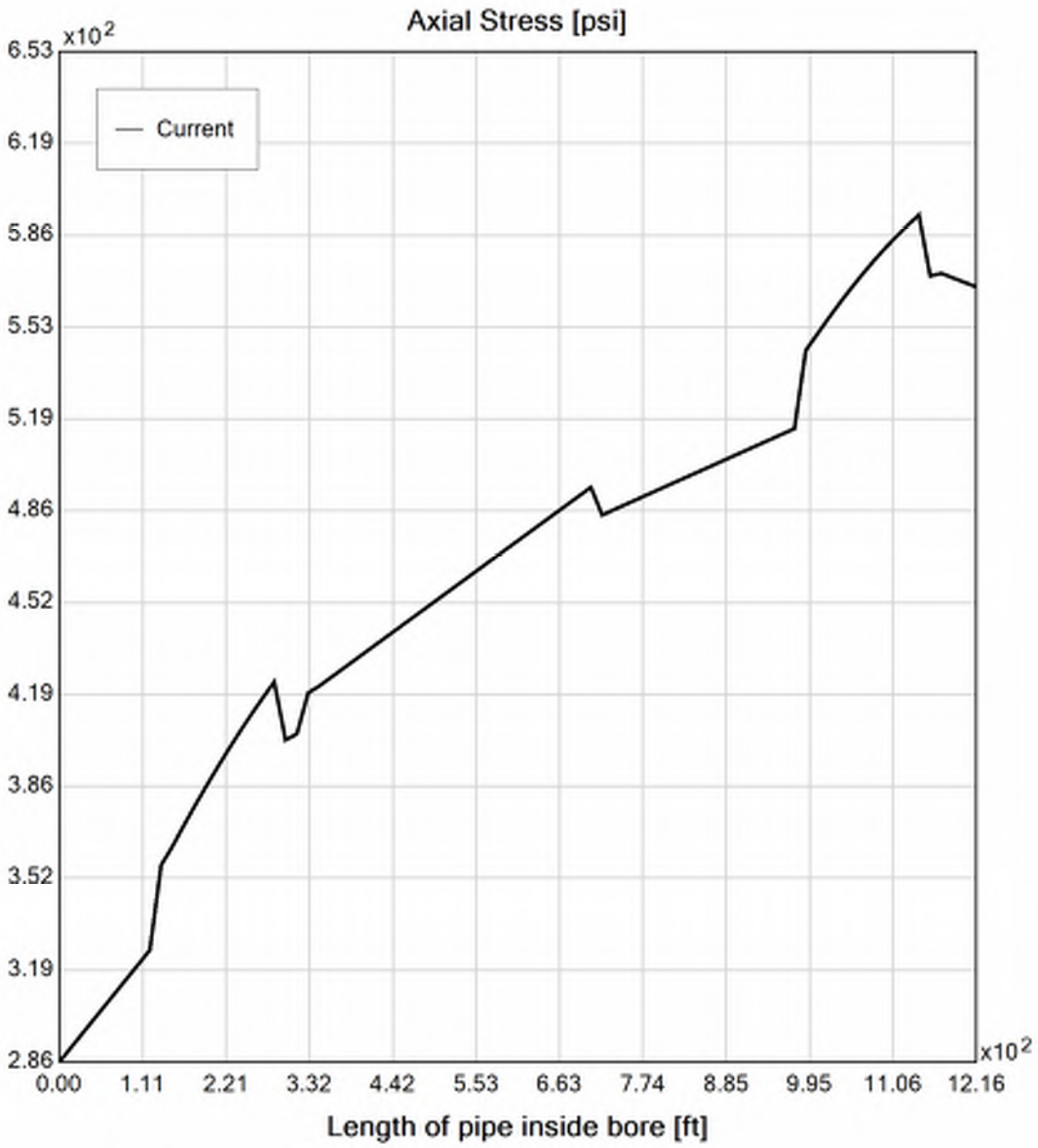
Virtual Site

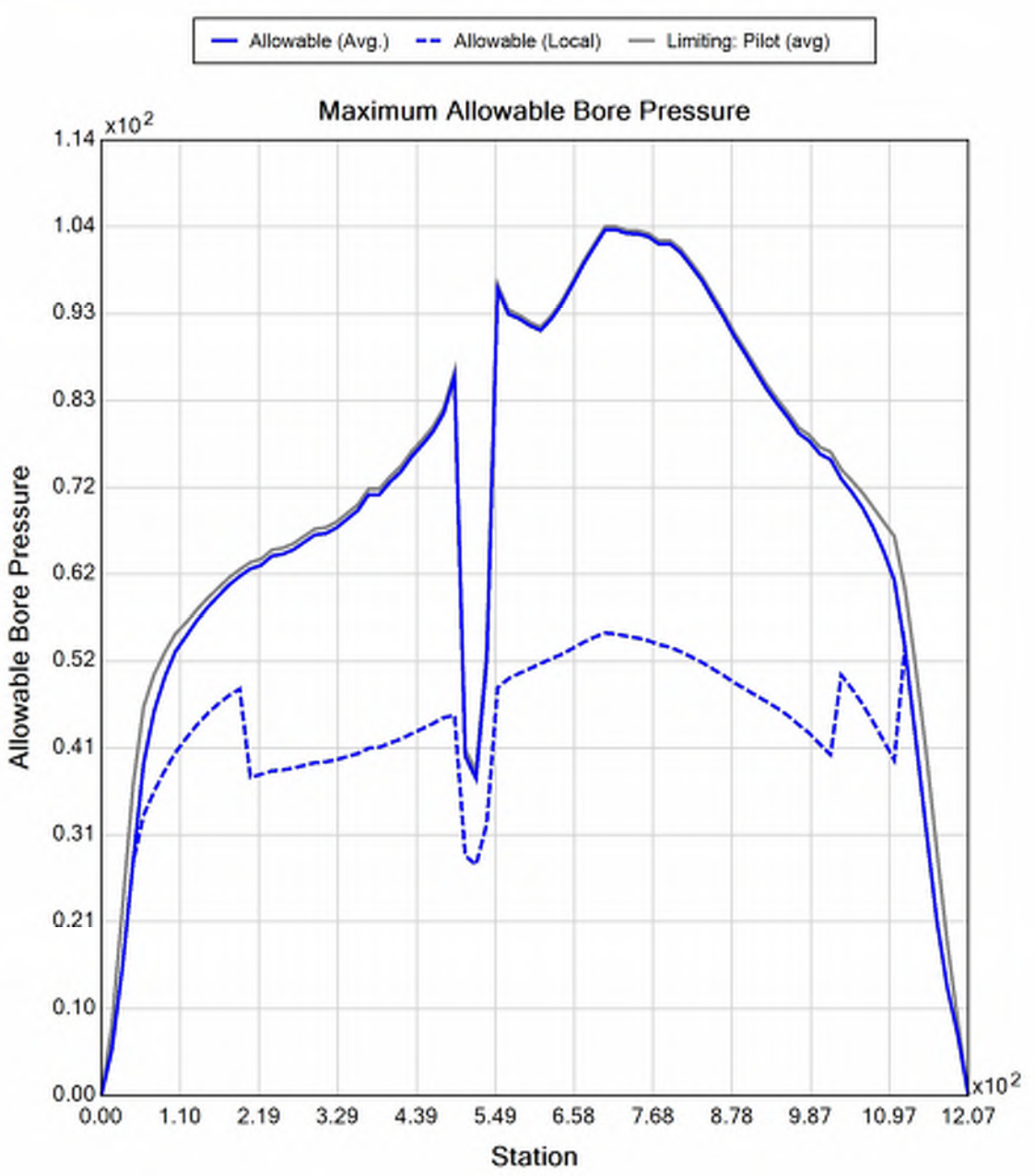


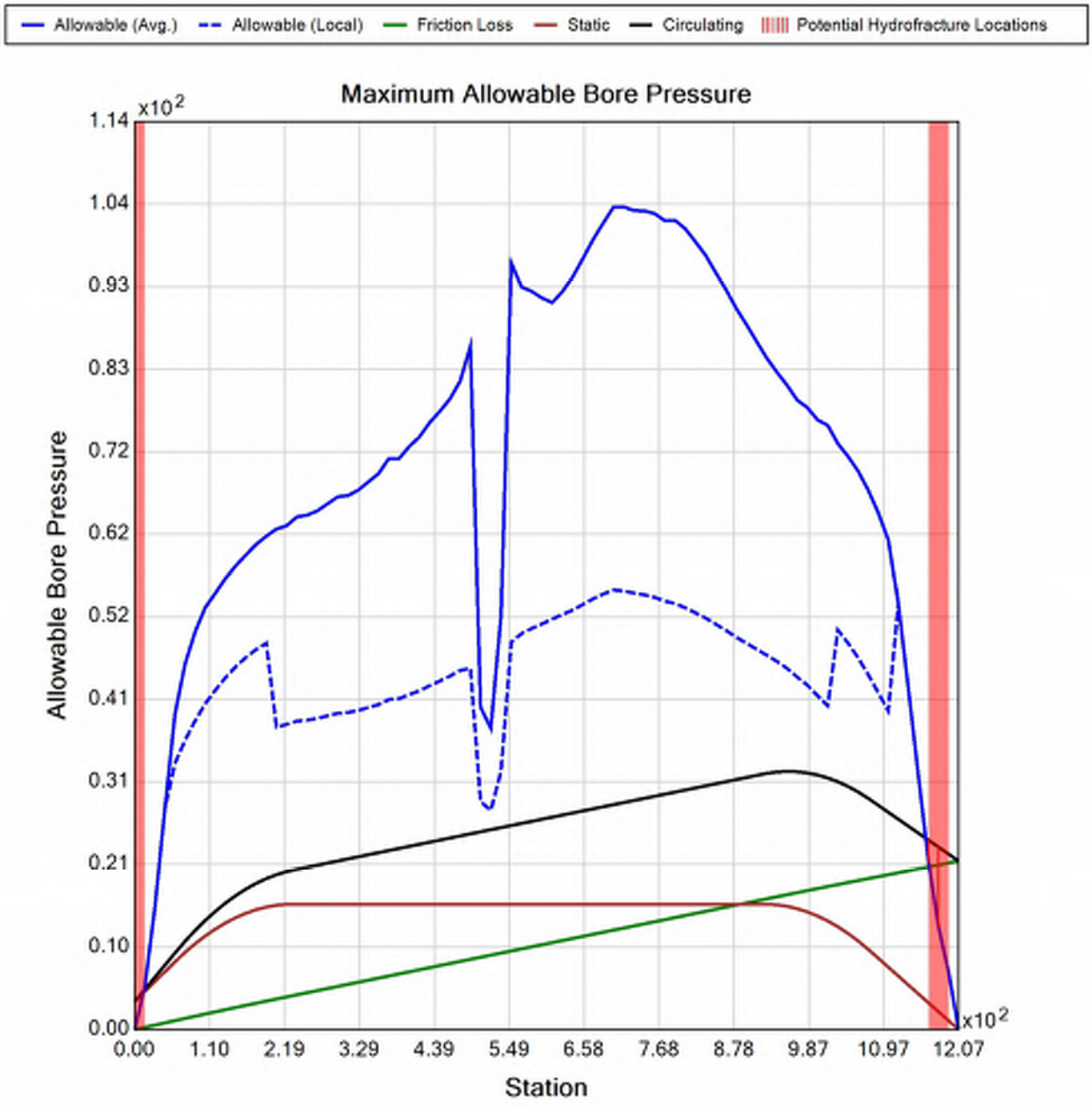












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Input Summary

Start Coordinate	(0.00, 0.00, 129.14) ft
End Coordinate	(1210.00, 0.00, 136.00) ft
Project Length	1210.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1215.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.2	19.0
Water Pressure	20.1	20.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	21.4	39.2
Deflection		
Earth Load Deflection	0.858	5.178
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.887	5.207
Compressive Stress [psi]		
Compressive Wall Stress	96.1	176.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1110.9	1110.9
Pullback Stress [psi]	634.8	634.8
Pullback Strain	1.104E-2	1.104E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	634.8	636.0
Tensile Strain	1.104E-2	1.116E-2

Net External Pressure = 19.9 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.887	7.5	8.5	OK
Unconstrained Collapse [psi]	21.5	127.5	5.9	OK
Compressive Wall Stress [psi]	96.1	1150.0	12.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	31.4	219.0	7.0	OK
Tensile Stress [psi]	636.0	1200.0	1.9	OK

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Project Summary

General:	CHPE HDD 10 Conduit 2 P2 Start Date: 09-22-2022 End Date: 09-22-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 10 Conduit 2 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 129.14) ft
End Coordinate	(1240.00, 0.00, 136.00) ft
Project Length	1240.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

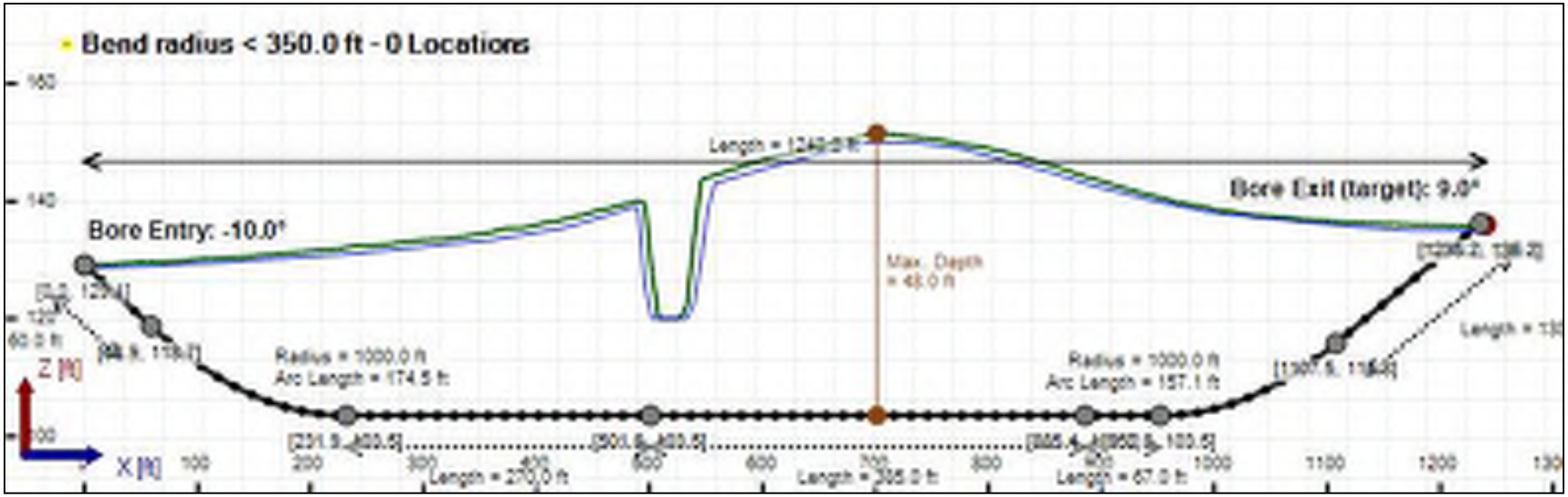
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Clay (C), CL
From Assistant
Unit Weight: 80.0000 (dry), 110.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 300.00, Coh: 5.50 [psi]

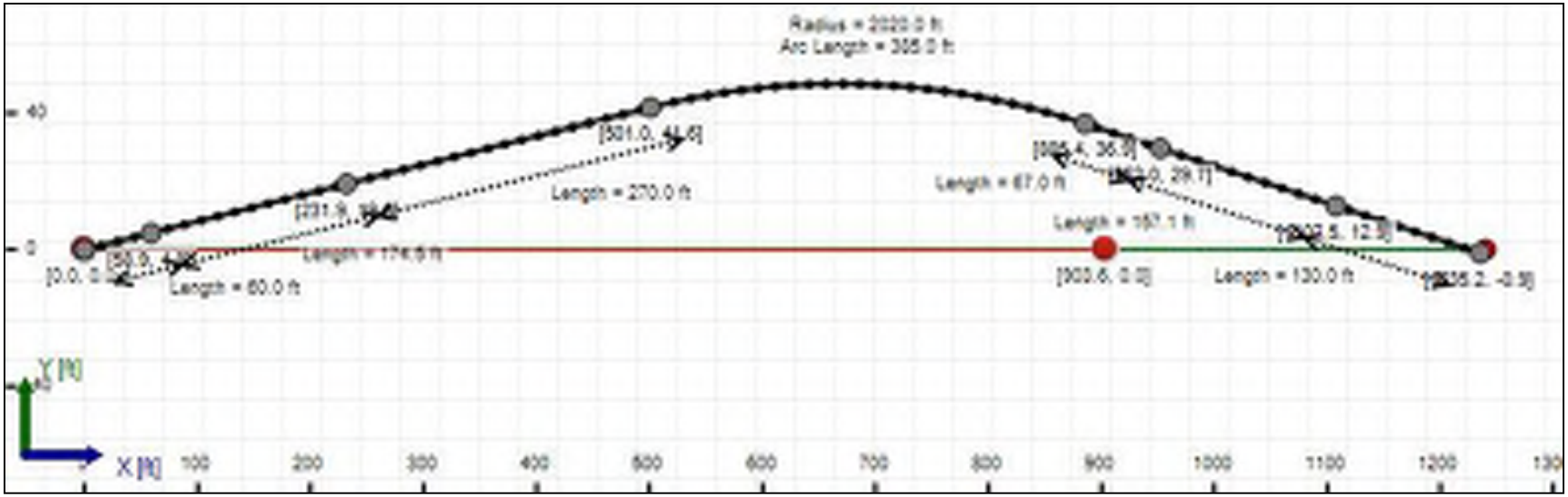
Soil Layer #3 USCS, Clay (C), CL
From Assistant
Unit Weight: 70.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 200.00, Coh: 3.13 [psi]

Soil Layer #4 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 1245.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.1	19.0
Water Pressure	20.1	20.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	23.2	39.2
Deflection		
Earth Load Deflection	1.217	5.178
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.349	5.310
Compressive Stress [psi]		
Compressive Wall Stress	104.5	176.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	20991.8	20991.8
Pullback Stress [psi]	585.4	585.4
Pullback Strain	1.018E-2	1.018E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	585.4	606.5
Tensile Strain	1.018E-2	1.100E-2

Net External Pressure = 19.8 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.349	7.5	5.6	OK
Unconstrained Collapse [psi]	23.2	126.6	5.5	OK
Compressive Wall Stress [psi]	104.5	1150.0	11.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	31.3	220.2	7.0	OK
Tensile Stress [psi]	606.5	1200.0	2.0	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	103.573 psi	60.356 psi
1	8.00 in	12.00 in	103.422 psi	56.979 psi
2	12.00 in	16.13 in	103.205 psi	55.146 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

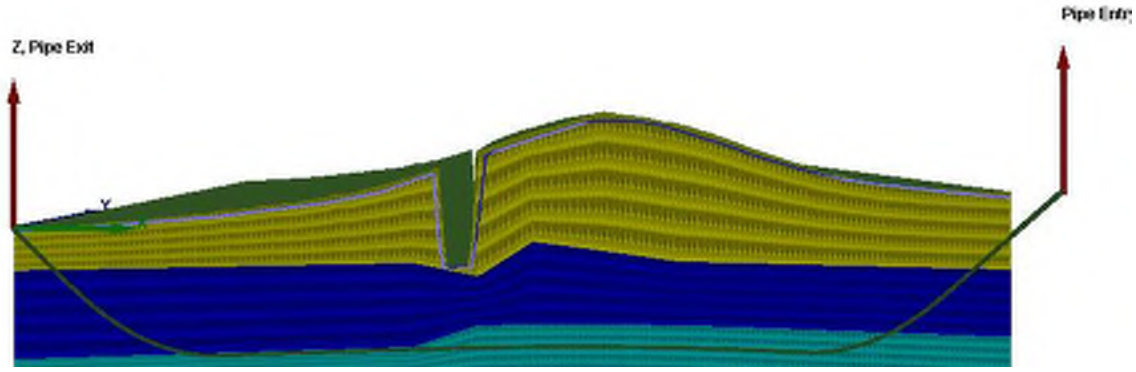
Rheological model: Power-Law

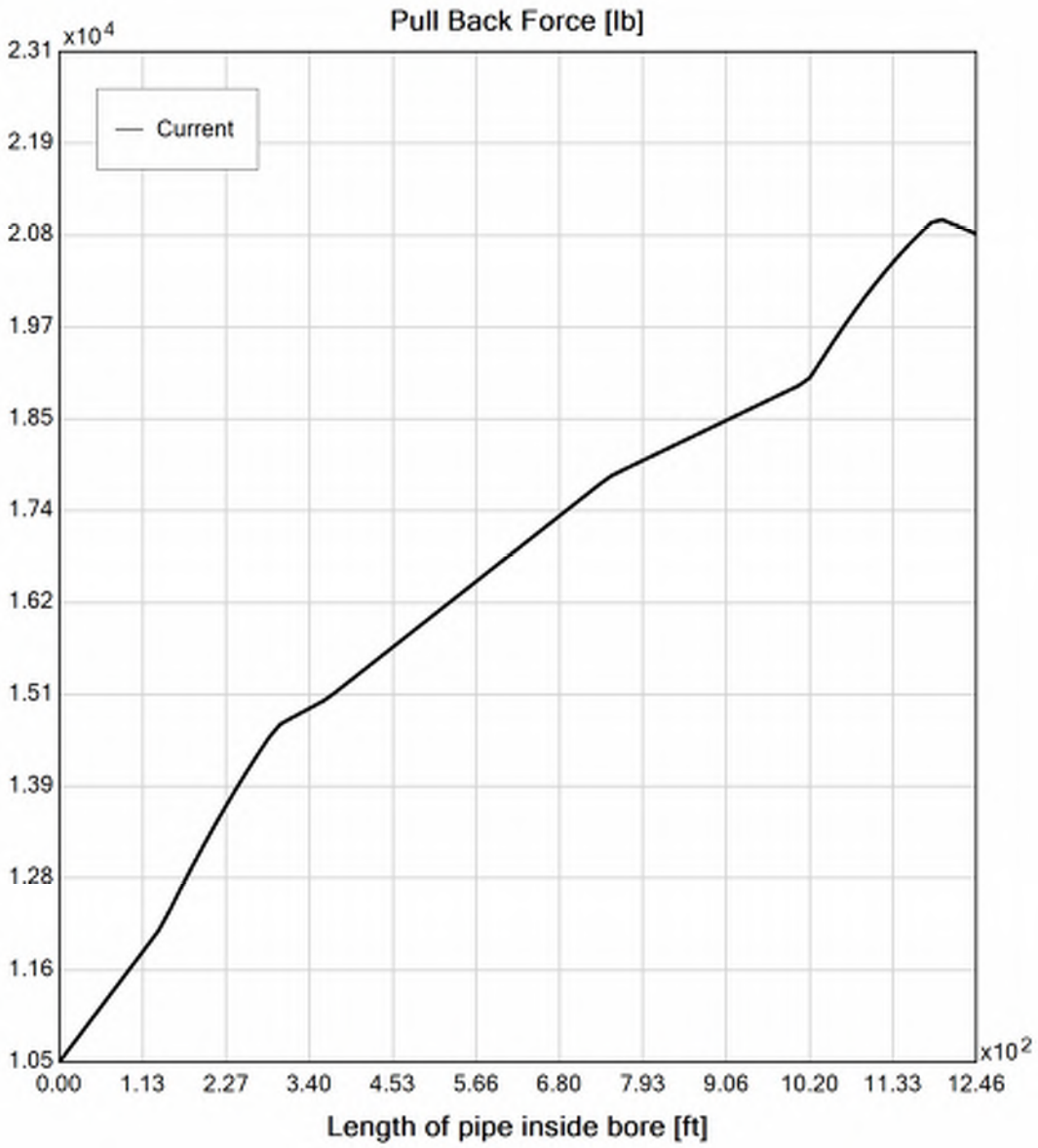
Fluid Consistency Index (K): 63.17

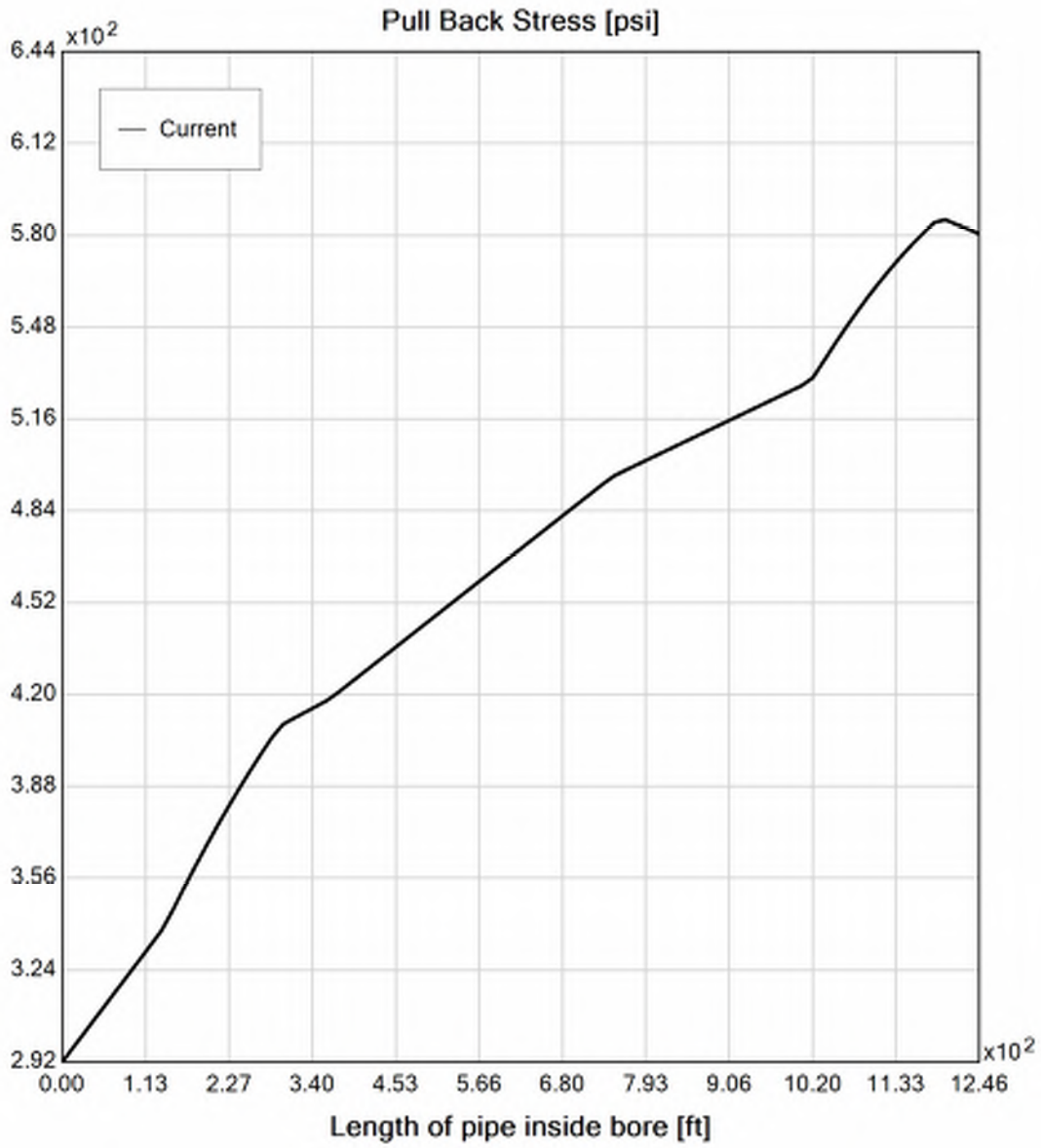
Power Law Exponent (n): 0.14

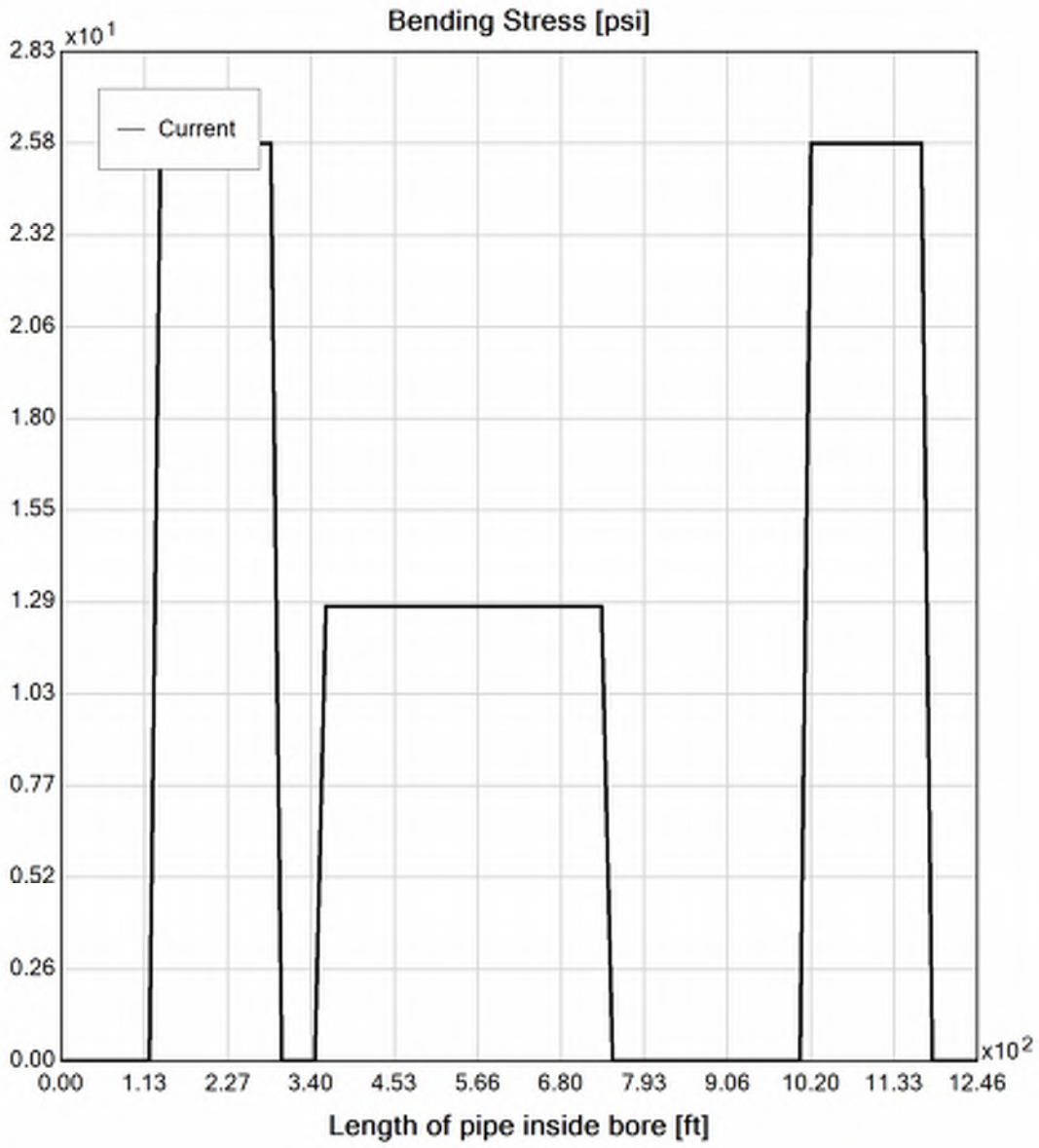
Effective Viscosity (cP): 859.3

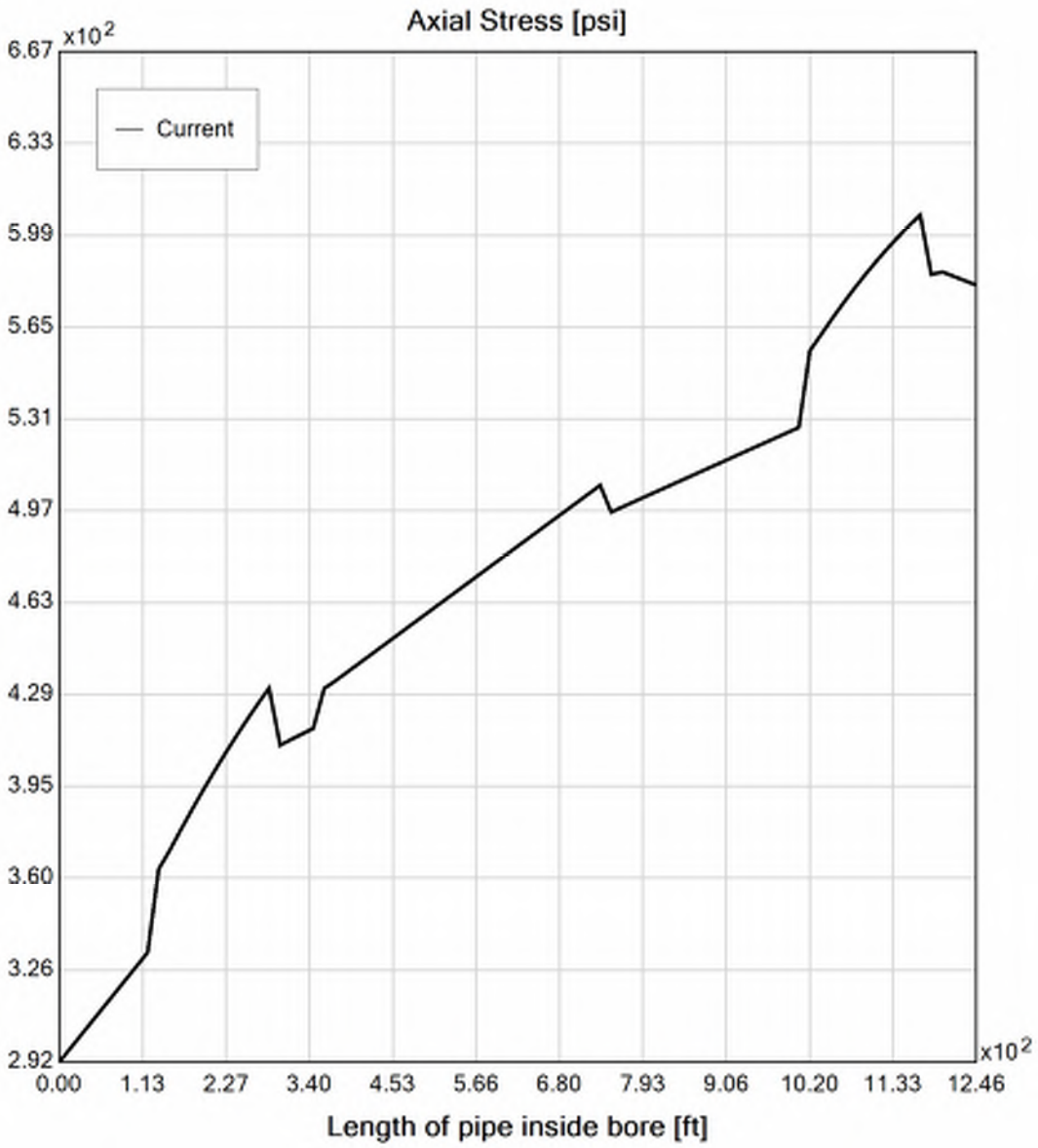
Virtual Site

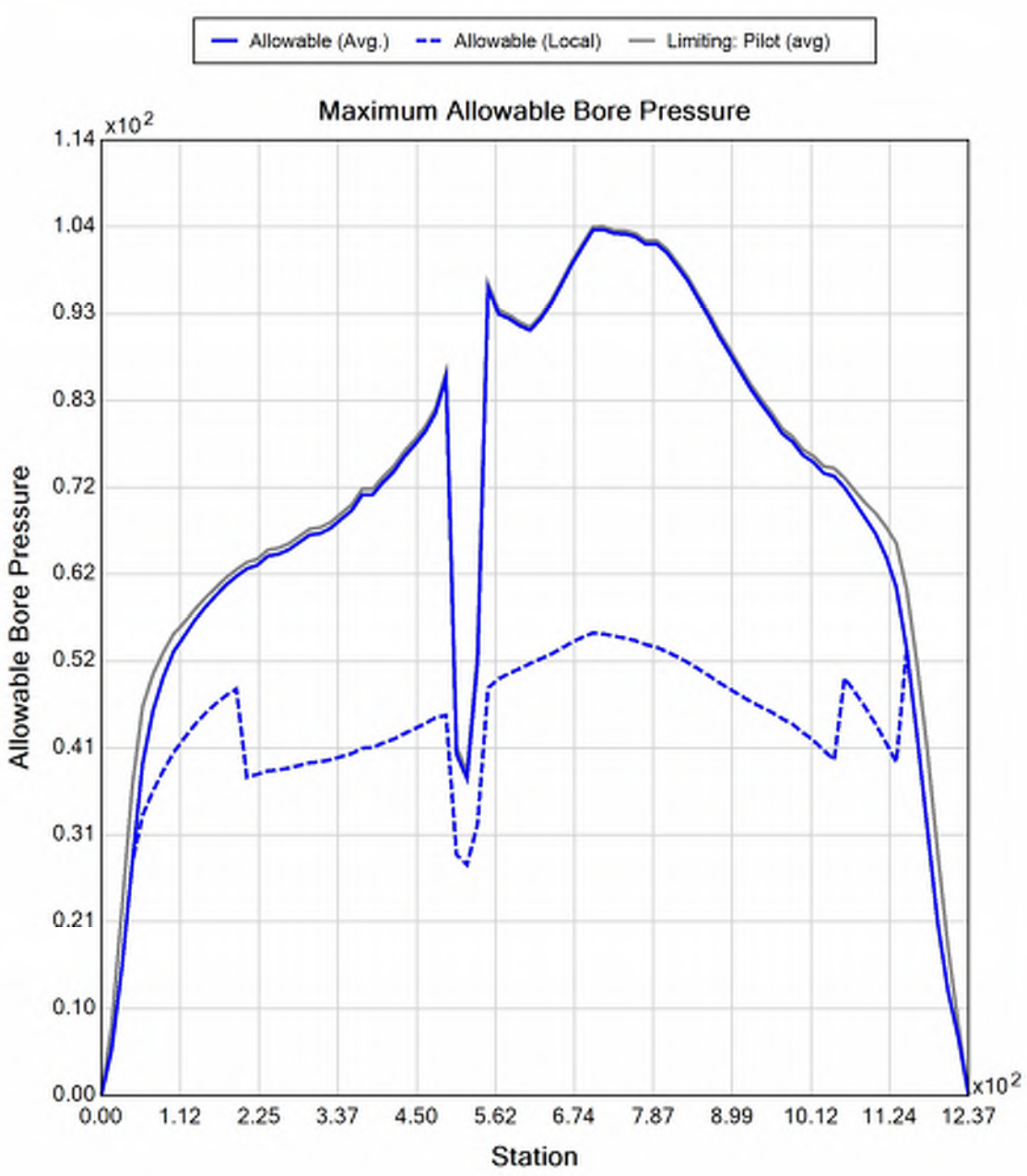


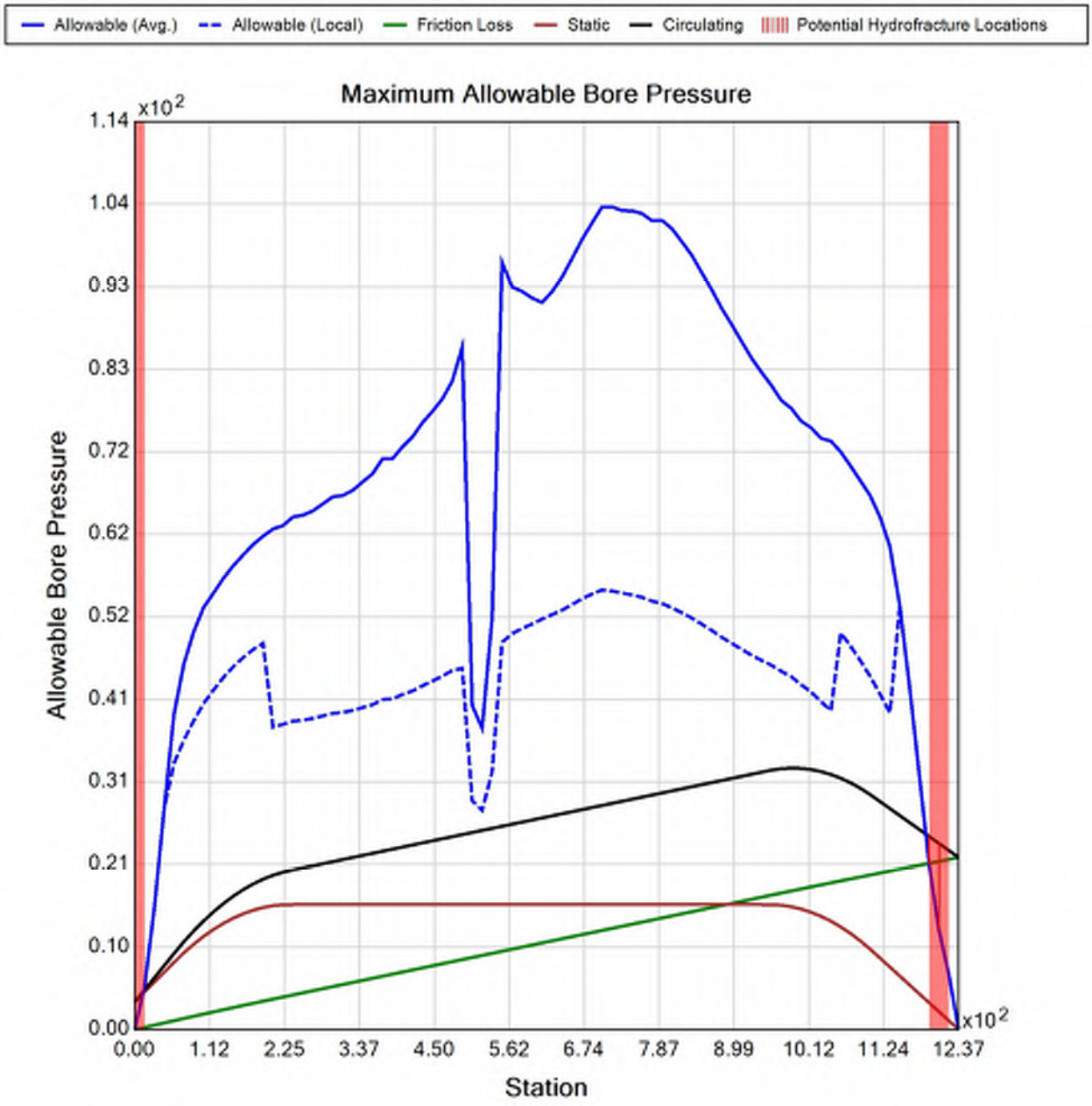












Generated Output

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Input Summary

Start Coordinate	(0.00, 0.00, 129.14) ft
End Coordinate	(1240.00, 0.00, 136.00) ft
Project Length	1240.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1245.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.2	19.0
Water Pressure	20.1	20.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	21.4	39.2
Deflection		
Earth Load Deflection	0.859	5.178
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.888	5.207
Compressive Stress [psi]		
Compressive Wall Stress	96.1	176.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1134.2	1134.2
Pullback Stress [psi]	648.0	648.0
Pullback Strain	1.127E-2	1.127E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	648.0	649.1
Tensile Strain	1.127E-2	1.139E-2

Net External Pressure = 19.8 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.888	7.5	8.4	OK
Unconstrained Collapse [psi]	21.4	127.5	6.0	OK
Compressive Wall Stress [psi]	96.1	1150.0	12.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	31.3	218.1	7.0	OK
Tensile Stress [psi]	649.1	1200.0	1.8	OK

Generated Output

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Project Summary

General:	CHPE HDD 11 - Conduit 1
	P2
	Start Date: 06-24-2022
	End Date: 06-24-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 11 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 129.00) ft
End Coordinate	(1250.00, 0.00, 129.00) ft
Project Length	1250.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 5

Soil Layer #1 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

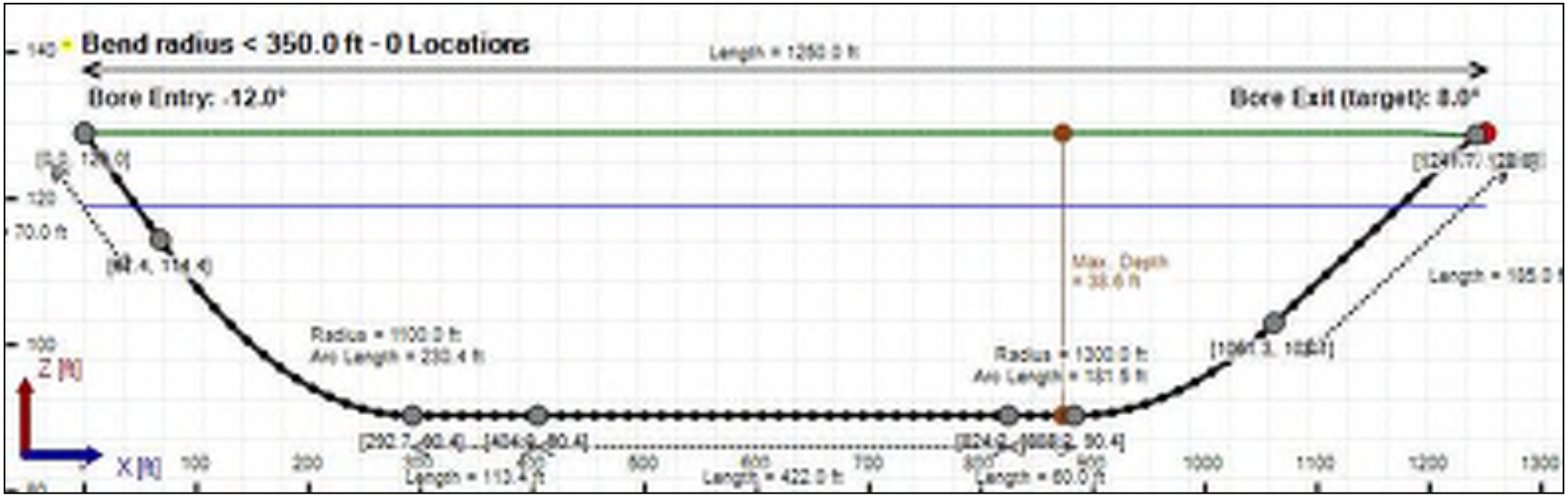
Soil Layer #2 USCS, Silt (M), MH
From Assistant
Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 28.00, S.M.: 50.00, Coh: 0.00 [psi]

Soil Layer #3 USCS, Clay (C), CL
From Assistant
Unit Weight: 100.0000 (dry), 120.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 145.00, Coh: 8.30 [psi]

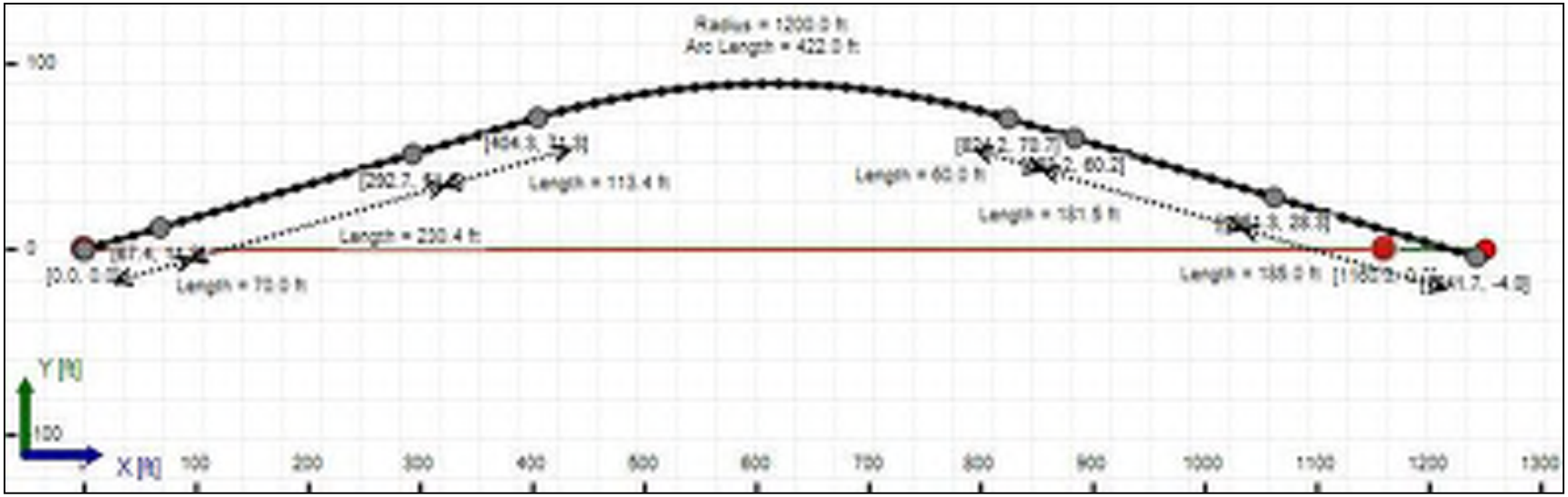
Soil Layer #4 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Soil Layer #5 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 107.8272 (dry), 177.6384 (sat) [lb/ft3]
Phi: 35.00, S.M.: 1450.40, Coh: 2900.80 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 1274.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.9	19.6
Water Pressure	12.4	12.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	16.3	32.0
Deflection		
Earth Load Deflection	1.162	5.344
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.294	5.476
Compressive Stress [psi]		
Compressive Wall Stress	73.2	144.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	22775.1	22775.1
Pullback Stress [psi]	635.2	635.2
Pullback Strain	1.105E-2	1.105E-2
Bending Stress [psi]	0.0	23.4
Bending Strain	0	4.072E-4
Tensile Stress [psi]	635.2	657.0
Tensile Strain	1.105E-2	1.183E-2

Net External Pressure = 19.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.294	7.5	5.8	OK
Unconstrained Collapse [psi]	26.1	124.2	4.8	OK
Compressive Wall Stress [psi]	73.2	1150.0	15.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	36.1	217.6	6.0	OK
Tensile Stress [psi]	657.0	1200.0	1.8	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	6.50 in	105.909 psi	132.552 psi
1	6.50 in	12.00 in	105.629 psi	132.035 psi
2	12.00 in	16.13 in	105.314 psi	131.455 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

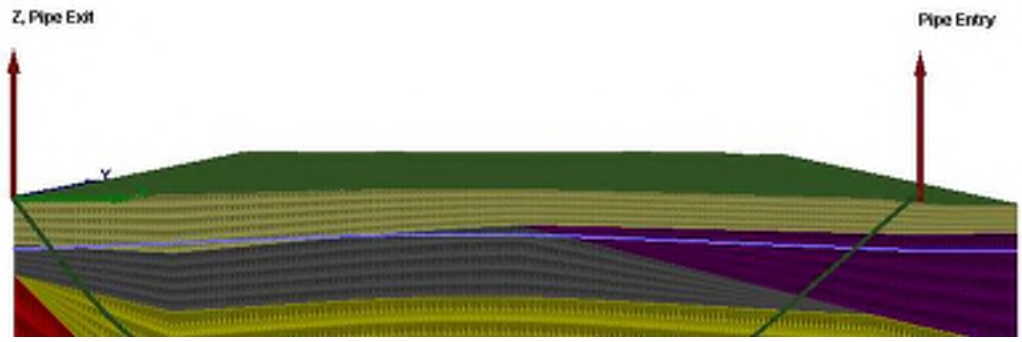
Rheological model: Power-Law

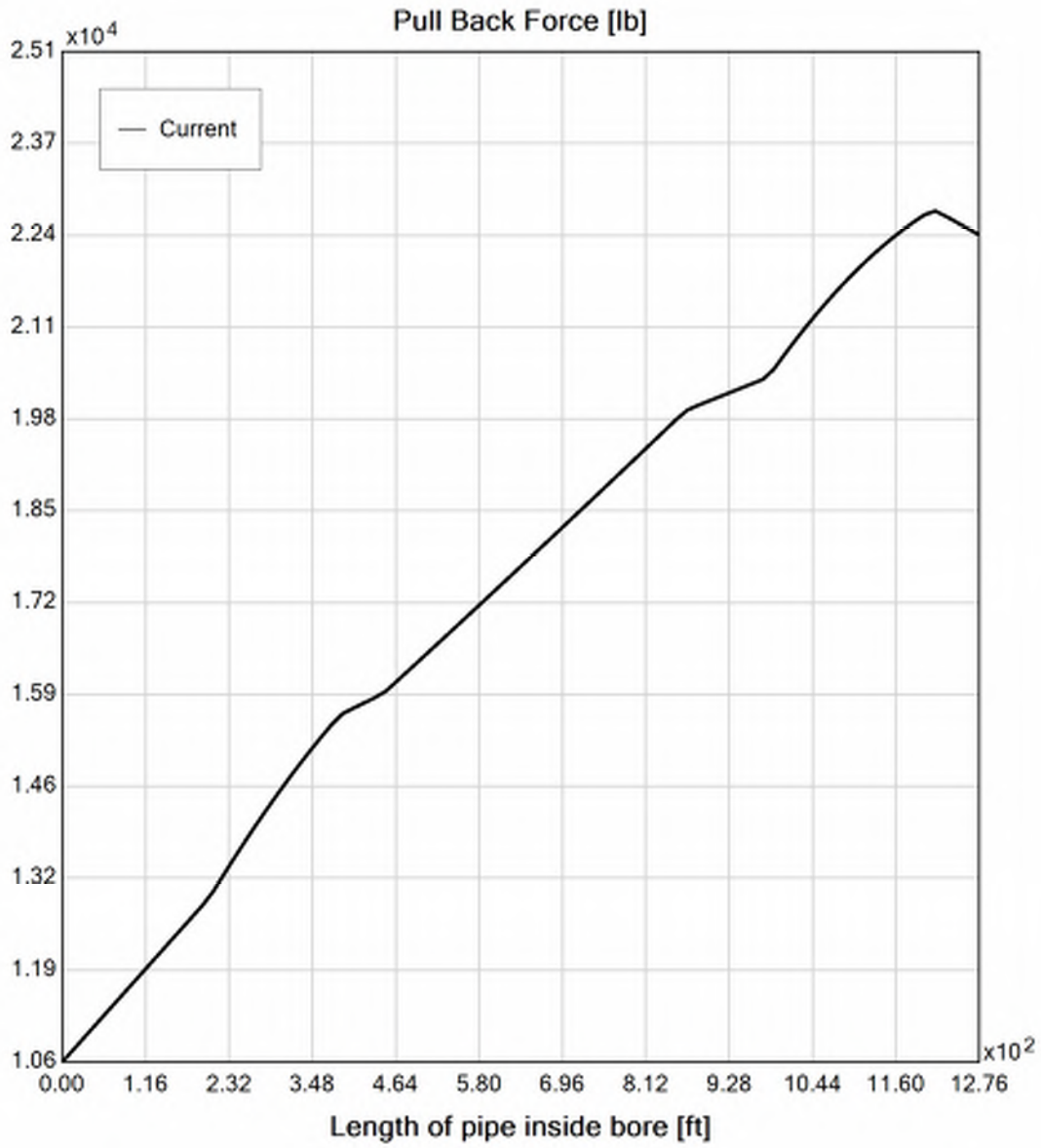
Fluid Consistency Index (K): 63.17

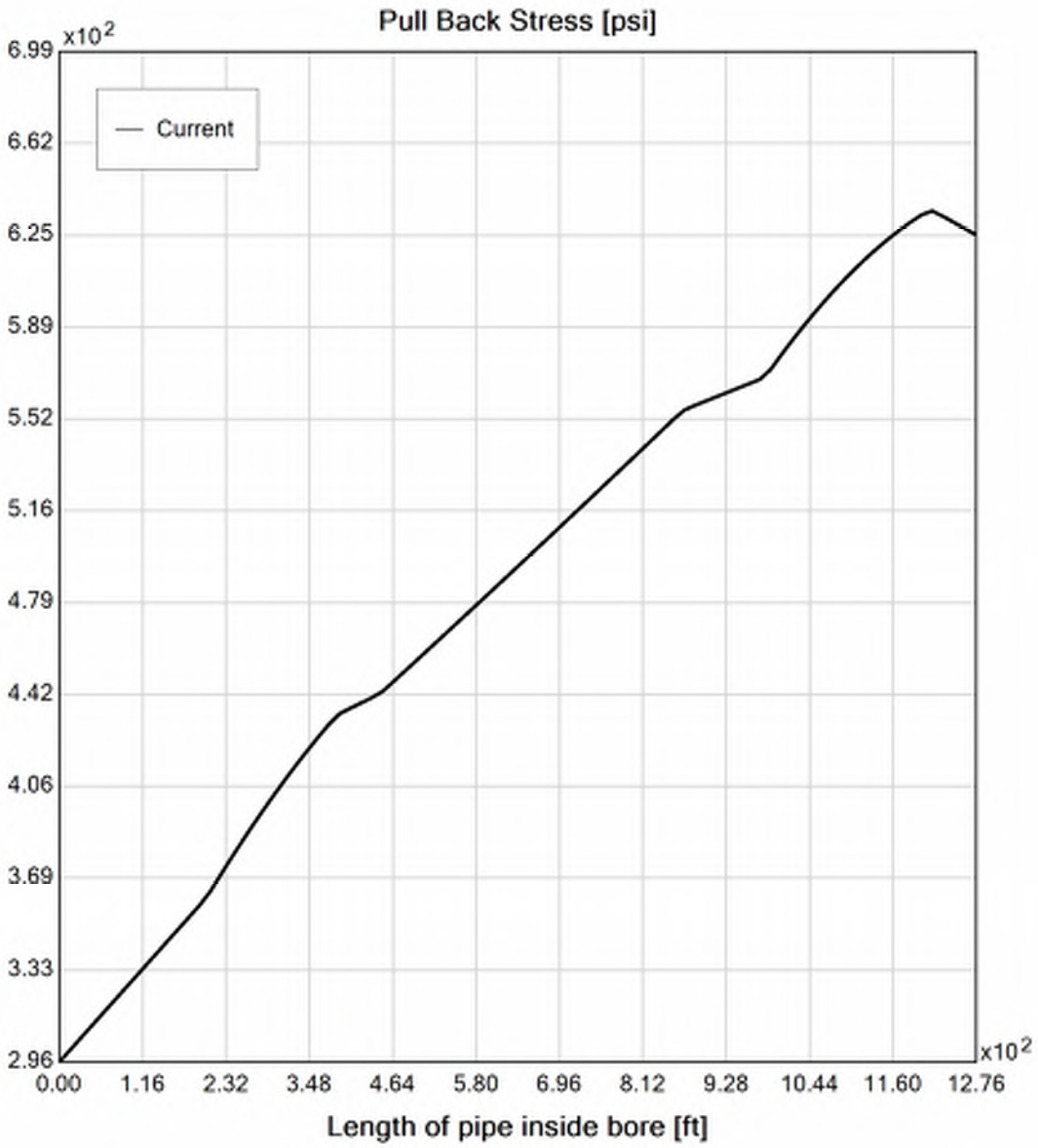
Power Law Exponent (n): 0.14

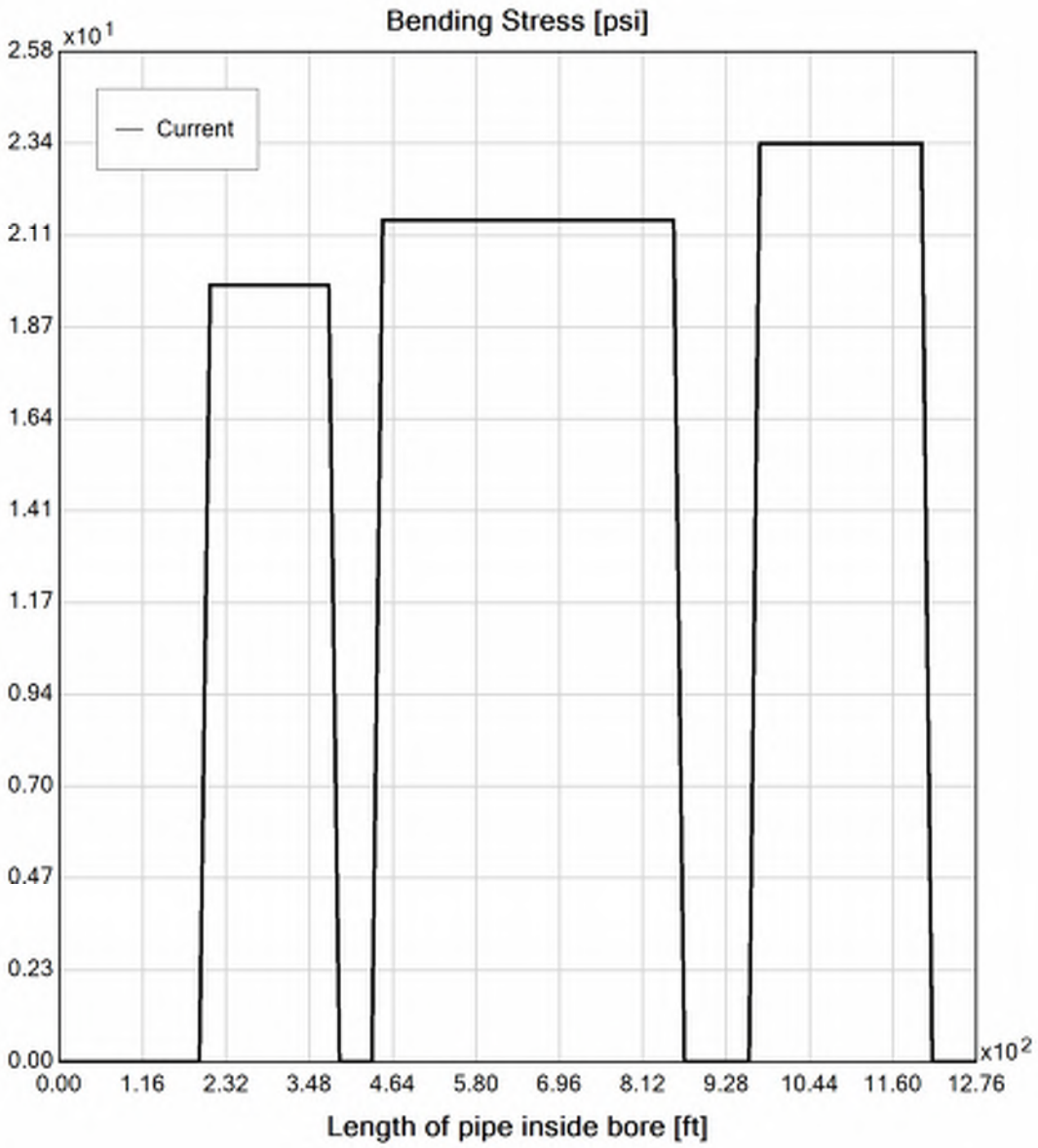
Effective Viscosity (cP): 378.3

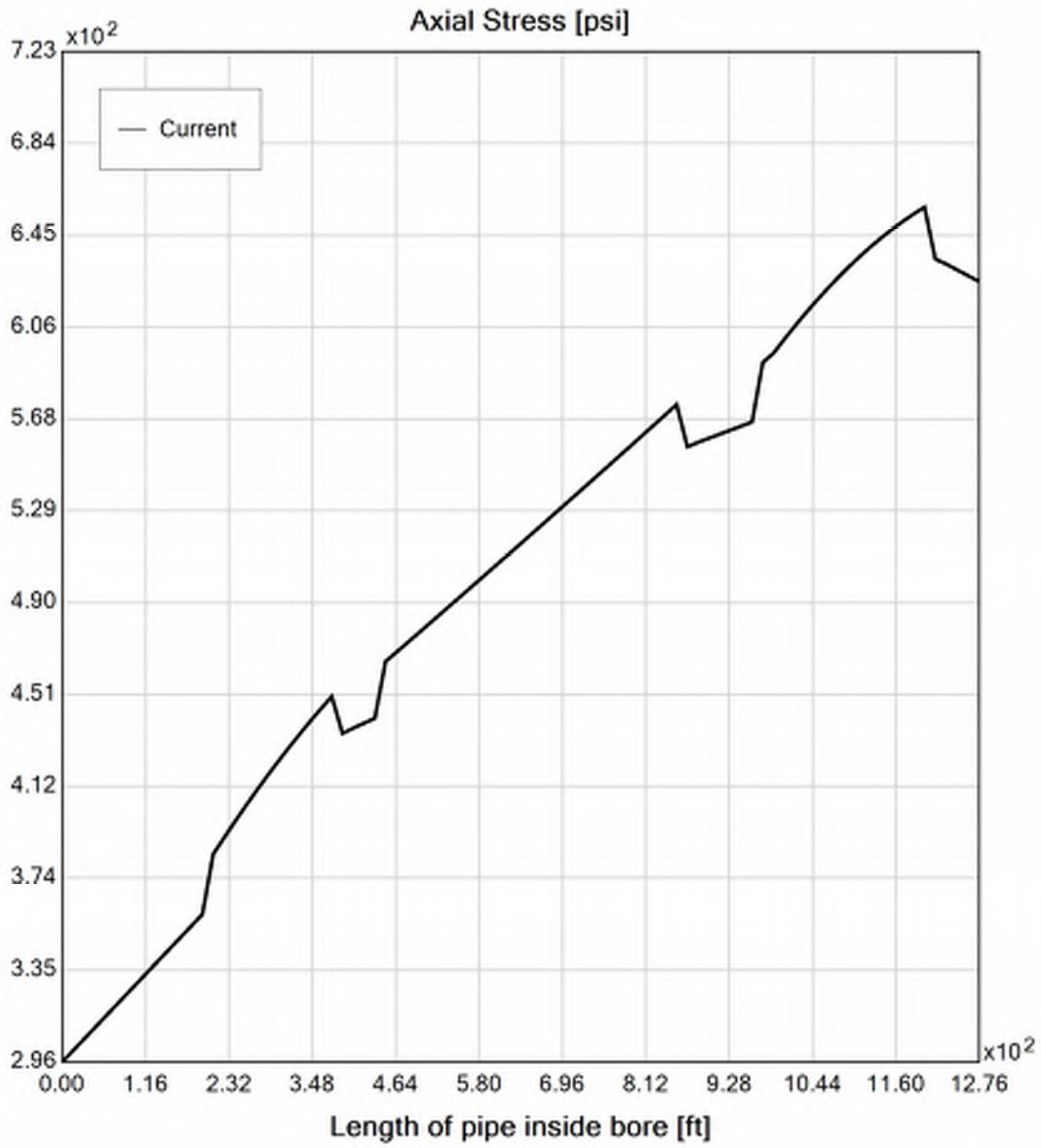
Virtual Site

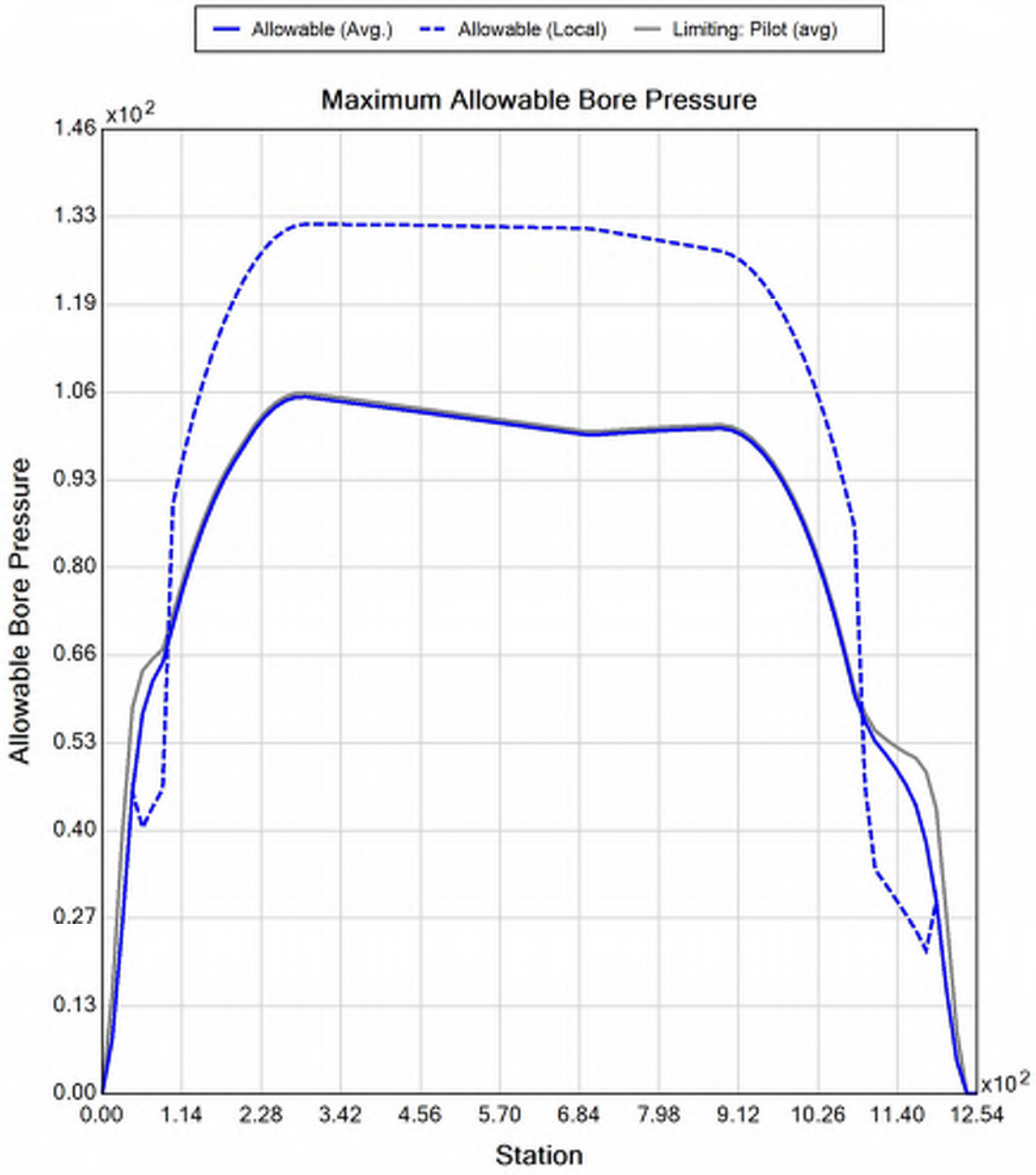


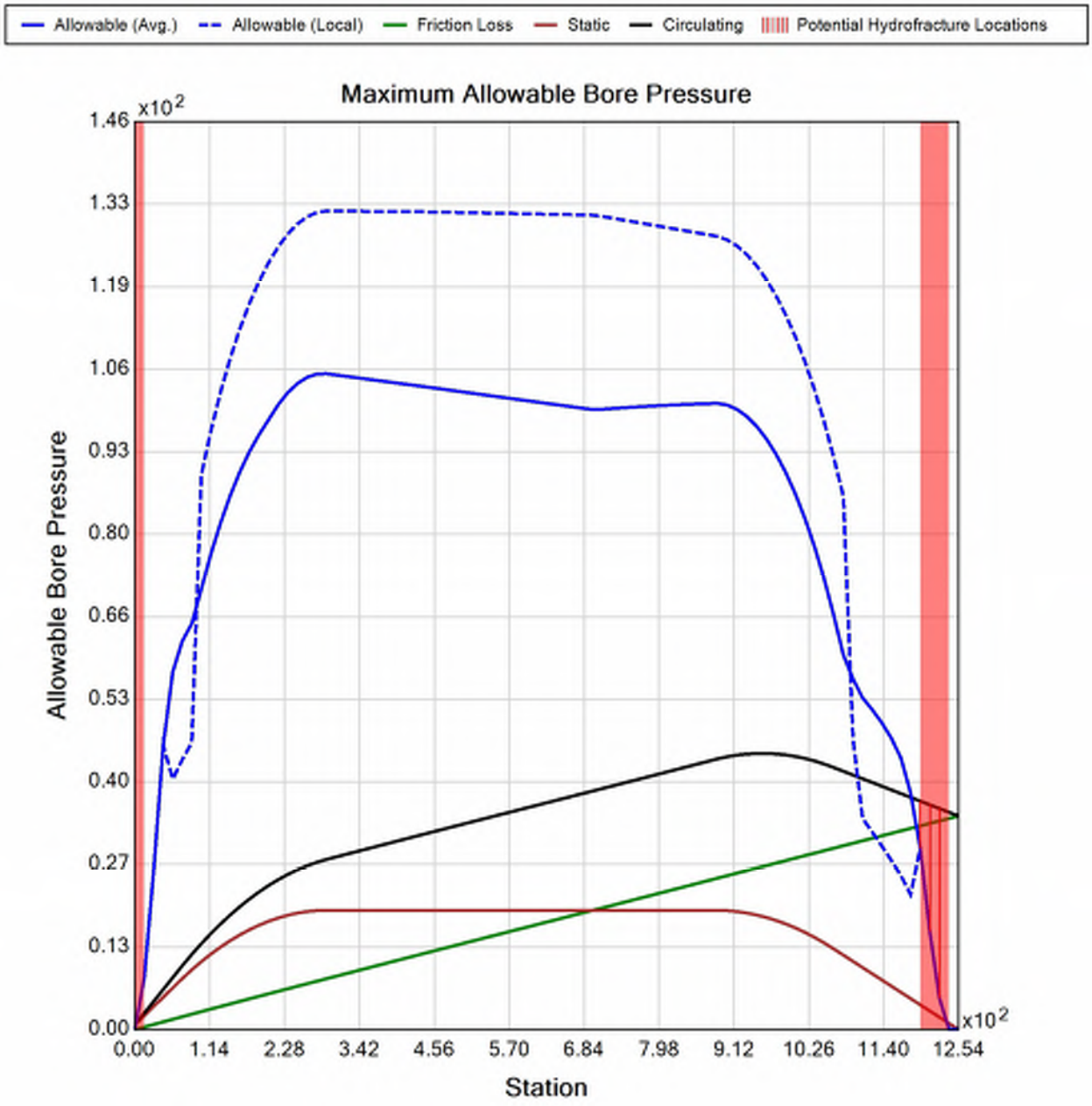












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Input Summary

Start Coordinate	(0.00, 0.00, 129.00) ft
End Coordinate	(1250.00, 0.00, 129.00) ft
Project Length	1250.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1274.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.5	19.6
Water Pressure	12.4	12.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.9	32.0
Deflection		
Earth Load Deflection	0.609	5.344
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.638	5.373
Compressive Stress [psi]		
Compressive Wall Stress	62.7	144.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1221.2	1221.2
Pullback Stress [psi]	697.8	697.8
Pullback Strain	1.214E-2	1.214E-2
Bending Stress [psi]	0.0	5.2
Bending Strain	0	8.996E-5
Tensile Stress [psi]	697.8	701.4
Tensile Strain	1.214E-2	1.229E-2

Net External Pressure = 19.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.638	7.5	11.8	OK
Unconstrained Collapse [psi]	26.1	132.7	5.1	OK
Compressive Wall Stress [psi]	62.7	1150.0	18.3	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	36.1	215.3	6.0	OK
Tensile Stress [psi]	701.4	1200.0	1.7	OK

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Project Summary

General:	CHPE HDD 11 - Conduit 2
	P2
	Start Date: 06-29-2022
	End Date: 06-29-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 11 Conduit 2 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 129.00) ft
End Coordinate	(1200.00, 0.00, 129.00) ft
Project Length	1200.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 5

Soil Layer #1 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

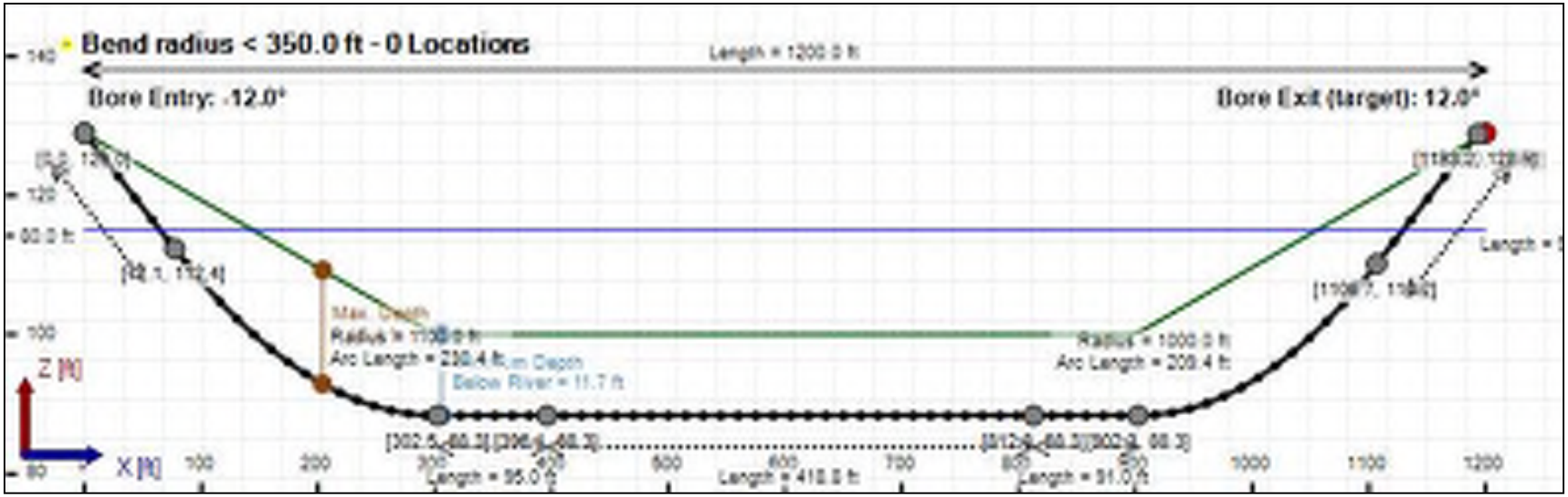
Soil Layer #2 USCS, Silt (M), MH
From Assistant
Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 28.00, S.M.: 50.00, Coh: 0.00 [psi]

Soil Layer #3 USCS, Clay (C), CL
From Assistant
Unit Weight: 100.0000 (dry), 120.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 300.00, Coh: 5.50 [psi]

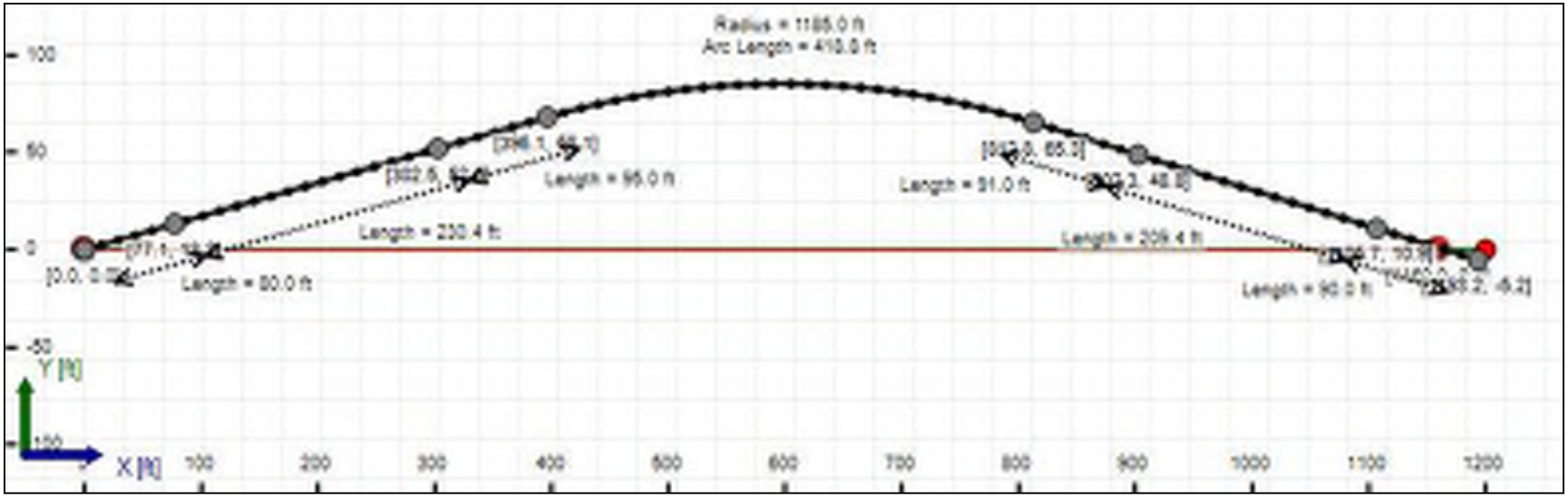
Soil Layer #4 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Soil Layer #5 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 107.8272 (dry), 177.6384 (sat) [lb/ft3]
Phi: 35.00, S.M.: 1450.40, Coh: 2900.80 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 1214.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.8	6.6
Water Pressure	11.5	11.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.3	17.7
Deflection		
Earth Load Deflection	1.166	1.911
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.298	2.043
Compressive Stress [psi]		
Compressive Wall Stress	64.2	79.7

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	22180.9	22180.9
Pullback Stress [psi]	618.6	618.6
Pullback Strain	1.076E-2	1.076E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	618.6	639.9
Tensile Strain	1.076E-2	1.154E-2

Net External Pressure = 20.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.298	7.5	5.8	OK
Unconstrained Collapse [psi]	26.4	127.9	4.8	OK
Compressive Wall Stress [psi]	64.2	1150.0	17.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	36.4	218.3	6.0	OK
Tensile Stress [psi]	639.9	1200.0	1.9	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	6.50 in	69.919 psi	70.704 psi
1	6.50 in	12.00 in	66.362 psi	67.233 psi
2	12.00 in	16.13 in	63.140 psi	64.058 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

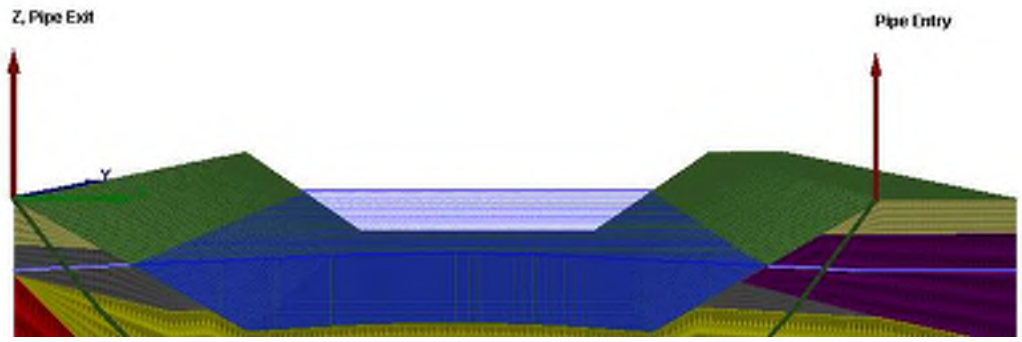
Rheological model: Power-Law

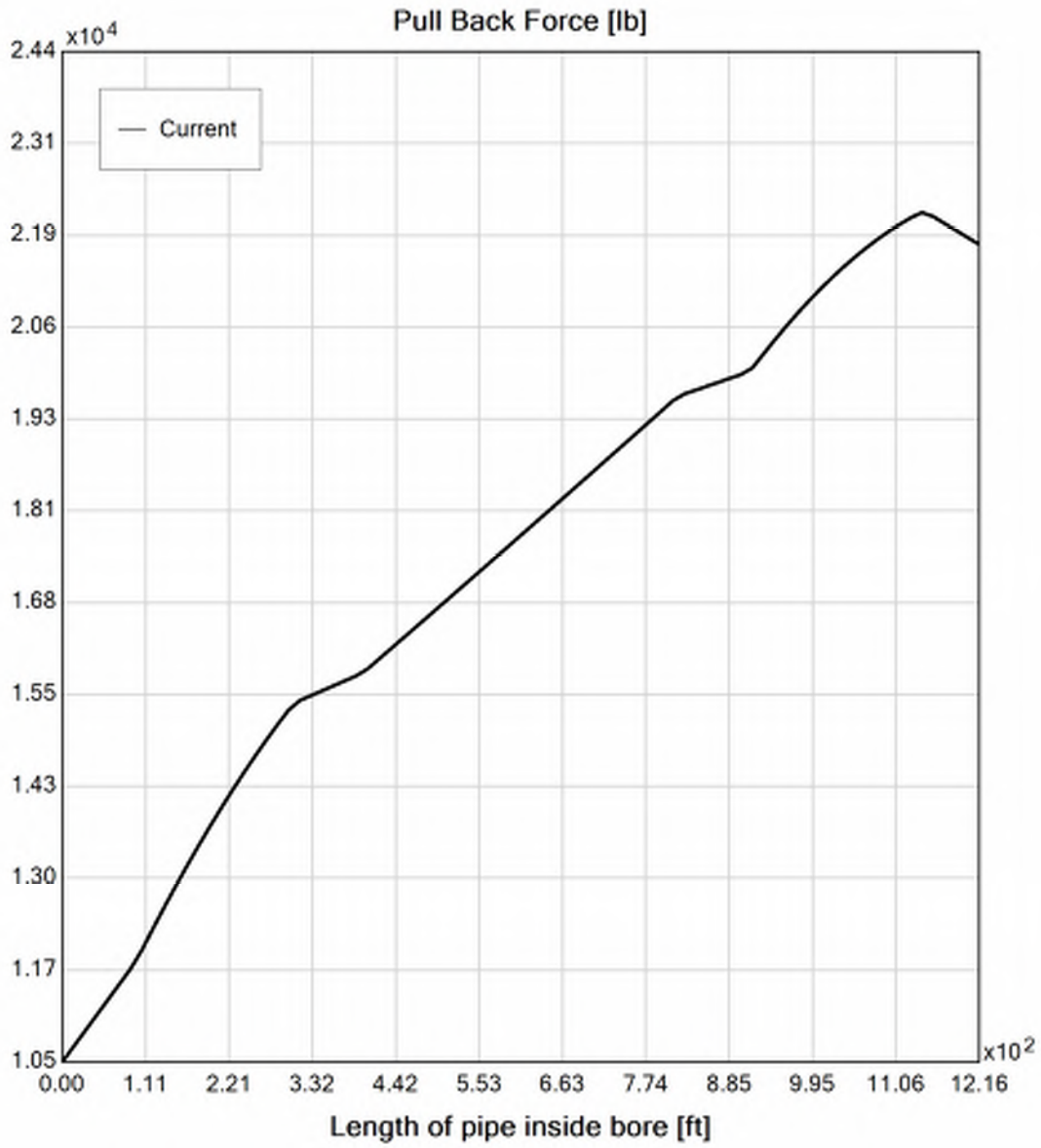
Fluid Consistency Index (K): 63.17

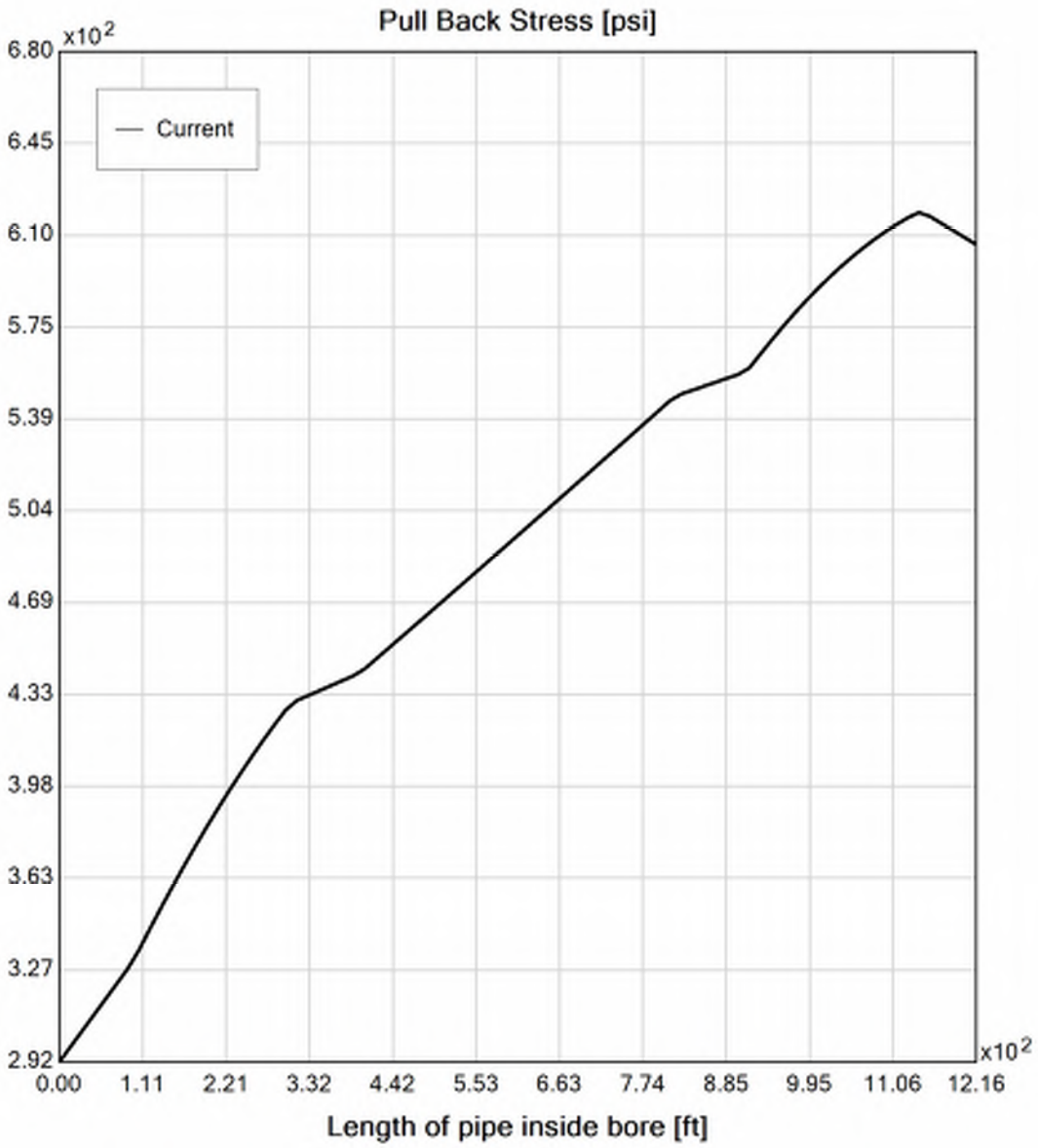
Power Law Exponent (n): 0.14

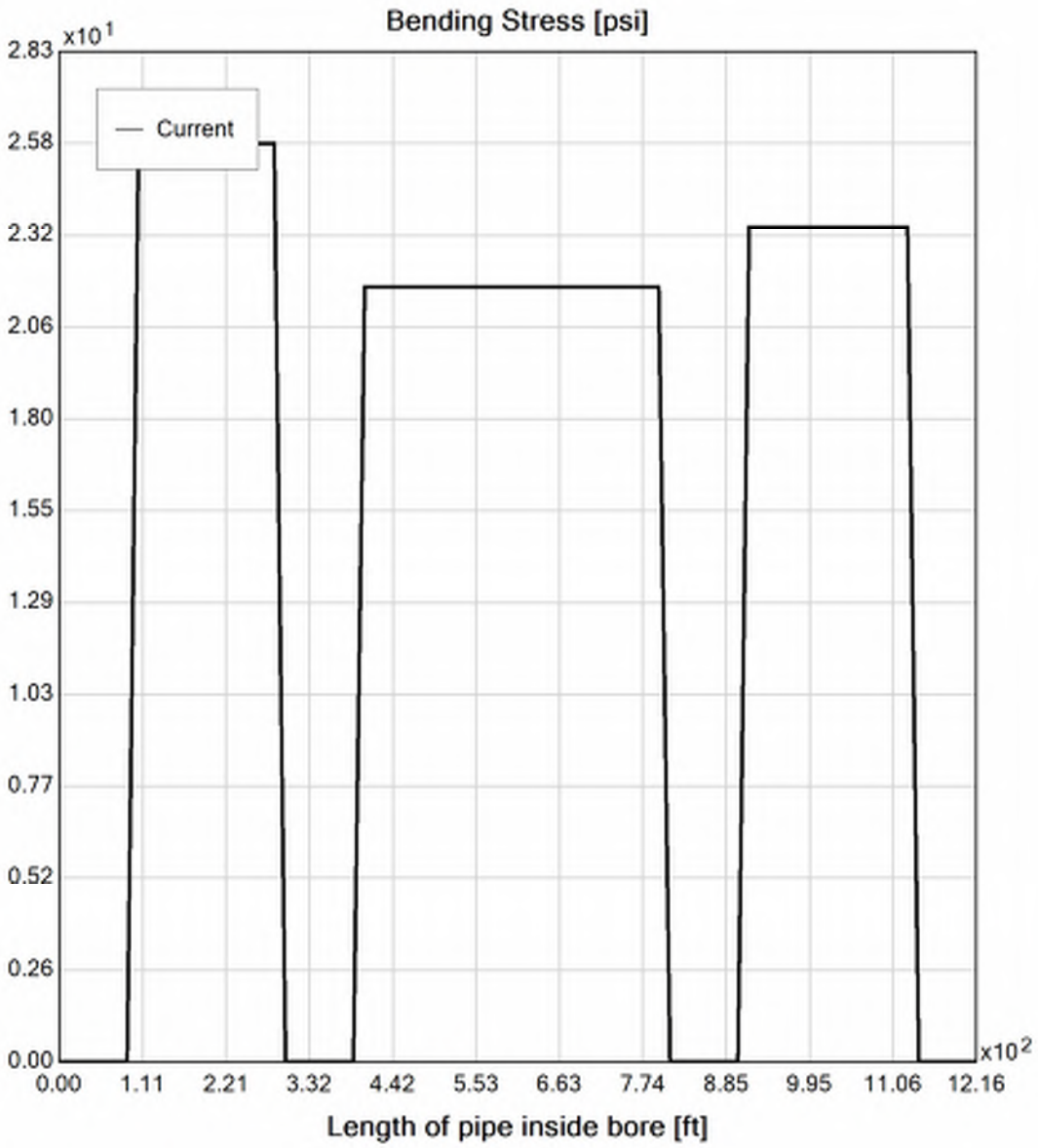
Effective Viscosity (cP): 378.3

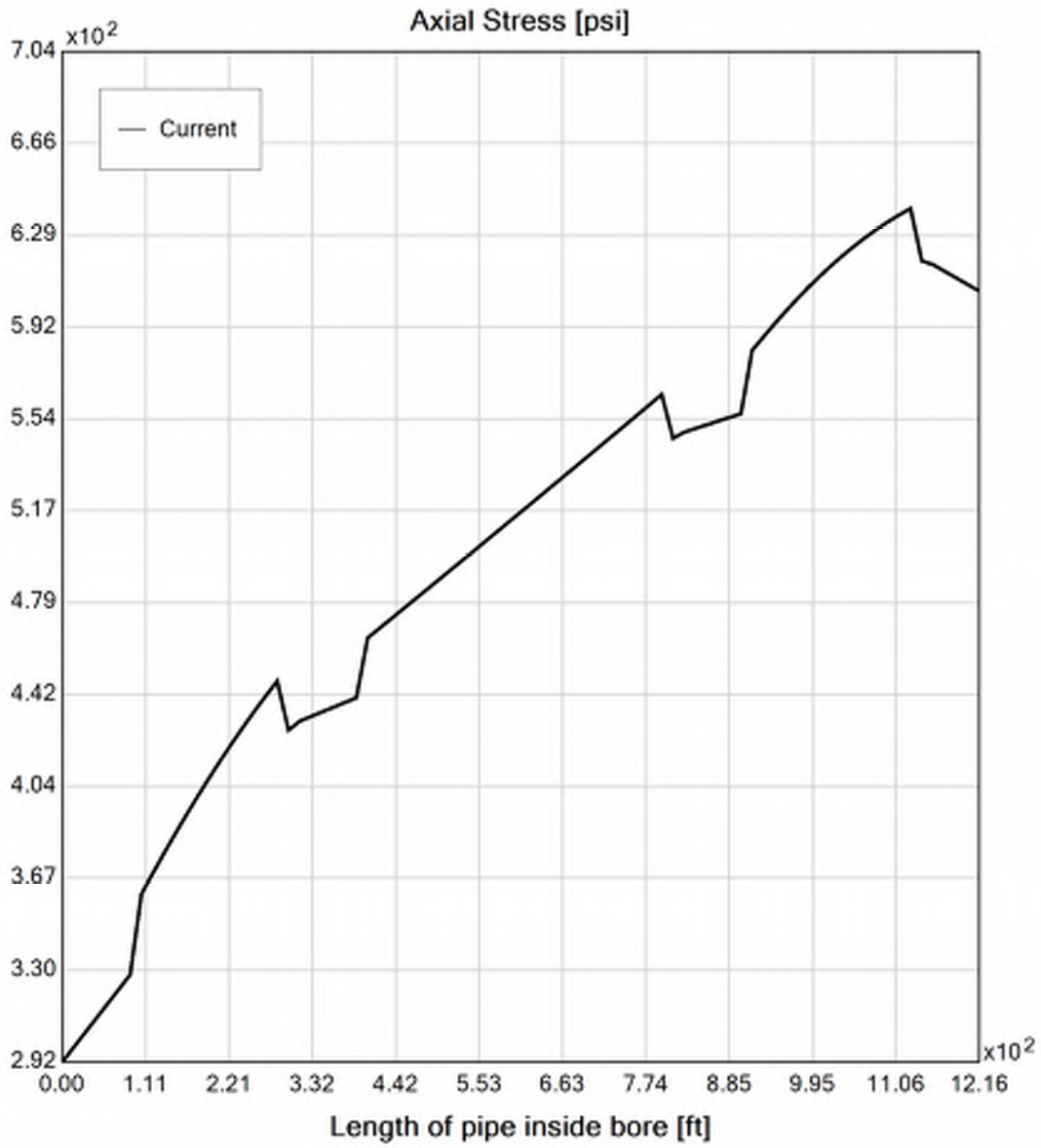
Virtual Site

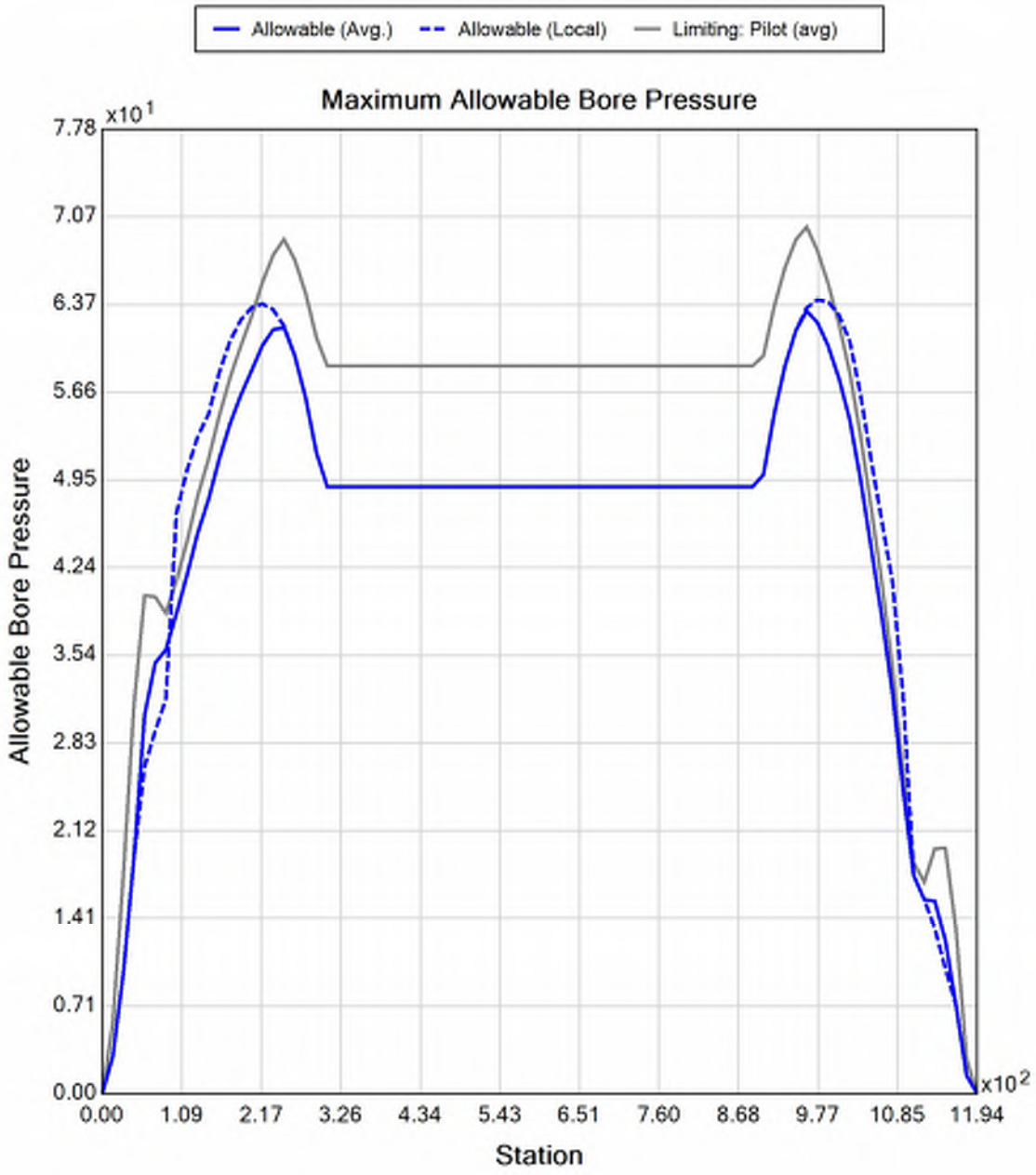


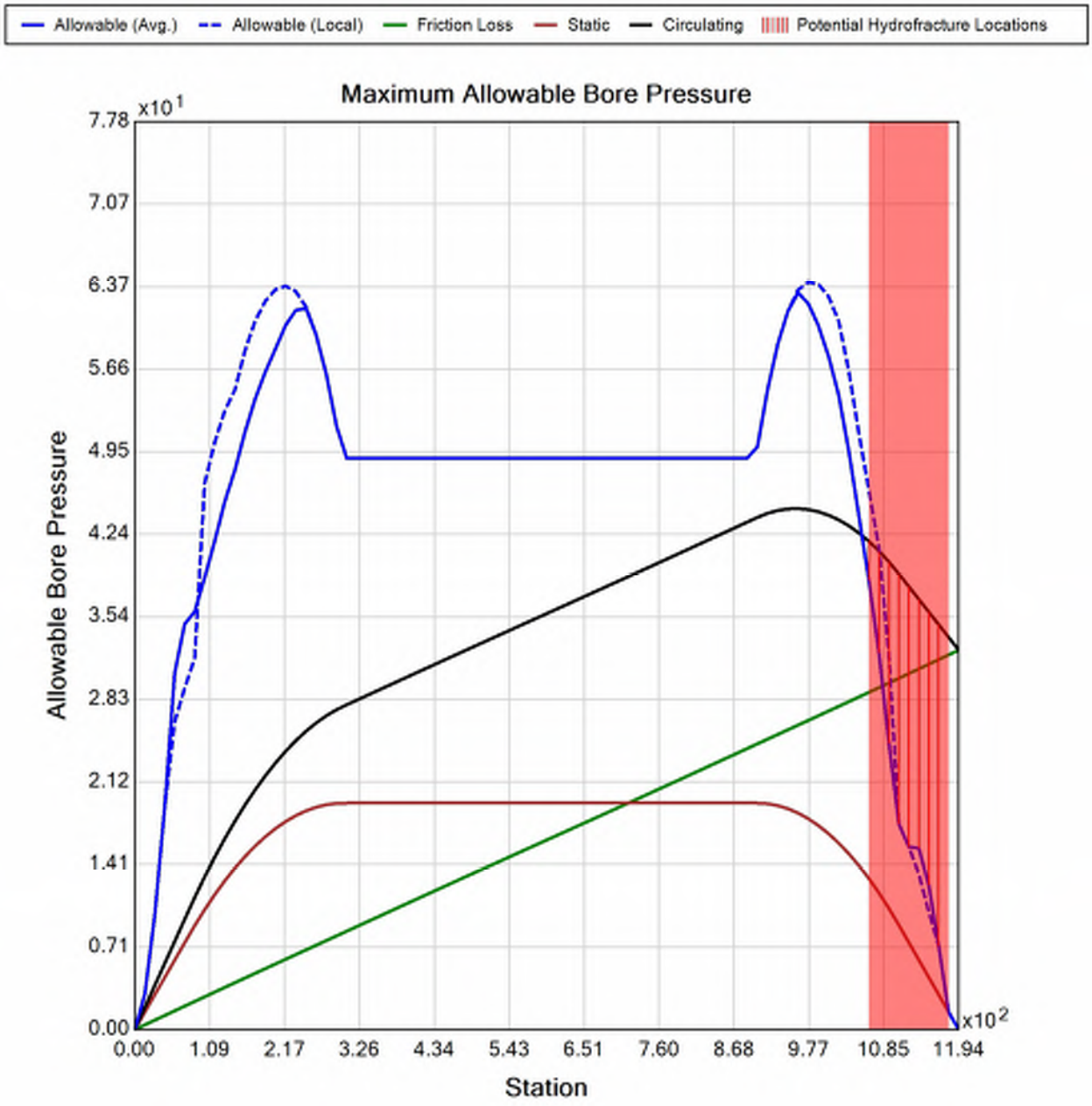












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Input Summary

Start Coordinate	(0.00, 0.00, 129.00) ft
End Coordinate	(1200.00, 0.00, 129.00) ft
Project Length	1200.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1214.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.3	6.6
Water Pressure	11.6	11.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.9	17.7
Deflection		
Earth Load Deflection	0.768	1.911
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.797	1.940
Compressive Stress [psi]		
Compressive Wall Stress	57.9	79.7

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1192.2	1192.2
Pullback Stress [psi]	681.2	681.2
Pullback Strain	1.185E-2	1.185E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	681.2	684.3
Tensile Strain	1.185E-2	1.199E-2

Net External Pressure = 20.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.797	7.5	9.4	OK
Unconstrained Collapse [psi]	26.4	133.4	5.0	OK
Compressive Wall Stress [psi]	57.9	1150.0	19.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	36.4	216.0	5.9	OK
Tensile Stress [psi]	684.3	1200.0	1.8	OK

Generated Output

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Project Summary

General:	CHPE HDD 12 - Conduit 1
	P2
	Start Date: 06-21-2022
	End Date: 06-21-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 12 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 131.80) ft
End Coordinate	(705.20, 0.00, 140.75) ft
Project Length	705.20 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

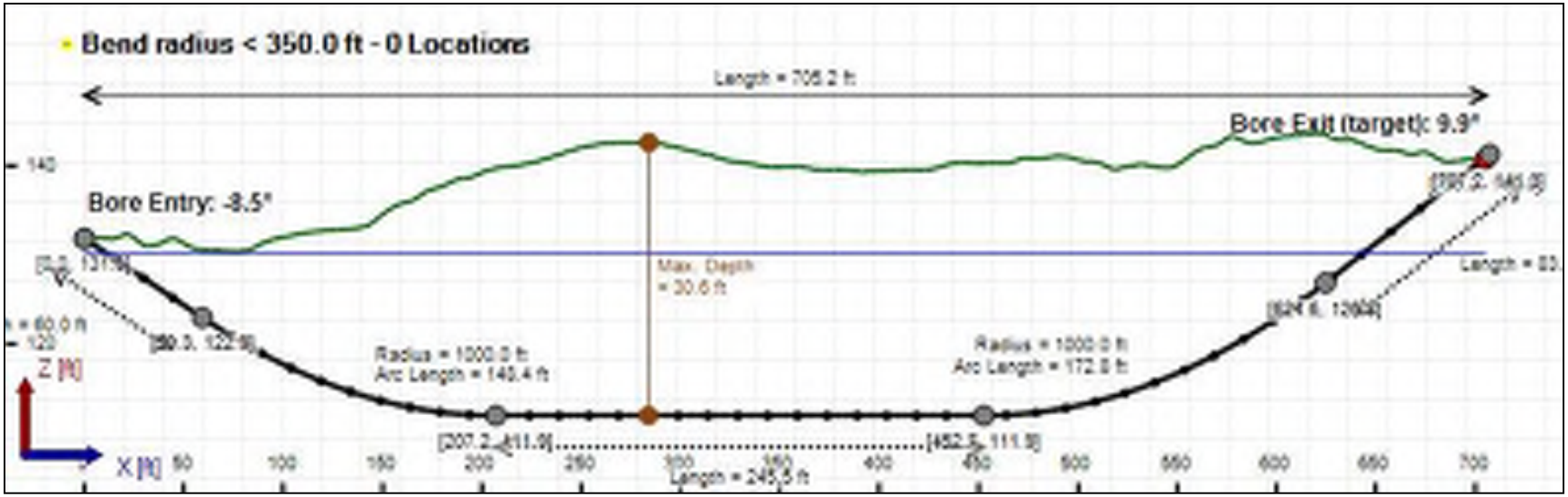
Soil Summary

Number of Layers: 2

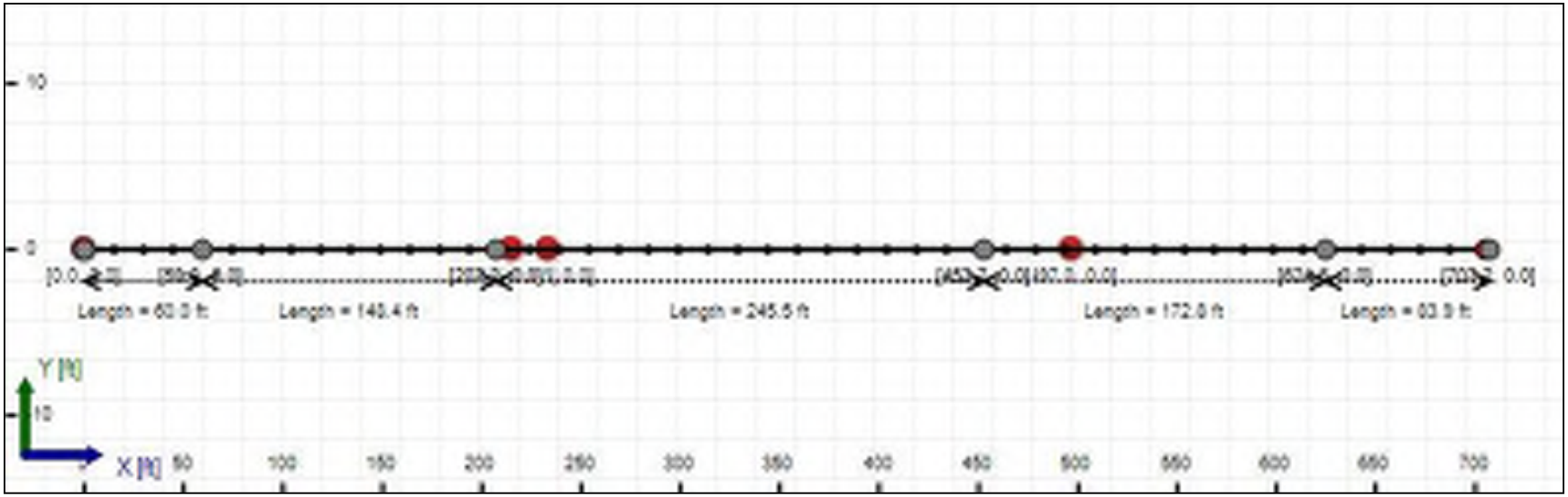
Soil Layer #1 USCS, Sand (S), SM
Depth: 1.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 Rock, Geological Classification, Sedimentary Rocks
Depth: 25.00 ft
Unit Weight: 107.8272 (dry), 177.6384 (sat) [lb/ft3]
Phi: 35.00, S.M.: 1450.40, Coh: 2900.80 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	5.8	23.7
Water Pressure	7.9	7.9
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.7	31.6
Deflection		
Earth Load Deflection	1.589	6.444
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.721	6.576
Compressive Stress [psi]		
Compressive Wall Stress	61.9	142.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	12257.2	12257.2
Pullback Stress [psi]	341.8	341.8
Pullback Strain	5.945E-3	5.945E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	341.8	364.9
Tensile Strain	5.945E-3	6.793E-3

Net External Pressure = 21.5 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.721	7.5	4.4	OK
Unconstrained Collapse [psi]	20.1	118.4	5.9	OK
Compressive Wall Stress [psi]	61.9	1150.0	18.6	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	30.1	235.1	7.8	OK
Tensile Stress [psi]	364.9	1200.0	3.3	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	1309.762 psi	1329.978 psi
1	8.00 in	12.00 in	1305.627 psi	1329.576 psi
2	12.00 in	16.13 in	1299.646 psi	1328.993 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

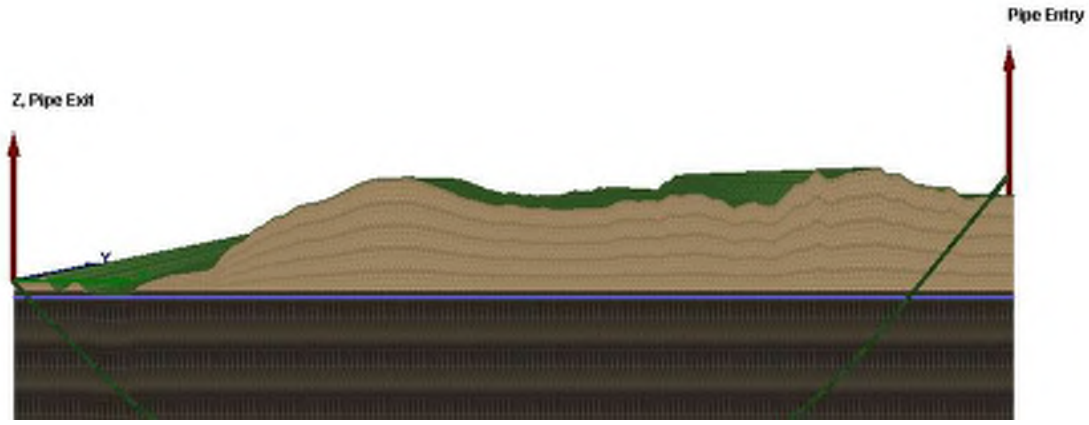
Rheological model: Bingham-Plastic

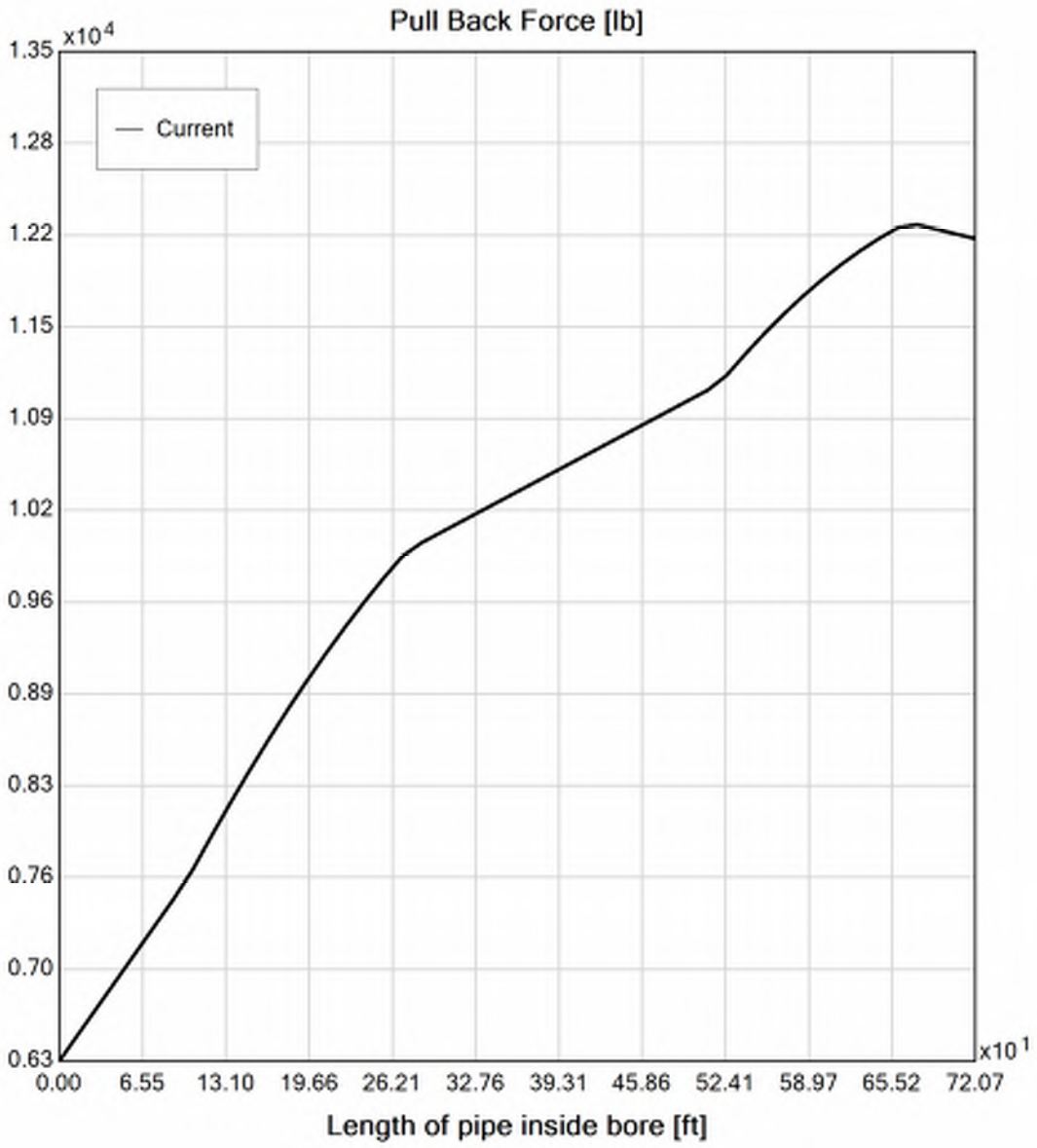
Plastic Viscosity (PV): 25.53

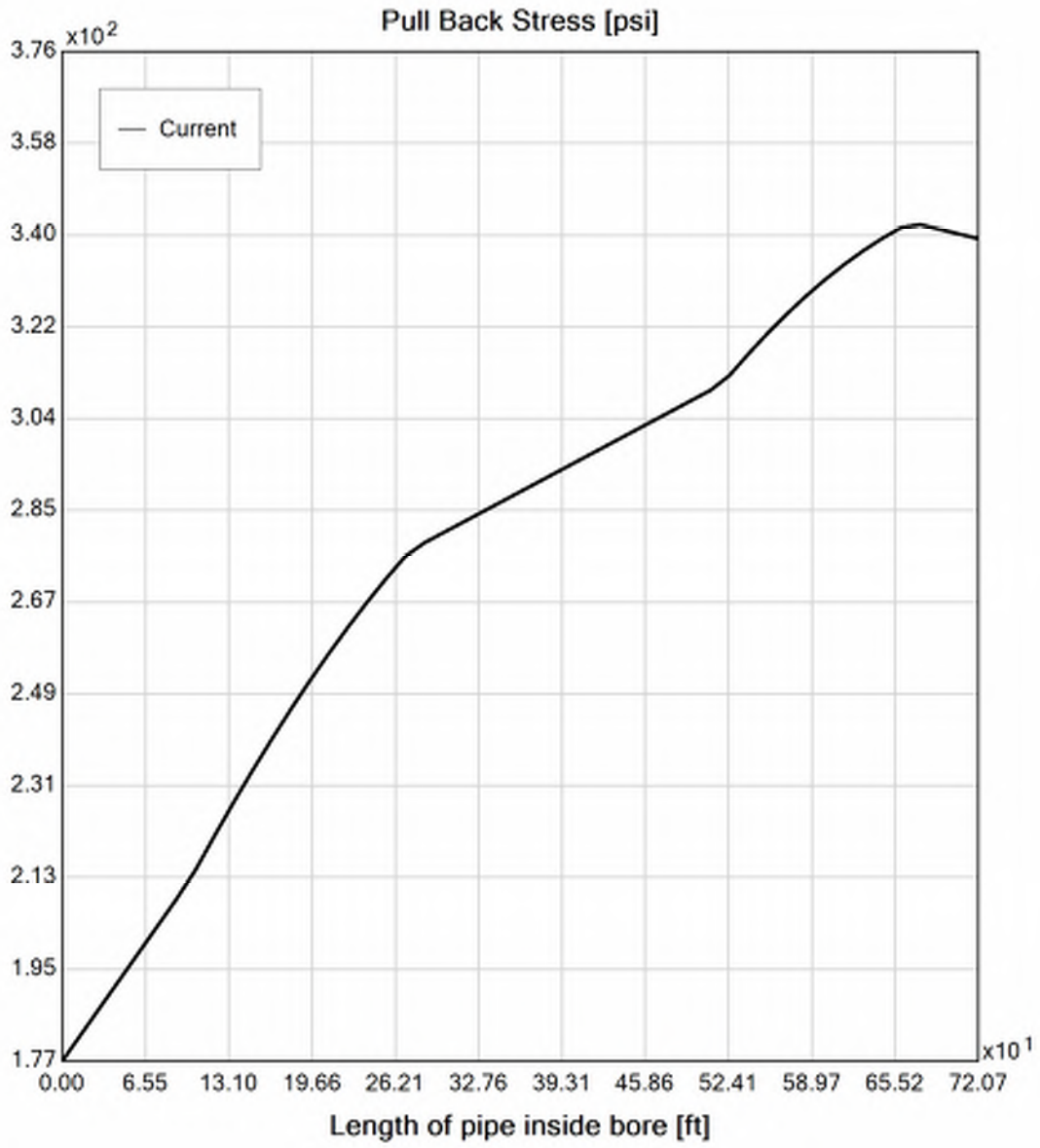
Yield Point (YP): 16.49

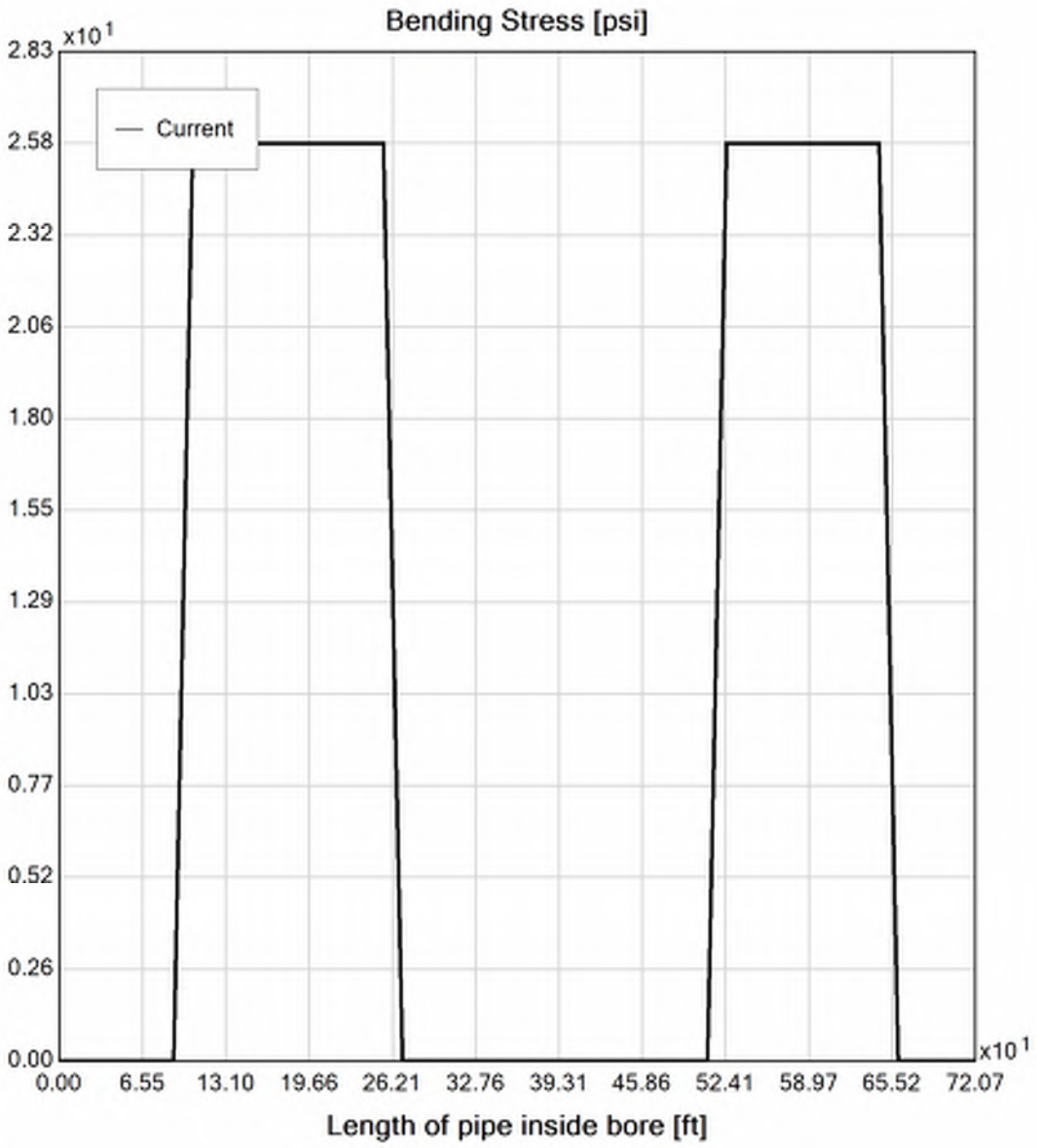
Effective Viscosity (cP): 1202.0

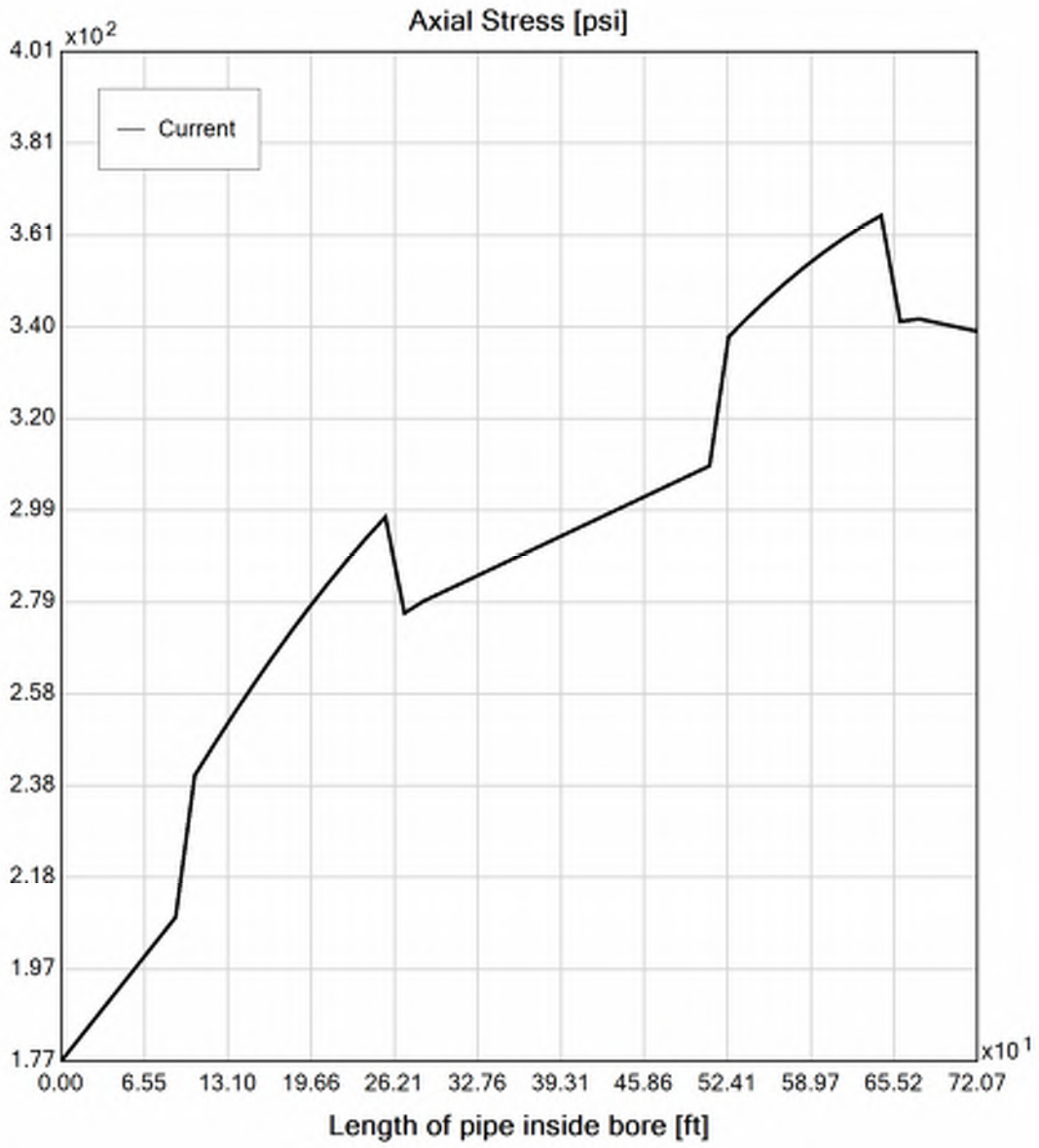
Virtual Site

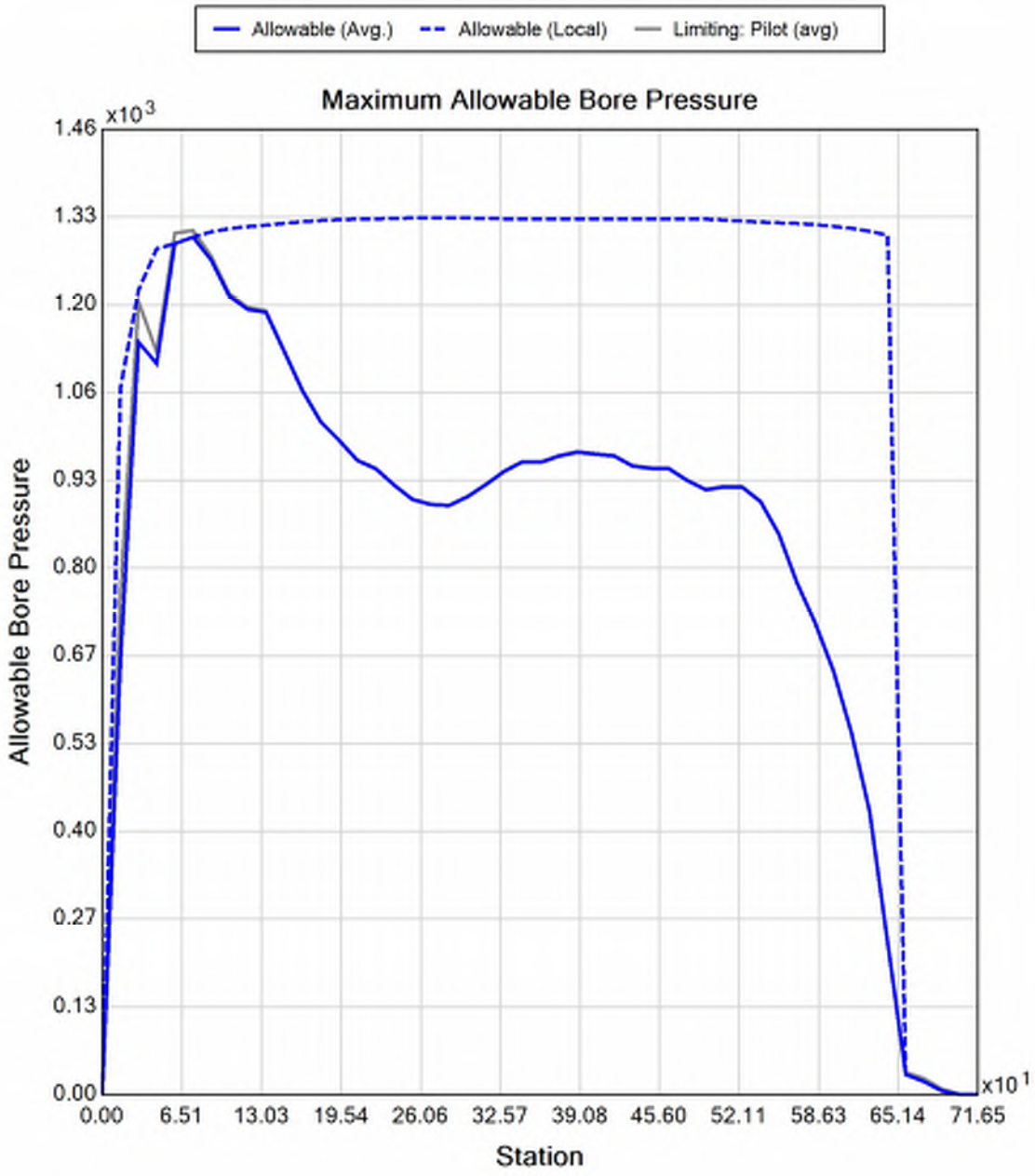


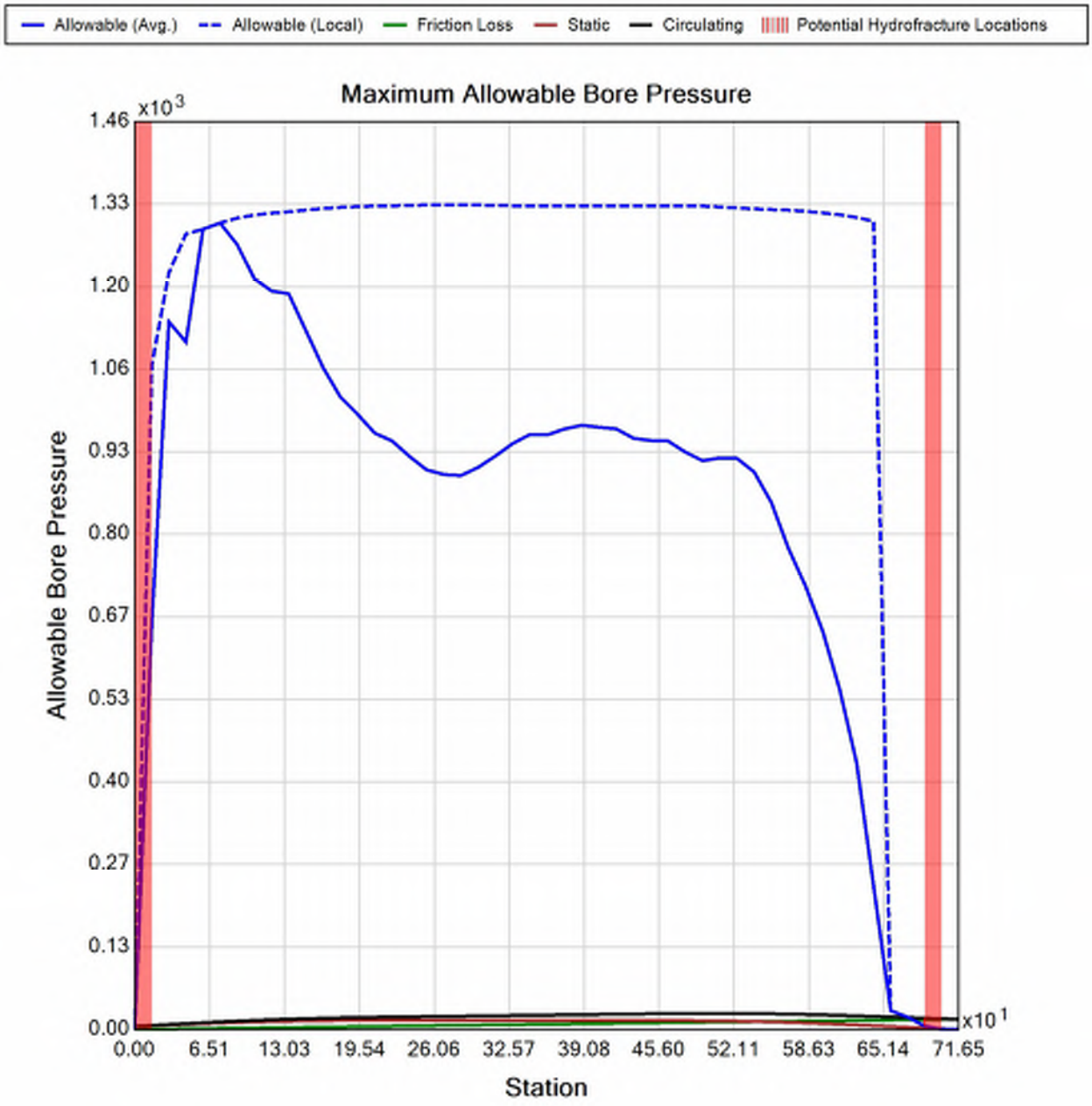












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Input Summary

Start Coordinate	(0.00, 0.00, 131.80) ft
End Coordinate	(705.20, 0.00, 140.75) ft
Project Length	705.20 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.4	23.7
Water Pressure	7.9	7.9
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	10.3	31.6
Deflection		
Earth Load Deflection	0.662	6.444
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.692	6.473
Compressive Stress [psi]		
Compressive Wall Stress	46.3	142.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	707.9	707.9
Pullback Stress [psi]	404.5	404.5
Pullback Strain	7.034E-3	7.034E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	404.5	407.4
Tensile Strain	7.034E-3	7.184E-3

Net External Pressure = 21.5 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.692	7.5	10.8	OK
Unconstrained Collapse [psi]	20.1	130.0	6.5	OK
Compressive Wall Stress [psi]	46.3	1150.0	24.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	30.1	233.3	7.8	OK
Tensile Stress [psi]	407.4	1200.0	2.9	OK

Generated Output

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Project Summary

General:	CHPE HDD 12 - Conduit 2
	P2
	Start Date: 06-21-2022
	End Date: 06-21-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 12 Conduit 2 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 131.07) ft
End Coordinate	(920.00, 0.00, 142.07) ft
Project Length	920.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	2.875 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

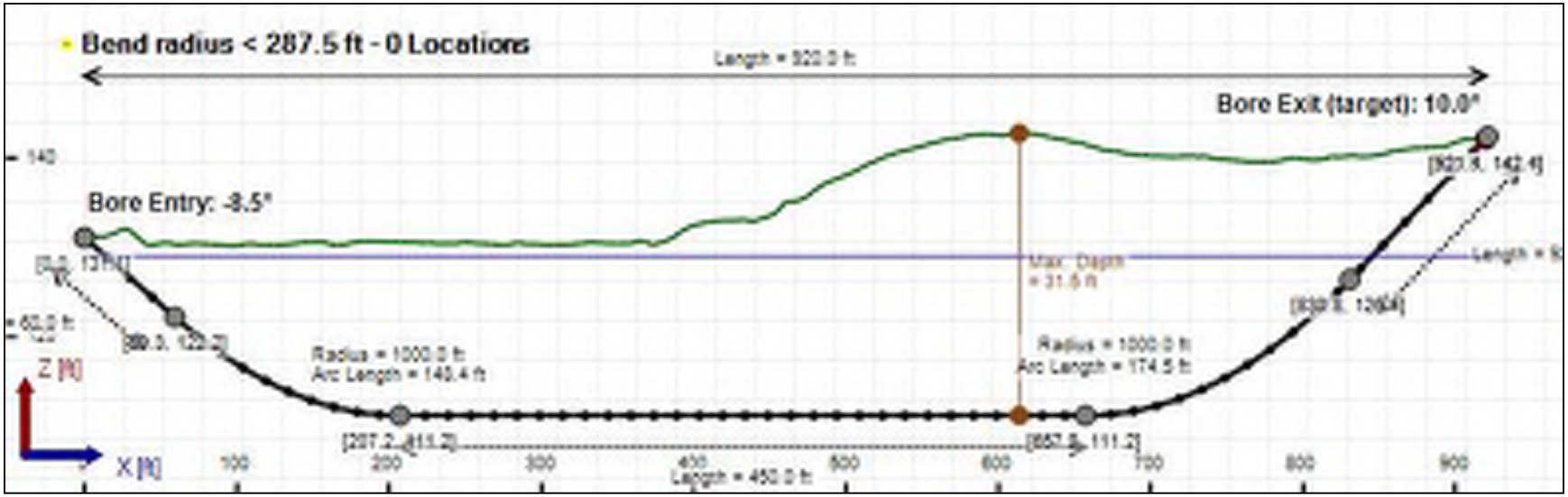
Soil Summary

Number of Layers: 2

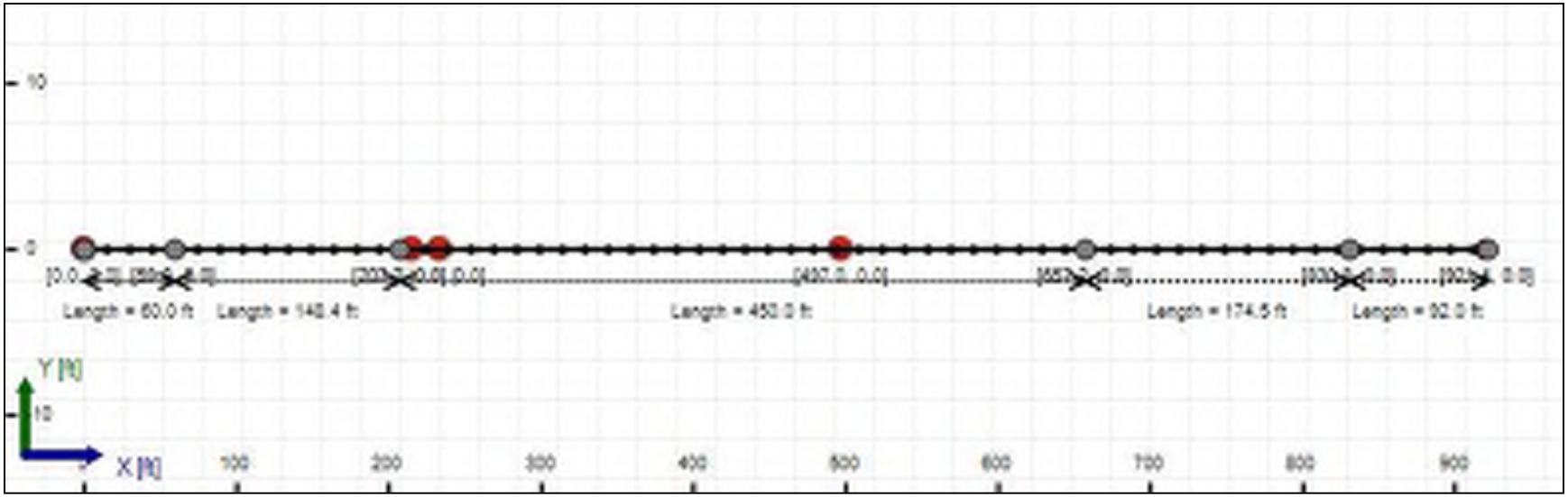
Soil Layer #1 USCS, Sand (S), SM
Depth: 1.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 Rock, Geological Classification, Sedimentary Rocks
Depth: 25.00 ft
Unit Weight: 107.8272 (dry), 177.6384 (sat) [lb/ft3]
Phi: 35.00, S.M.: 1450.40, Coh: 2900.80 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 930.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	5.8	24.3
Water Pressure	7.7	7.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.5	32.0
Deflection		
Earth Load Deflection	1.587	6.607
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.719	6.739
Compressive Stress [psi]		
Compressive Wall Stress	60.9	143.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	15479.9	15479.9
Pullback Stress [psi]	431.7	431.7
Pullback Strain	7.508E-3	7.508E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	431.7	453.5
Tensile Strain	7.508E-3	8.336E-3

Net External Pressure = 22.3 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.719	7.5	4.4	OK
Unconstrained Collapse [psi]	20.8	118.4	5.7	OK
Compressive Wall Stress [psi]	60.9	1150.0	18.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	30.8	229.6	7.5	OK
Tensile Stress [psi]	453.5	1200.0	2.6	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	3.00 in	1306.899 psi	1330.555 psi
1	3.00 in	12.00 in	1305.175 psi	1329.913 psi
2	12.00 in	16.13 in	1303.695 psi	1329.361 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

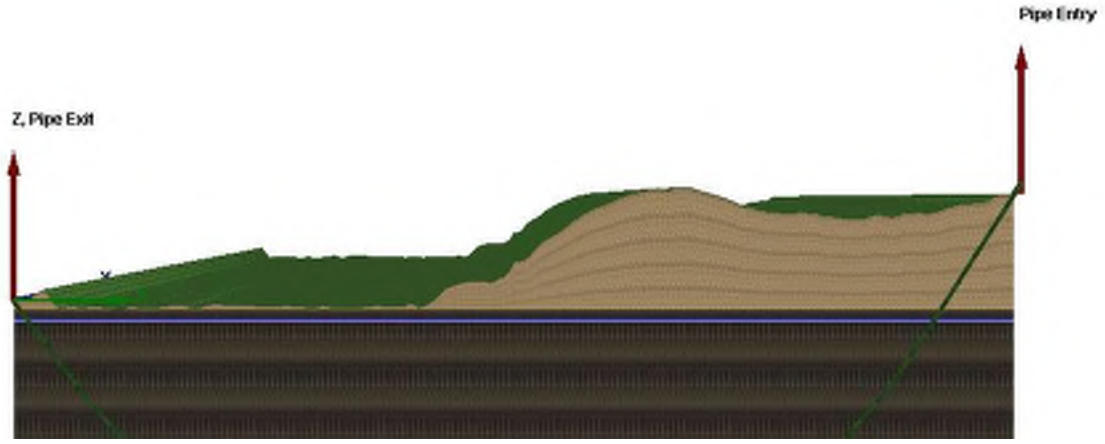
Rheological model: Bingham-Plastic

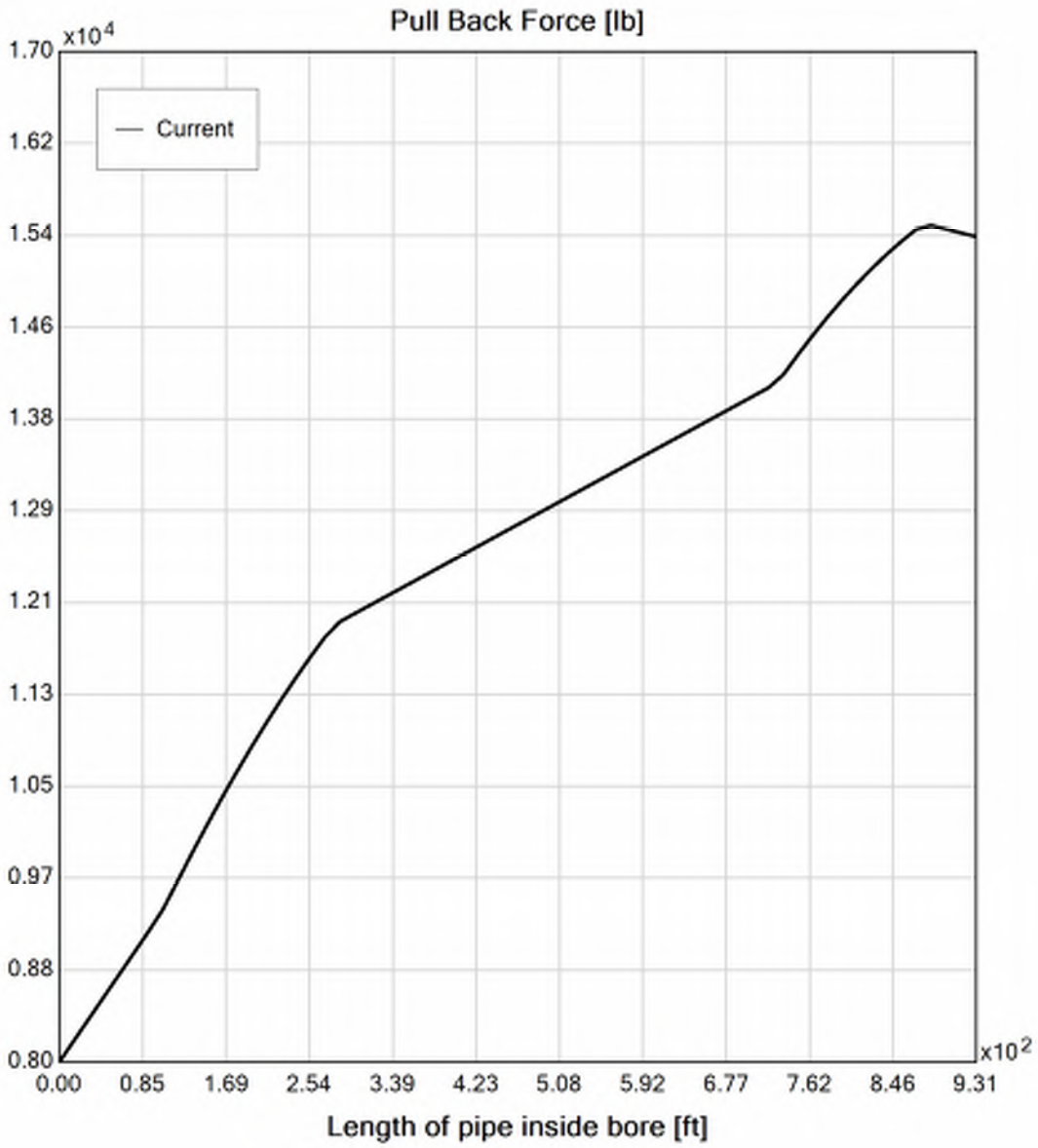
Plastic Viscosity (PV): 25.53

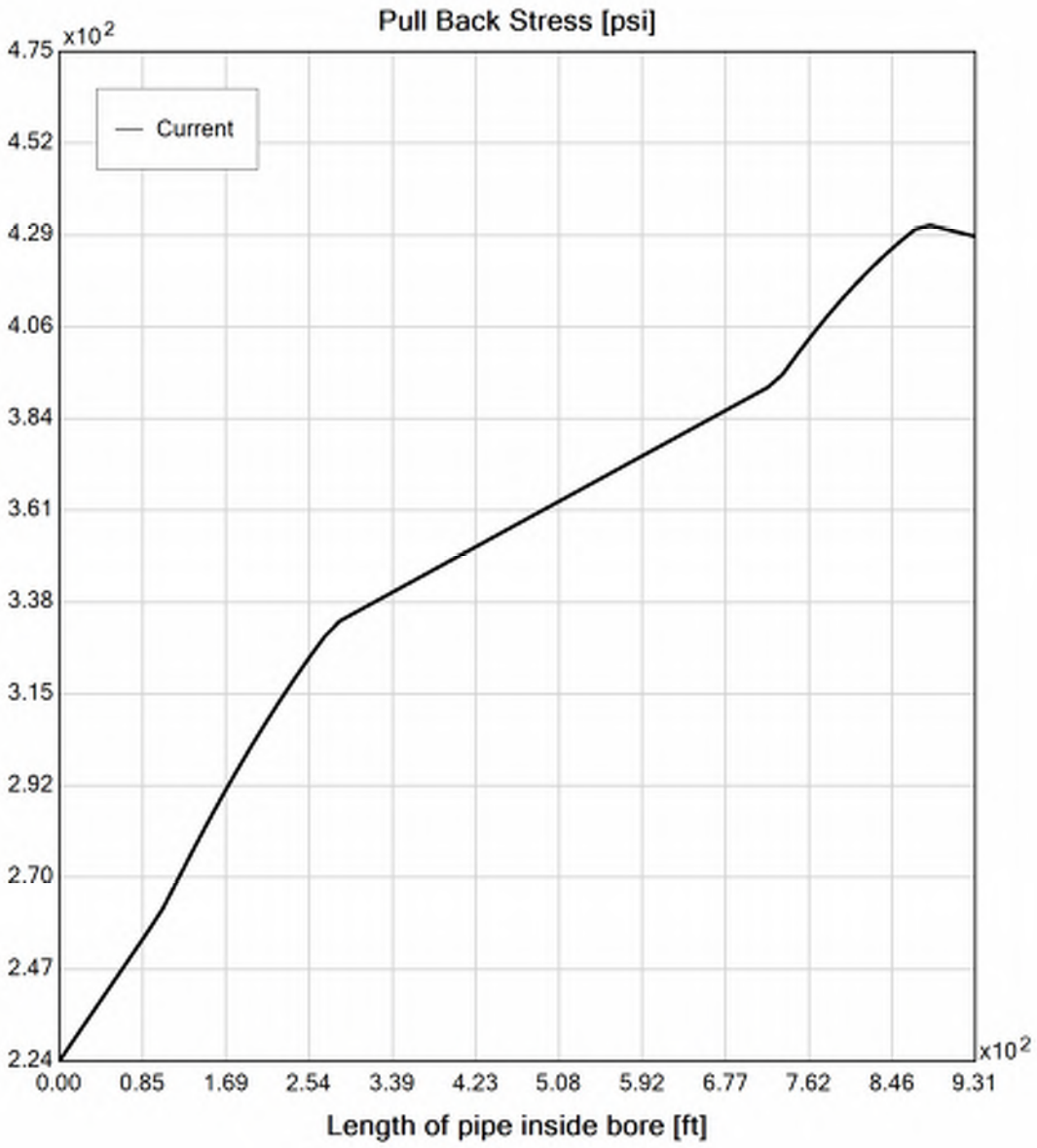
Yield Point (YP): 16.49

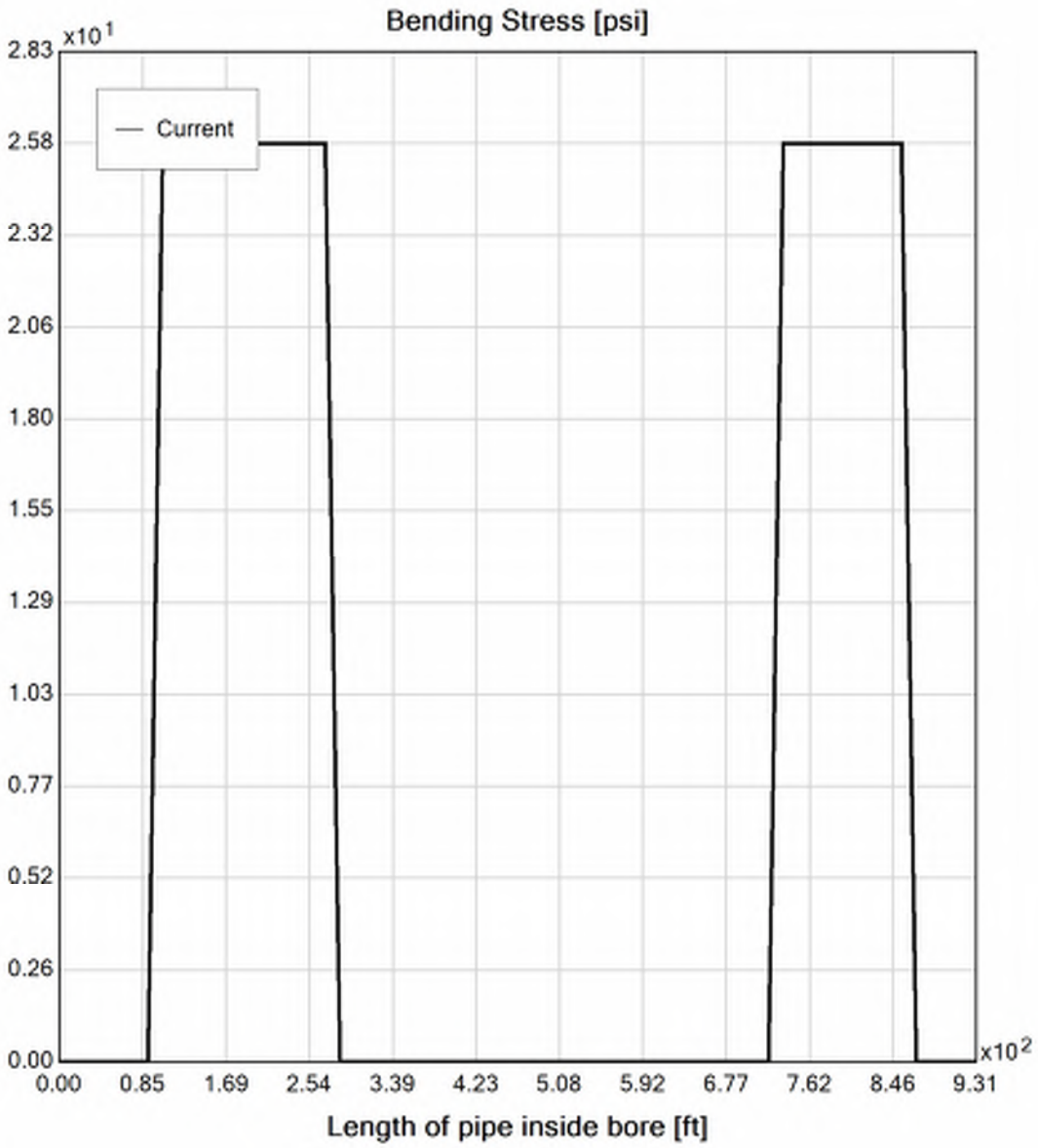
Effective Viscosity (cP): 26.0

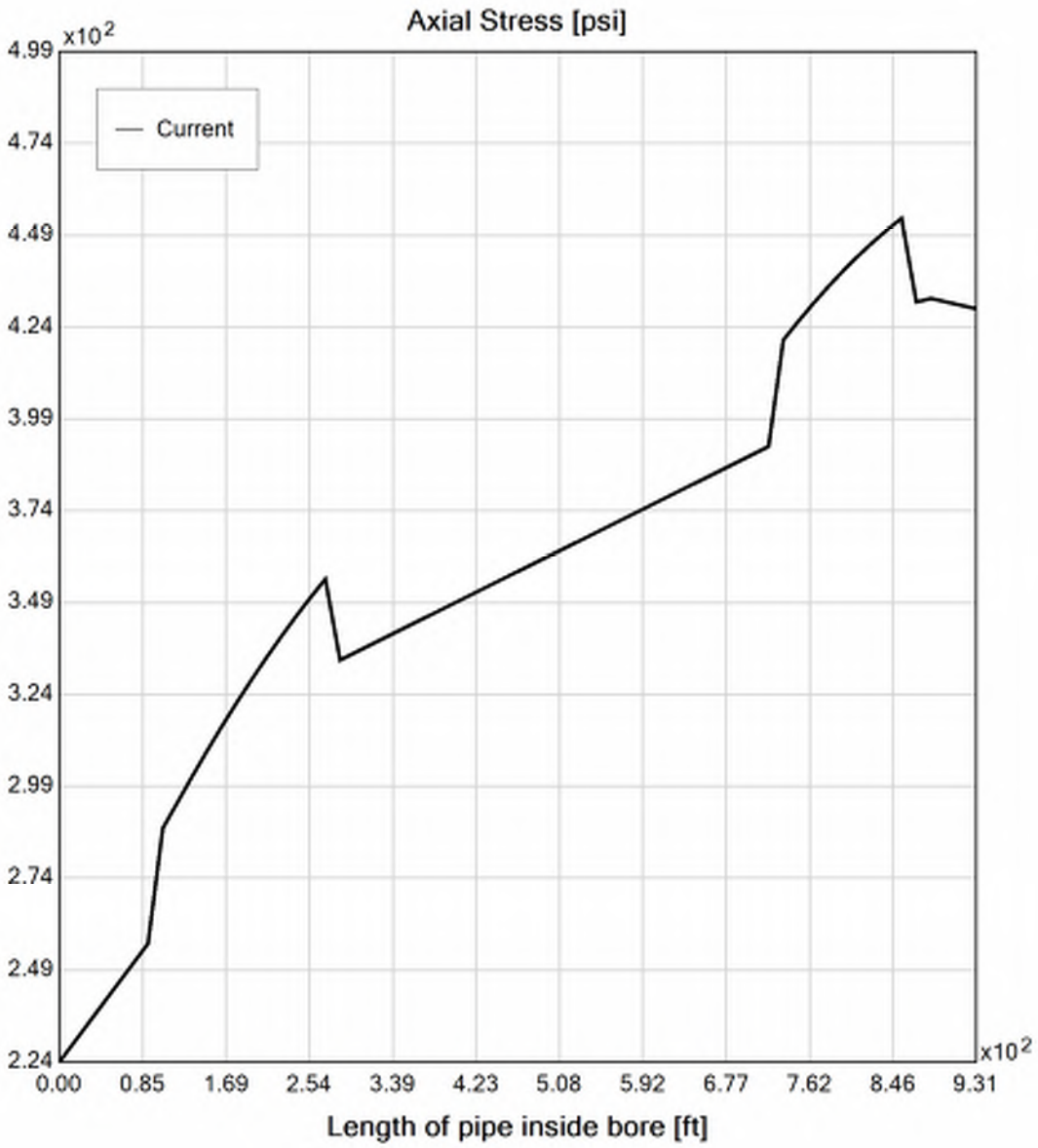
Virtual Site

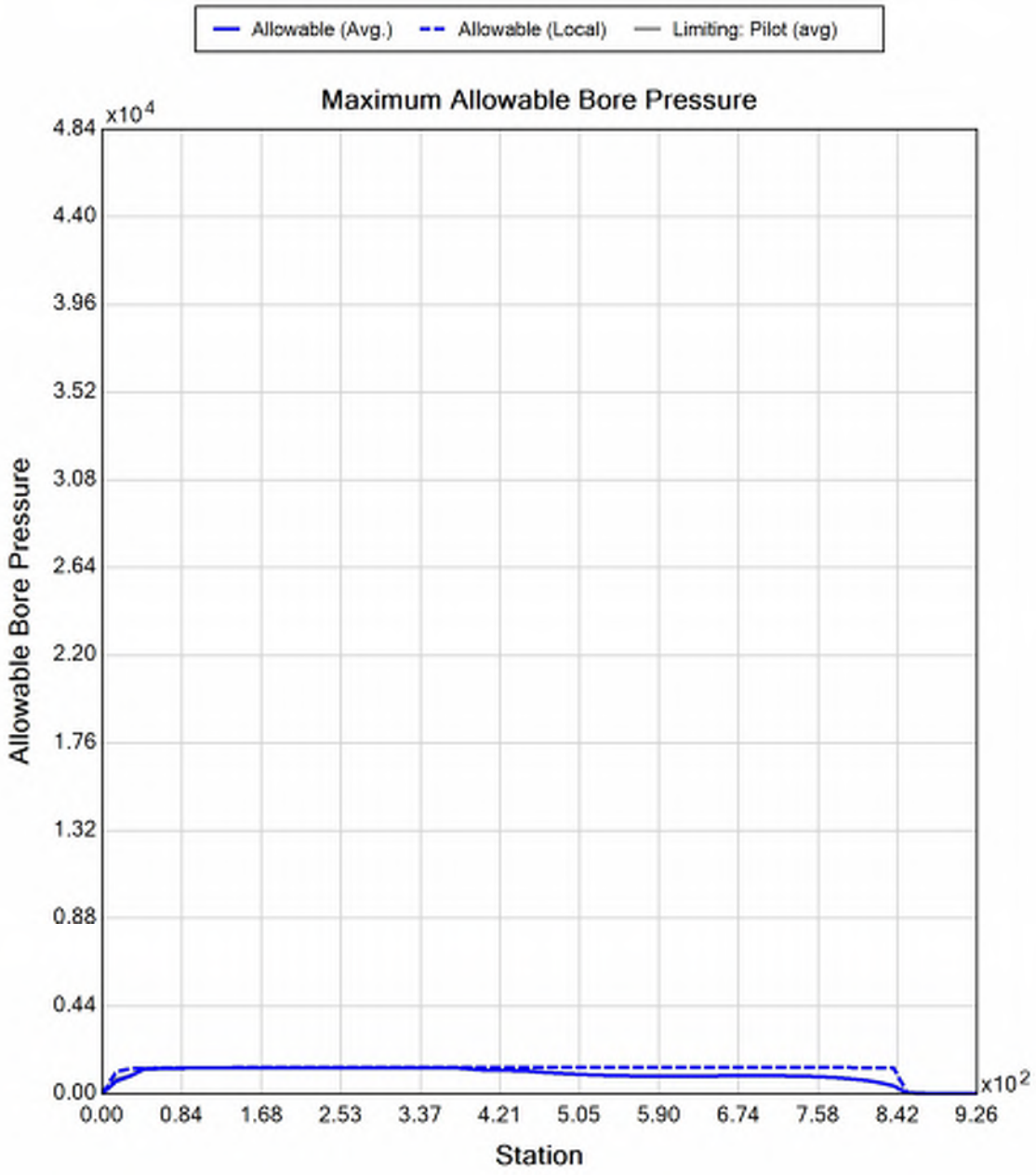


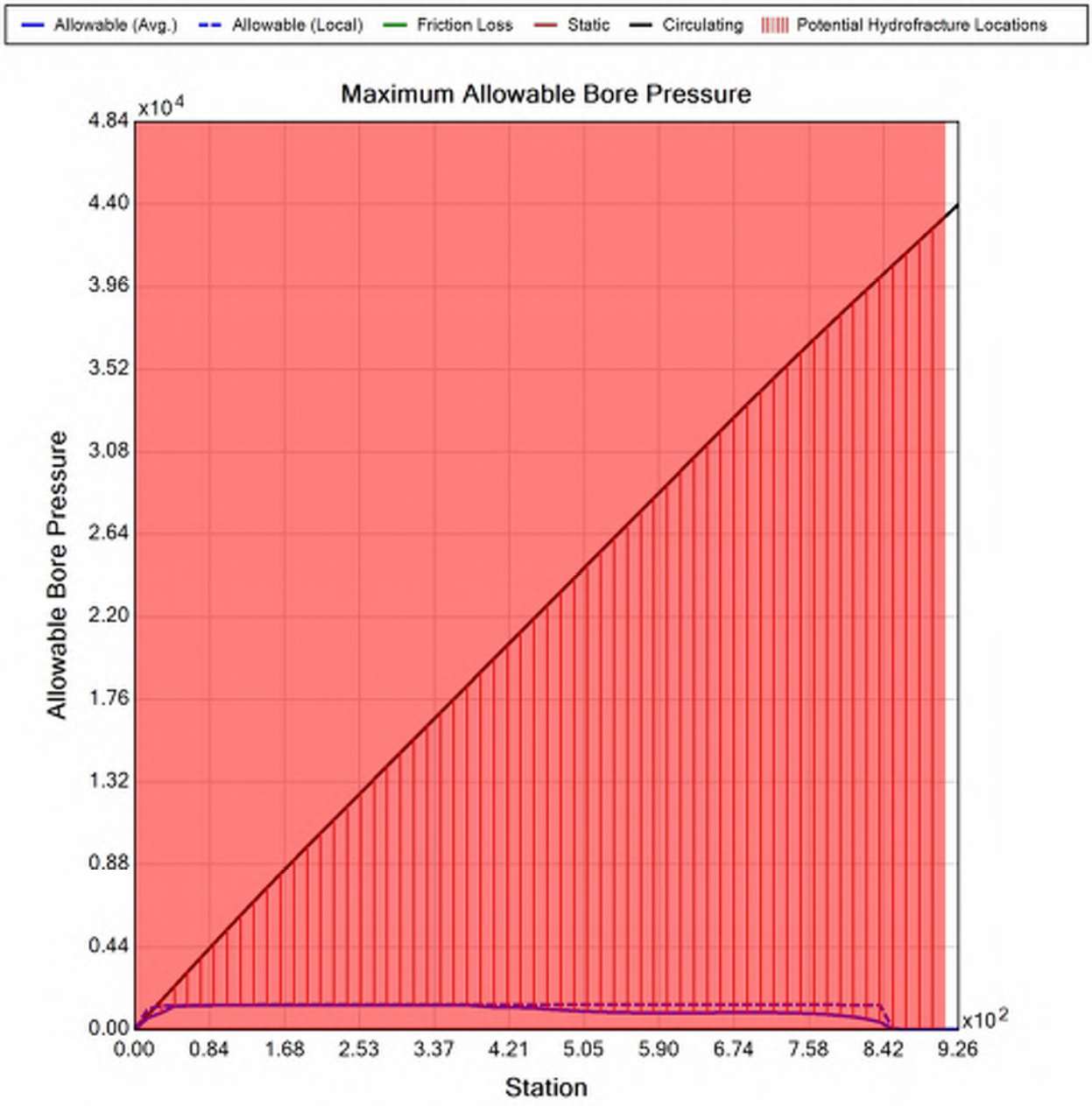












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Input Summary

Start Coordinate	(0.00, 0.00, 131.07) ft
End Coordinate	(920.00, 0.00, 142.07) ft
Project Length	920.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	2.875 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 930.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.5	24.3
Water Pressure	7.7	7.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	10.2	32.0
Deflection		
Earth Load Deflection	0.672	6.607
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.701	6.637
Compressive Stress [psi]		
Compressive Wall Stress	45.8	143.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	865.2	865.2
Pullback Stress [psi]	494.3	494.3
Pullback Strain	8.597E-3	8.597E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	494.3	496.1
Tensile Strain	8.597E-3	8.727E-3

Net External Pressure = 22.3 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.701	7.5	10.7	OK
Unconstrained Collapse [psi]	20.8	129.7	6.2	OK
Compressive Wall Stress [psi]	45.8	1150.0	25.1	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	30.8	227.8	7.4	OK
Tensile Stress [psi]	496.1	1200.0	2.4	OK

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Project Summary

General:	CHPE HDD 12A - Conduit 1
	P2
	Start Date: 06-21-2022
	End Date: 06-21-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	
Description:	HDD 12A Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 137.09) ft
End Coordinate	(1490.00, 0.00, 143.80) ft
Project Length	1490.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

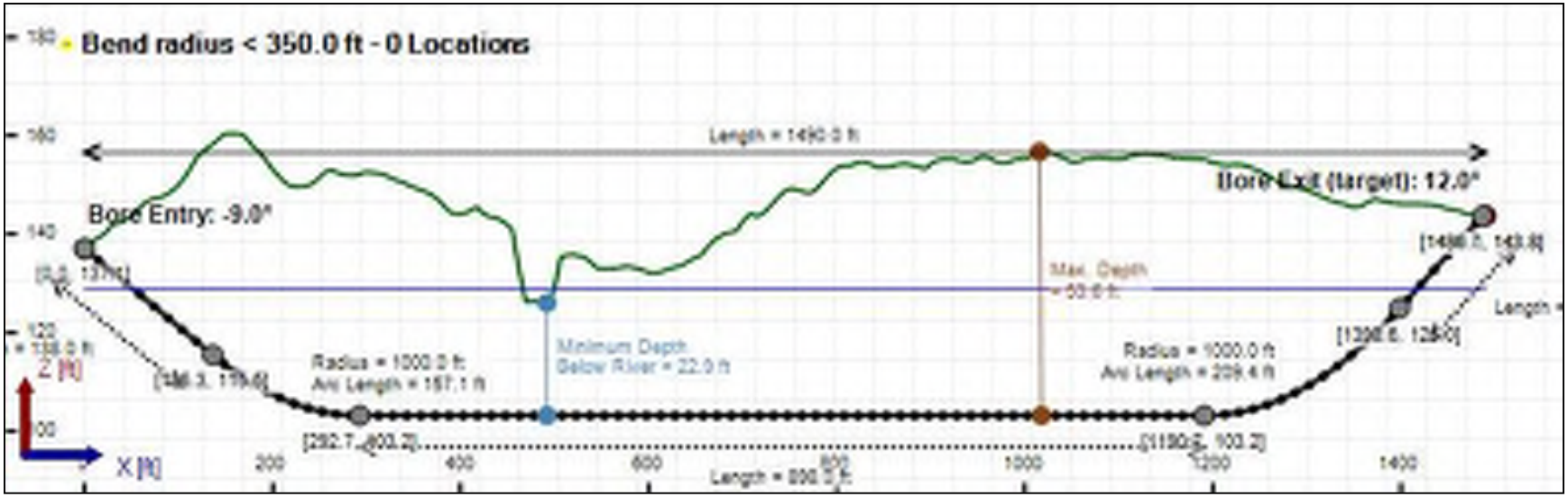
Number of Layers: 3

Soil Layer #1 USCS, Sand (S), SP
Depth: 4.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 1.39, Coh: 0.00 [psi]

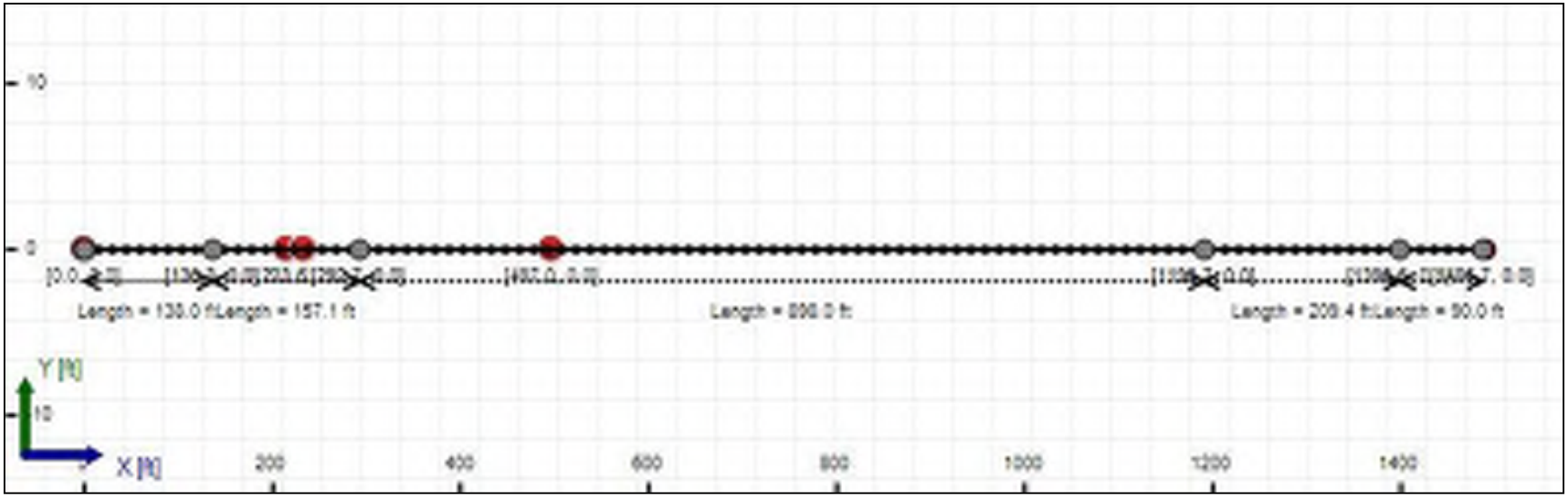
Soil Layer #2 Rock, Geological Classification, Sedimentary Rocks
Depth: 40.00 ft
Unit Weight: 120.0000 (dry), 140.0000 (sat) [lb/ft3]
Phi: 37.00, S.M.: 1000.00, Coh: 0.00 [psi]

Soil Layer #3 Rock, Geological Classification, Sedimentary Rocks
Depth: 20.00 ft
Unit Weight: 120.0000 (dry), 140.0000 (sat) [lb/ft3]
Phi: 37.00, S.M.: 1000.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 1500.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	5.0	34.7
Water Pressure	11.2	11.2
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	16.2	45.8
Deflection		
Earth Load Deflection	1.423	9.437
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.555	9.569
Compressive Stress [psi]		
Compressive Wall Stress	72.9	206.3

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	24484.2	24484.2
Pullback Stress [psi]	682.8	682.8
Pullback Strain	1.188E-2	1.188E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	682.8	703.1
Tensile Strain	1.188E-2	1.268E-2

Net External Pressure = 27.6 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.555	7.5	4.8	OK
Unconstrained Collapse [psi]	27.4	120.8	4.4	OK
Compressive Wall Stress [psi]	72.9	1150.0	15.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	37.4	213.4	5.7	OK
Tensile Stress [psi]	703.1	1200.0	1.7	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	190.926 psi	248.409 psi
1	8.00 in	12.00 in	190.725 psi	247.950 psi
2	12.00 in	16.13 in	190.436 psi	247.288 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

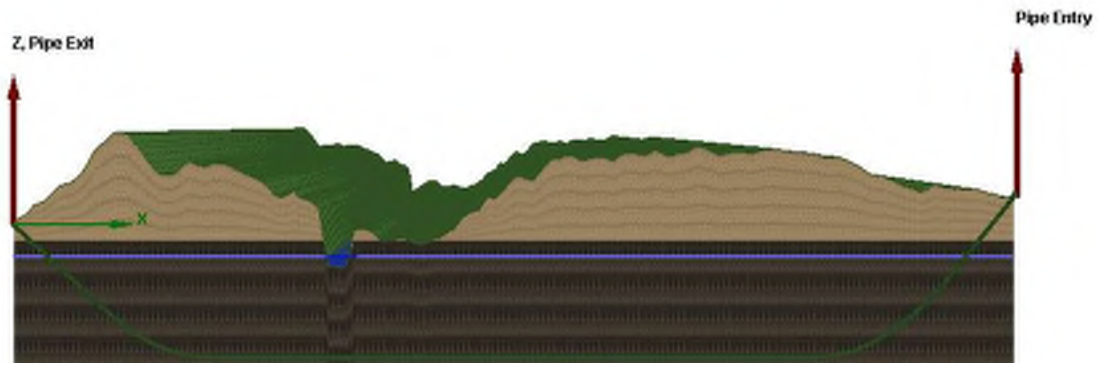
Rheological model: Bingham-Plastic

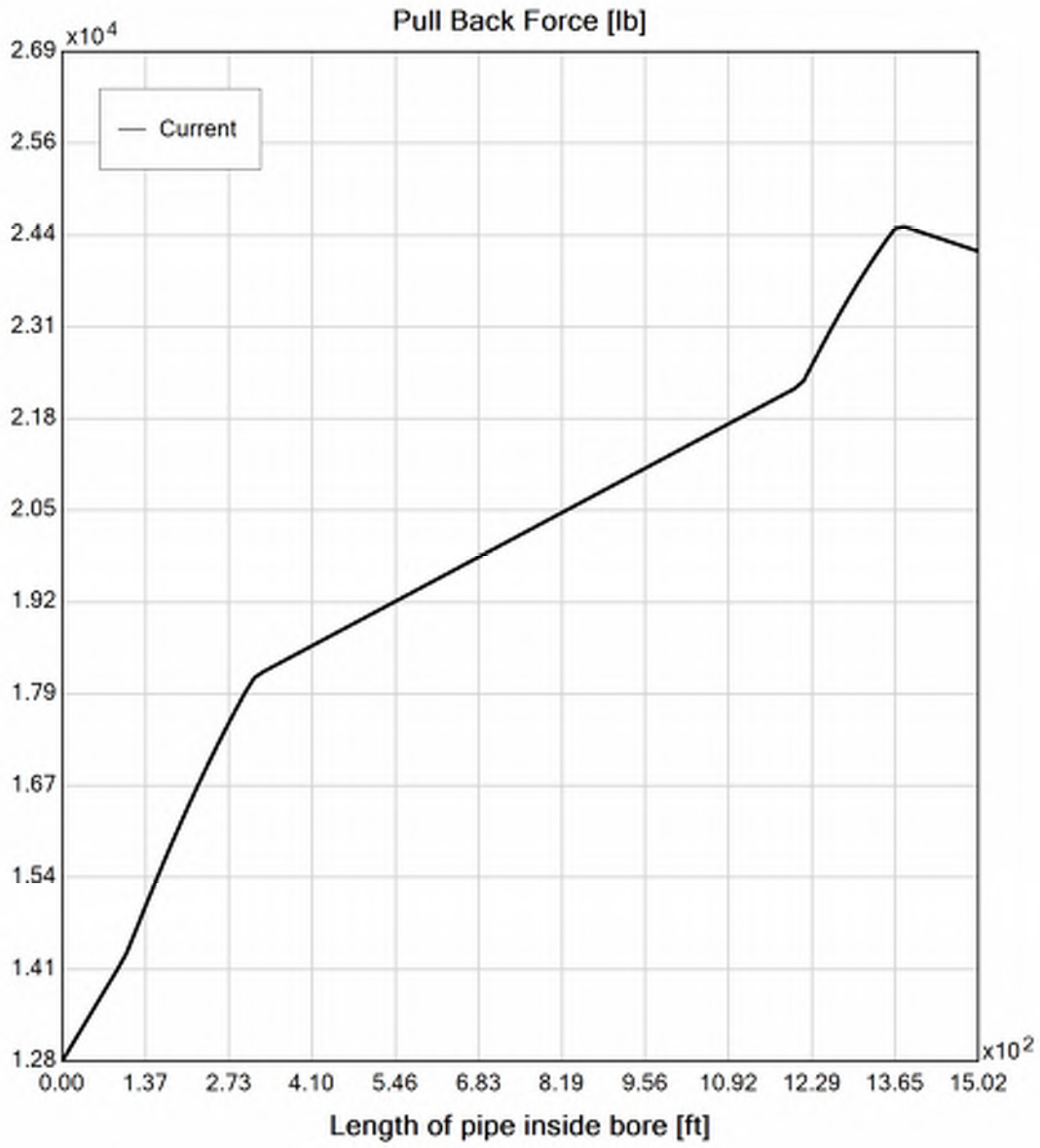
Plastic Viscosity (PV): 25.53

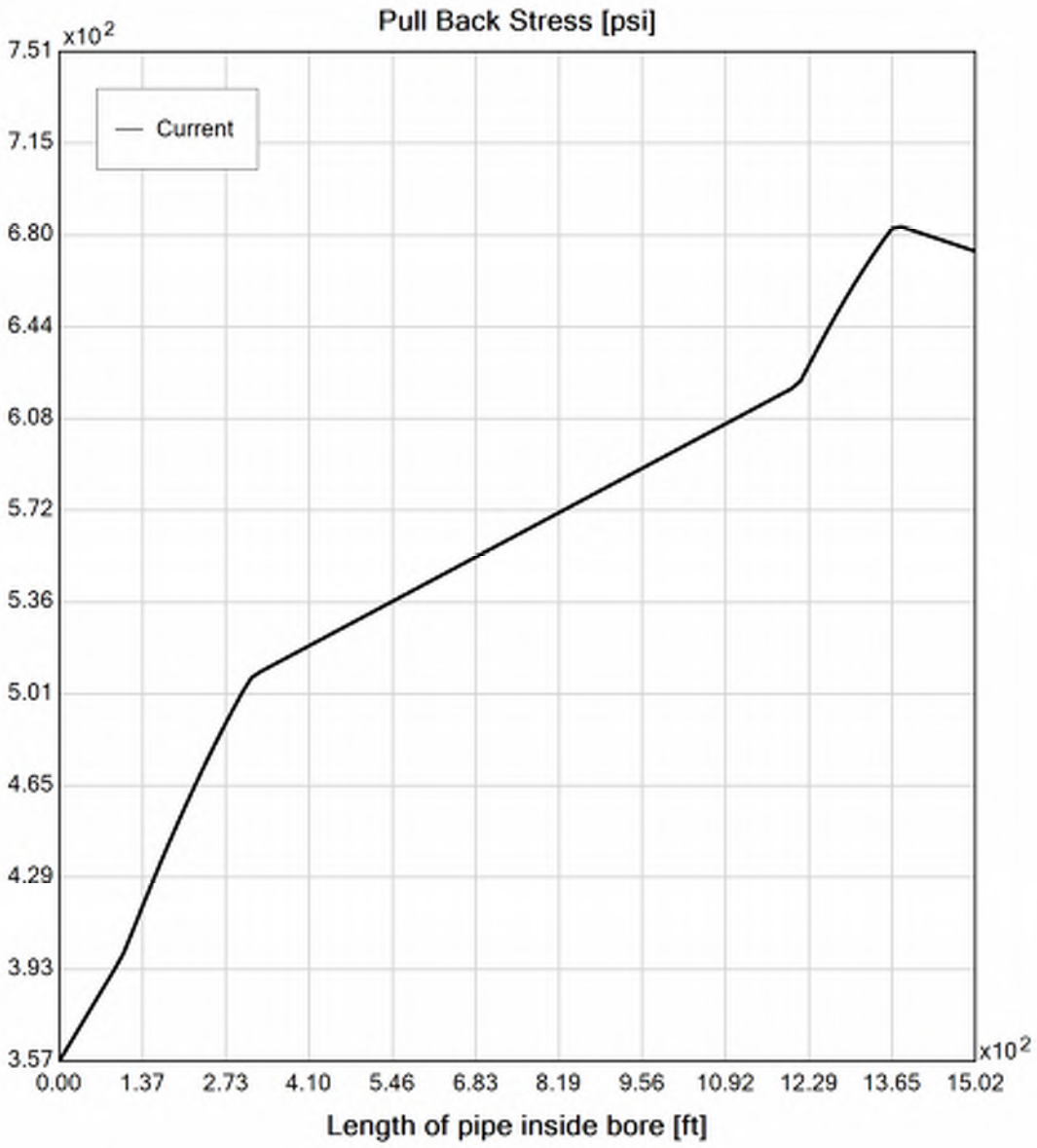
Yield Point (YP): 16.49

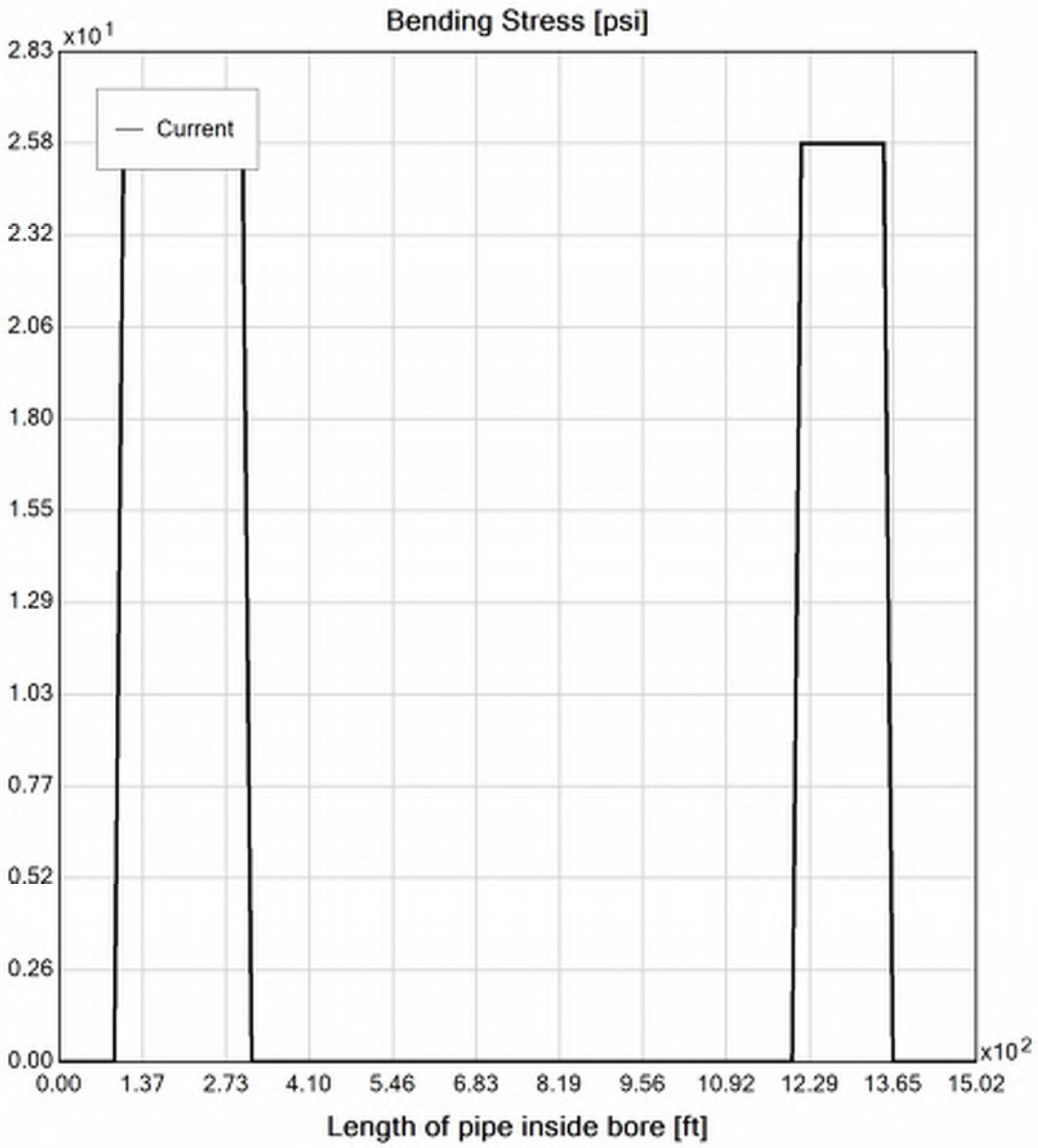
Effective Viscosity (cP): 1202.0

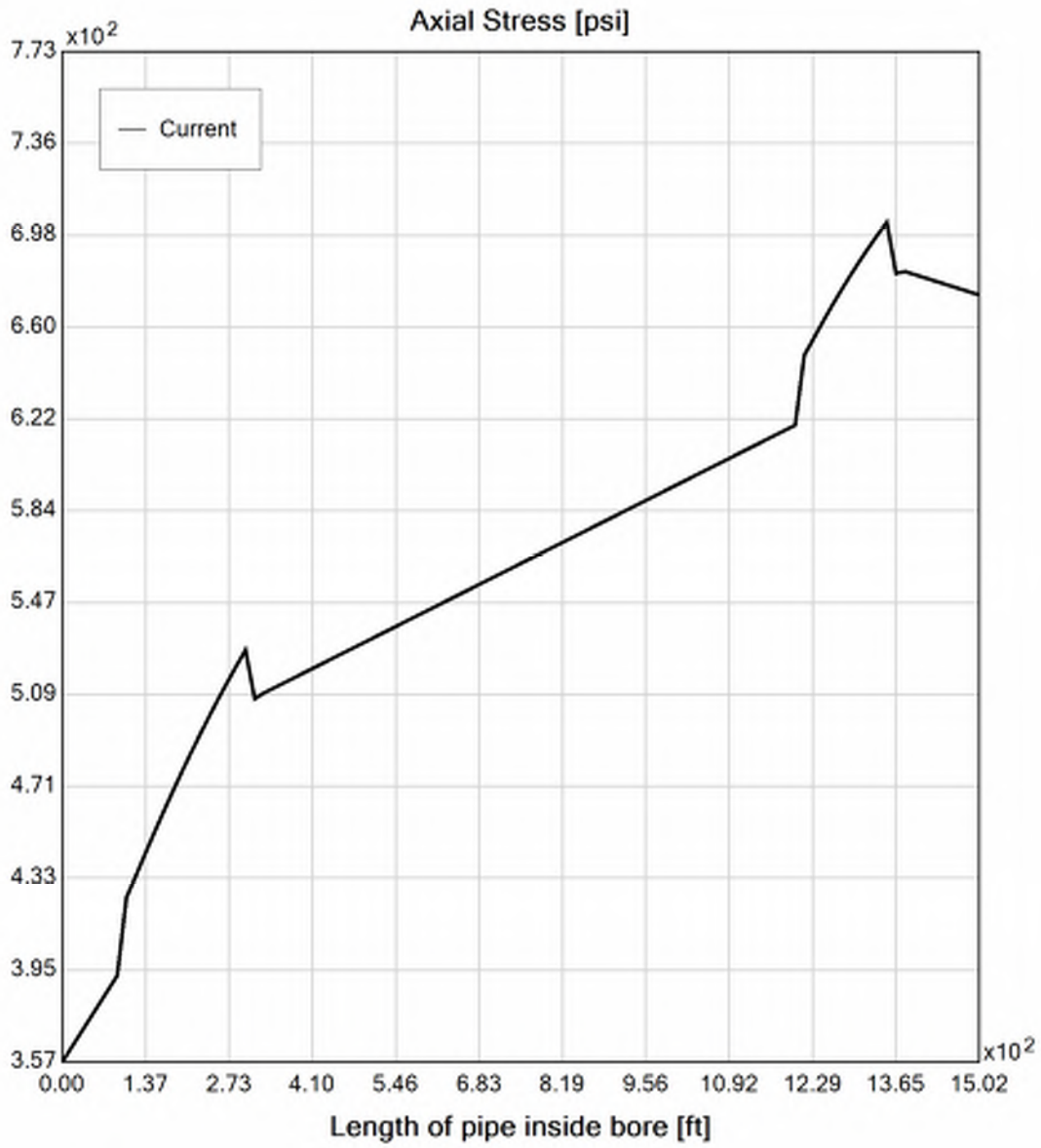
Virtual Site

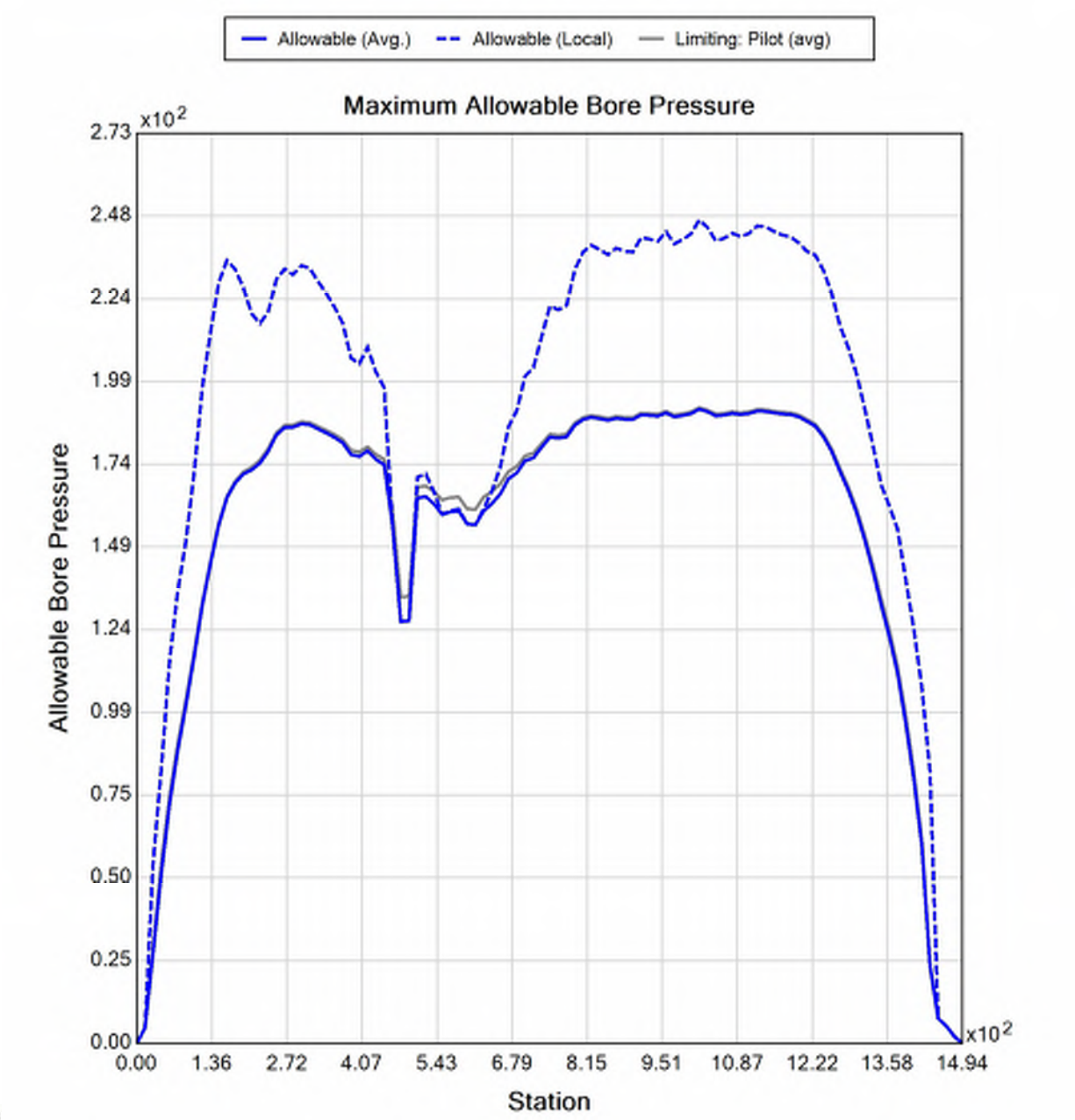


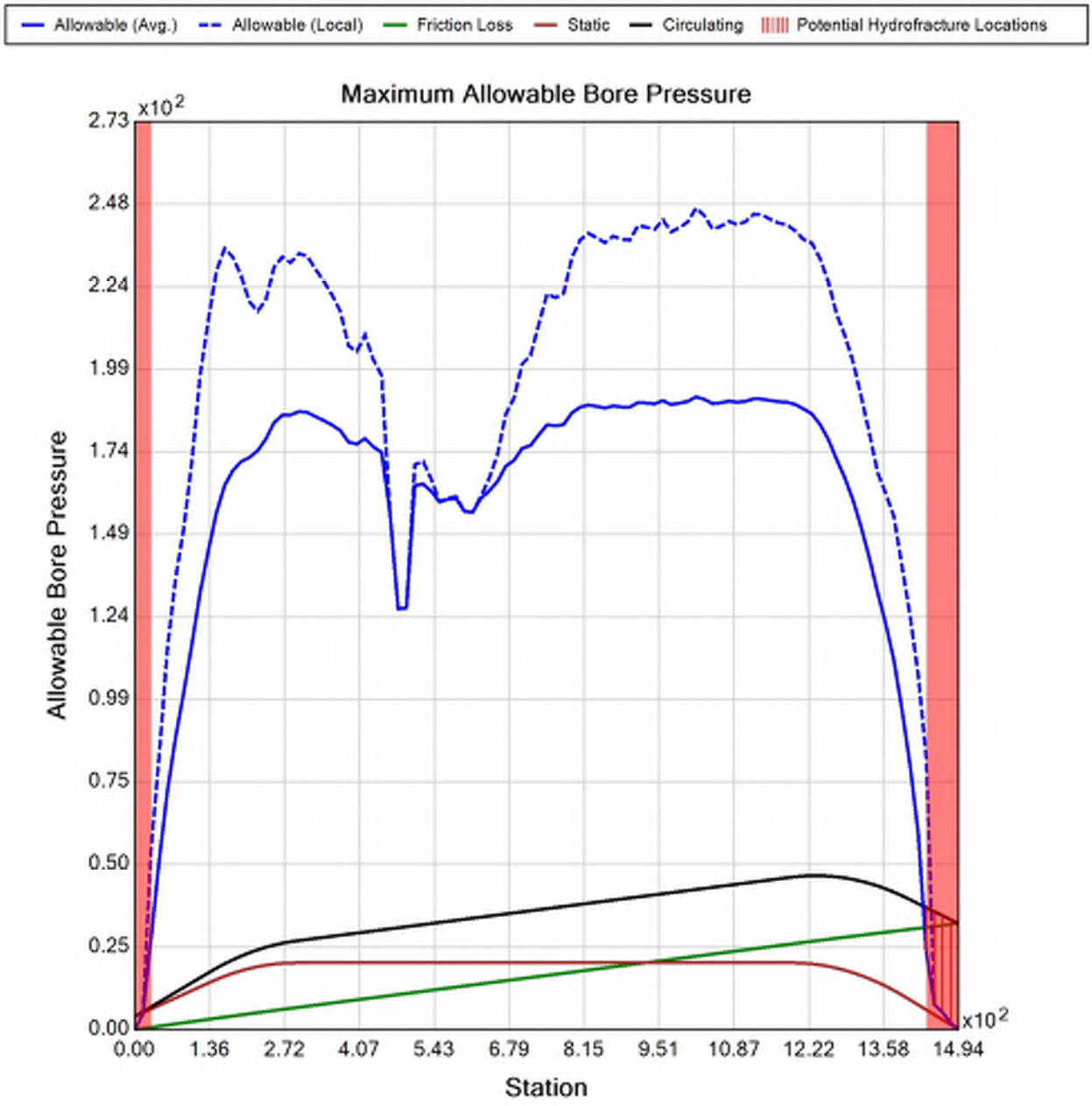












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Input Summary

Start Coordinate	(0.00, 0.00, 137.09) ft
End Coordinate	(1490.00, 0.00, 143.80) ft
Project Length	1490.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1500.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.0	34.7
Water Pressure	11.2	11.2
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.2	45.8
Deflection		
Earth Load Deflection	0.611	9.437
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.640	9.466
Compressive Stress [psi]		
Compressive Wall Stress	59.3	206.3

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1304.7	1304.7
Pullback Stress [psi]	745.4	745.4
Pullback Strain	1.296E-2	1.296E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	745.4	745.6
Tensile Strain	1.296E-2	1.307E-2

Net External Pressure = 27.6 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.640	7.5	11.7	OK
Unconstrained Collapse [psi]	27.4	131.2	4.8	OK
Compressive Wall Stress [psi]	59.3	1150.0	19.4	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	37.4	211.2	5.7	OK
Tensile Stress [psi]	745.6	1200.0	1.6	OK