Package 4B Phase 4 Borings Rev 1
Champlain Hudson Power Express
New York

Kiewit

PROJECT NUMBER 20001480

CREATED BY Kiewit
DATE 03/31/2023

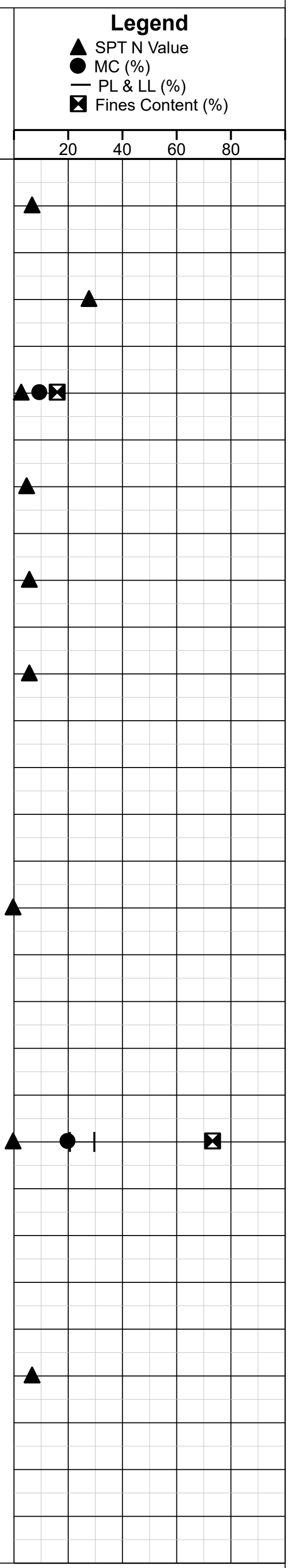
Legend Key
- Kiewit Borings

EXPLORATORY BORING LOG
Champlain Hudson Power Express
New York

BORING NO: KB-169.0-2.4

PROJECT NUMBER	20001480	**LOGGED BY**	S. Crowley	**COORDINATES**	N 1460599.31 E 642825.02
START DATE	11/28/2022	**DRILLER/RIG**	Eric / Geoprobe 7822DT	**GROUND ELEV.**	286.9 ft
FINISH DATE	11/29/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0			Silty SAND (SM), brown, very loose to medium dense, fine to coarse grained, few sub-angular to angular fine gravel			50%		4-3-4-5 (7)	
						34%		3-25-3-3 (28)	
5						50%		1-2-1-1 (3)	
						46%		2-3-2-2 (5)	
						62%		1-3-3-3 (6)	
10						62%		3-3-3-2 (6)	
15	271.9		Sandy SILT (ML), brown, very soft to firm, moist, fine to coarse sand, few fine gravel			46%		1-0-0-0 (0)	
20						100%		1-0-0-0 (0)	
25						100%		4-3-4-5 (7)	
30									



EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-169.0-2.4

PROJECT NUMBER	20001480	**LOGGED BY**	S. Crowley	**COORDINATES**	N 1460599.31 E 642825.02
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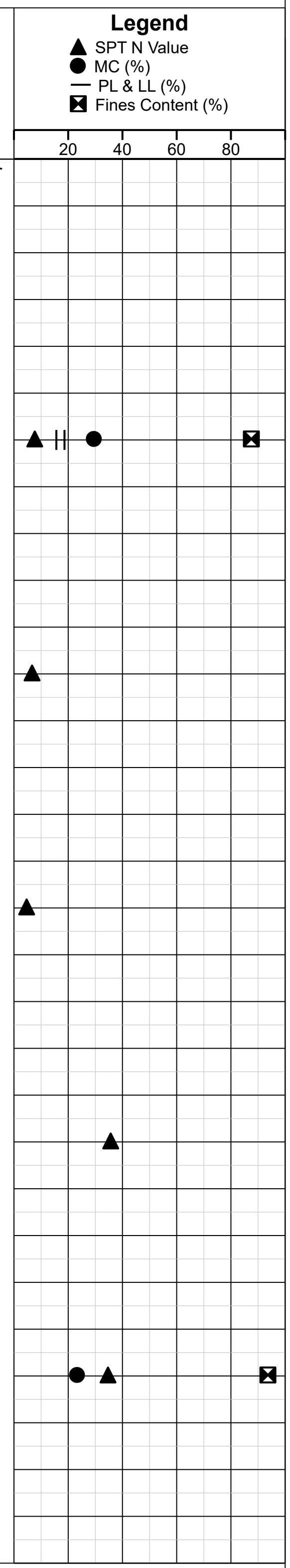
FINISH DATE	11/29/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
30	256.9		Sandy SILT (ML), brown, firm to hard, moist, fine to coarse sand, few fine gravel					4-5-5-7	3-inch ring sampler
35						79%		5-4-4-8 (8)	
40						100%		2-2-5-8 (7)	
45						79%		1-2-3-7 (5)	
50						71%		6-22-14-15 (36)	
55						100%		8-13-22-17 (35)	
57	229.9		Boring Terminated at 57ft						
60									



EXPLORATORY BORING LOG

Kiewit

Champlain Hudson Power Express

New York

BORING NO: KB-169.0-2.5

PROJECT NUMBER	20001480	**LOGGED BY**	J. Techel	**COORDINATES**	N 1460427.31 E 642489.69
START DATE	12/14/2022	**DRILLER/RIG**	Eric / Geoprobe 7822DT	**GROUND ELEV.**	286.4 ft
FINISH DATE	12/15/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

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

Depth (ft)	Elevation (ft)	Material Description	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
0		FILL: Silty SAND (SM), dark brown, very loose, medium grained, few gravel	1	25%		0-1-2-4 (3)	
2	284.4	Silty SAND (SM), brown, very loose to loose, moist, fine to coarse grained, few fine gravel	2	12%		3-3-1-2 (4)	
5			3	42%		2-3-4-3 (7)	
		yellow brown to dark brown	4	79%		3-2-3-1 (5)	
			5	42%		0-0-0-1 (0)	
10	276.4	SAND with Silt (SP-SM), brown, very loose, wet, fine to medium grained	6	100%		1-0-1-2 (1)	
15		w/ gravel, grayish brown	7	25%		2-1-2-1 (3)	
20	266.4	Silty SAND (SM), gray to dark gray, medium dense, fine-grained	8	58%		7-7-6-8 (13)	
25	261.4	Silty CLAY (CL-ML), gray to dark gray, stiff to firm	9	92%		2-5-10-8 (15)	
30							

EXPLORATORY BORING LOG

Champlain Hudson Power Express

New York

BORING NO: KB-169.0-2.5

PROJECT NUMBER	20001480	**LOGGED BY**	J. Techel	**COORDINATES**	N 1460427.31 E 642489.69
START DATE	12/14/2022	**DRILLER/RIG**	Eric / Geoprobe 7822DT	**GROUND ELEV.**	286.4 ft
FINISH DATE	12/15/2022	**DRILL CONTRACTOR**	ADT Inc.	**HAMMER TYPE/EFF.**	Automatic

Depth (ft)	Elevation (ft)	Graphic Log	Material Description	Sample Type	Core Run No.	Recovery % RQD	Pocket Pen. (tsf)	Blow Counts (N Value)	Notes
			Silty CLAY (CL-ML), gray to dark gray, stiff to firm		10	100%		1-1-4-7 (5)	
35	251.4		SILT (ML), dark gray, loose to medium dense, non-plastic, trace fine sand		1			11-13-15-17	3-inch ring sampler
40					11	100%		2-3-5-12 (8)	
45					12	92%		6-11-11-11 (22)	
	239.4		Boring Terminated at 47ft						
50									
55									
60									

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

20 40 60 80

Summary of Laboratory Results

BORING ID	Depth (Ft.)	Water Content (%)
KB-169.0-1.0	4-6	18.6
KB-169.0-1.0	10-12	22.8
KB-169.0-1.0	20-22	29.0
KB-169.0-1.0	35-37	26.2
KB-169.0-1.0	50-52	25.1
KB-169.0-2.4	4-6	9.7
KB-169.0-2.4	20-22	20.1
KB-169.0-2.4	35-37	29.8
KB-169.0-2.4	55-57	23.6
KB-169.0-2.5	4-6	18.0
KB-169.0-2.5	10-12	18.5
KB-169.0-2.5	30-32	28.0
KB-169.0-2.5	40-42	24.7
KB-169.0-3.6	4-6	13.0
KB-169.0-3.6	10-12	3.4
KB-169.0-3.6	25-27	13.3
KB-169.0-3.6	40-42	9.3
KB-169.0-3.6	50-52	2.5
KB-169.0-3.7	4-6	11.7
KB-169.0-3.7	20-22	23.0
KB-169.0-3.7	40-42	4.4
KB-169.0-3.7	60-62	8.6
KB-169.0-7.9	4-6	18.1
KB-221.0B	4-6	11.0
KB-221.0B	10-12	40.8
KB-221.0B	30-32	37.4
KB-221.0B	50-52	29.6
KB-221.8B	4-6	32.1
KB-221.8B	20-22	44.4
KB-221.8B	35-37	46.6
KB-221.8B	55-57	39.2
KB-222.8	6-8	33.6
KB-222.8	20-22	43.2
KB-222.8	45-47	39.4
KB-222.8	65-67	45.0

PROJECT: Lab Testing

SITE: Champlain to Hudsdon Power Express

Terracon
30 Corporate Cir Ste 201
Albany, NY

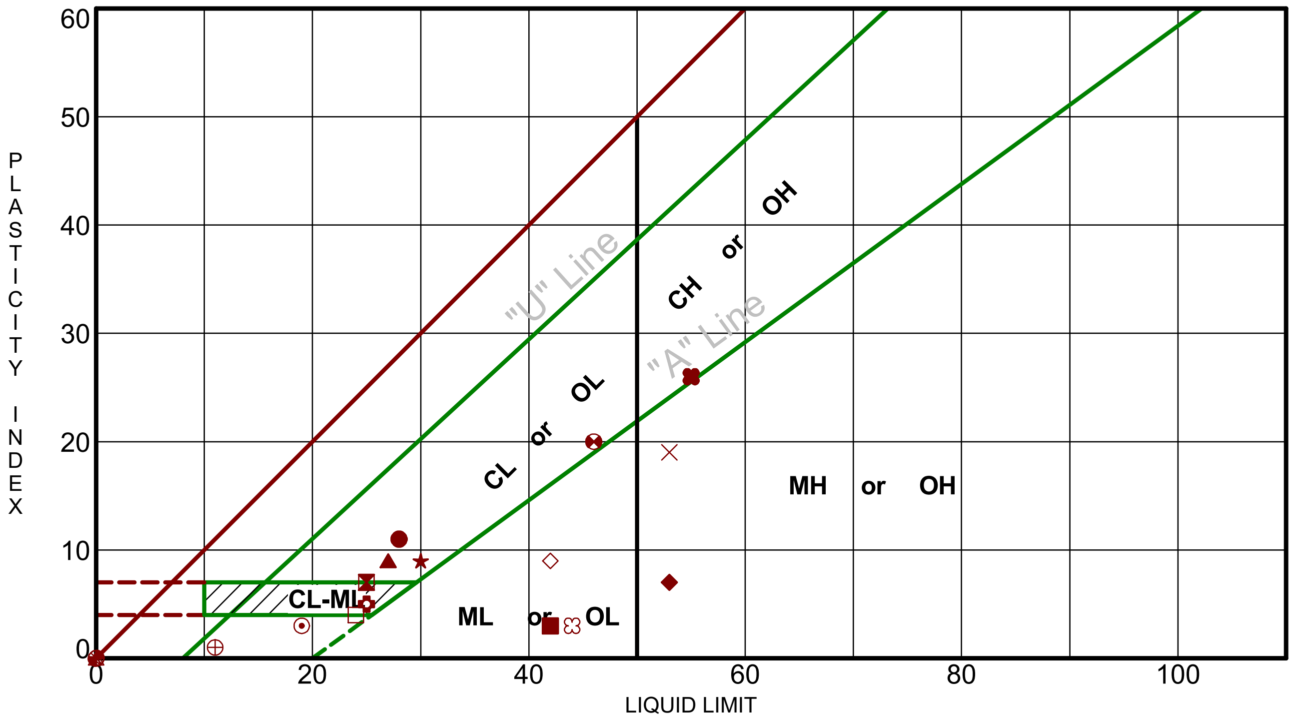
PROJECT NUMBER: JB215256H

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

EXHIBIT: B-1

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	KB-169.0-1.0	20 - 22	28	17	11	93.4	CL	LEAN CLAY
⧗	KB-169.0-1.0	35 - 37	25	18	7	97.1	CL-ML	SILTY CLAY
▲	KB-169.0-1.0	50 - 52	27	18	9	99.4	CL	LEAN CLAY
★	KB-169.0-2.4	20 - 22	30	21	9	73.6	ML	SANDY SILT
⊙	KB-169.0-2.4	35 - 37	19	16	3	87.9	ML	SILT
✿	KB-169.0-2.5	30 - 32	25	20	5	92.5	CL-ML	SILTY CLAY
○	KB-169.0-2.5	40 - 42	NP	NP	NP	95.7	ML	SILT
△	KB-169.0-3.6	4 - 6	NP	NP	NP	8.8	GP-GM	POORLY GRADED GRAVEL with SILT and SAND
⊗	KB-169.0-3.6	50 - 52	NP	NP	NP	43.6	SM	SILTY SAND
⊕	KB-169.0-3.7	60 - 62	11	10	1	39.1	SM	SILTY SAND
□	KB-221.0B	4 - 6	24	20	4	16.9	SC-SM	SILTY, CLAYEY SAND with GRAVEL
⊗	KB-221.0B	10 - 12	46	26	20	96.3	CL	LEAN CLAY
◕	KB-221.0B	30 - 32	NP	NP	NP	96.0	ML	SILT
☆	KB-221.0B	50 - 52	NP	NP	NP	99.4	ML	SILT
⁘	KB-221.8B	4 - 6	44	41	3	72.3	ML	SILT with GRAVEL
■	KB-221.8B	20 - 22	42	39	3	98.3	ML	SILT
◆	KB-221.8B	35 - 37	53	46	7	95.5	MH	ELASTIC SILT
◇	KB-221.8B	55 - 57	42	33	9	99.6	ML	SILT
×	KB-222.8	6 - 8	53	34	19	97.5	MH	ELASTIC SILT
✖	KB-222.8	20 - 22	55	29	26	92.8	CH	FAT CLAY

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Terracon
30 Corporate Cir Ste 201
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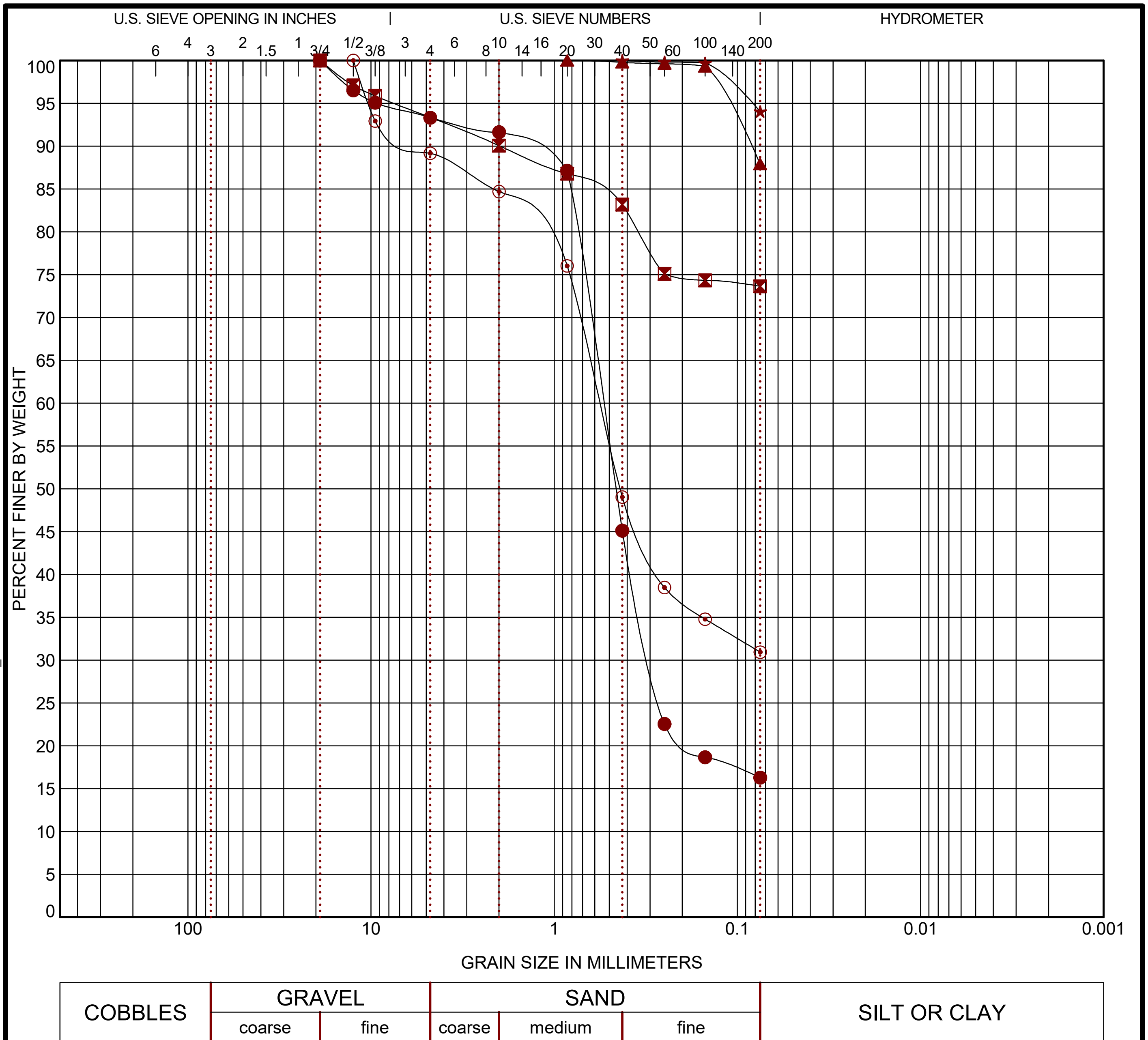
PROJECT NUMBER: JB215256H

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

EXHIBIT: B-1

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-169.0-2.4	4 - 6	SILTY SAND (SM)	9.7					
⊠	KB-169.0-2.4	20 - 22	SANDY SILT (ML)	20.1	30	21	9		
▲	KB-169.0-2.4	35 - 37	SILT (ML)	29.8	19	16	3		
★	KB-169.0-2.4	55 - 57	SILT (ML)	23.6					
⊙	KB-169.0-2.5	4 - 6	SILTY SAND (SM)	18.0					

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-169.0-2.4	4 - 6	19	0.543	0.298		0.0	6.7	77.0		16.3	
⊠	KB-169.0-2.4	20 - 22	19				0.0	6.7	19.6		73.6	
▲	KB-169.0-2.4	35 - 37	0.85				0.0	0.0	12.1		87.9	
★	KB-169.0-2.4	55 - 57	0.425				0.0	0.0	6.0		94.0	
⊙	KB-169.0-2.5	4 - 6	12.5	0.563			0.0	10.8	58.2		30.9	

PROJECT: Lab Testing

SITE: Champlain to Hudsdon Power Express

Terracon
30 Corporate Cir Ste 201
Albany, NY

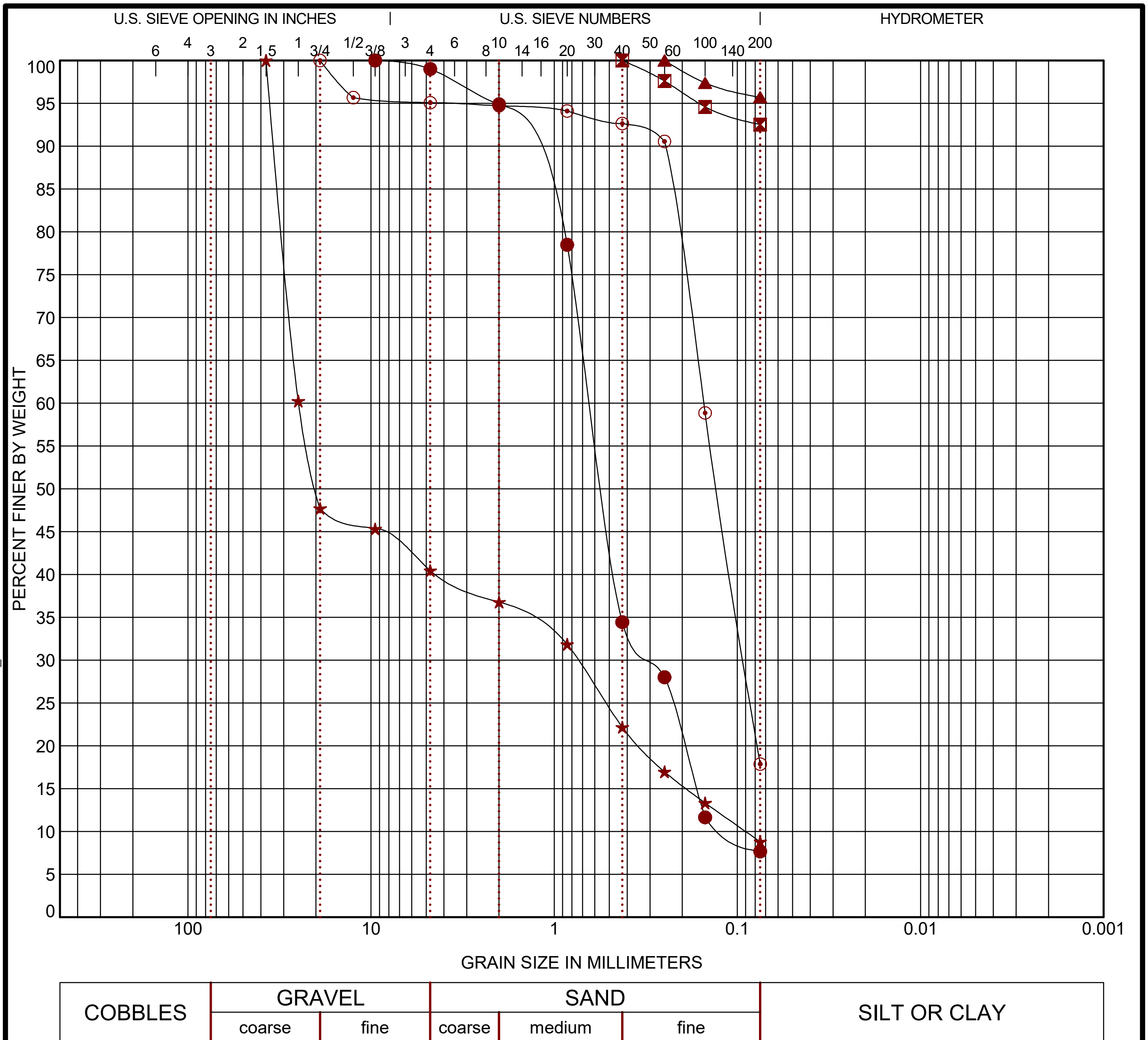
PROJECT NUMBER: JB215256H

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

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	KB-169.0-2.5	10 - 12	POORLY GRADED SAND with SILT (SP-SM)	18.5				1.21	5.65
⊠	KB-169.0-2.5	30 - 32	SILTY CLAY (CL-ML)	28.0	25	20	5		
▲	KB-169.0-2.5	40 - 42	SILT (ML)	24.7	NP	NP	NP		
★	KB-169.0-3.6	4 - 6	POORLY GRADED GRAVEL with SILT and SAND (GP-GM)	13.0	NP	NP	NP	0.25	276.06
⊙	KB-169.0-3.6	10 - 12	SILTY SAND (SM)	3.4					

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	KB-169.0-2.5	10 - 12	9.5	0.635	0.295	0.113	0.0	1.0	91.3		7.7	
⊠	KB-169.0-2.5	30 - 32	0.425				0.0	0.0	7.5		92.5	
▲	KB-169.0-2.5	40 - 42	0.25				0.0	0.0	4.3		95.7	
★	KB-169.0-3.6	4 - 6	37.5	24.866	0.745	0.09	0.0	59.5	31.7		8.8	
⊙	KB-169.0-3.6	10 - 12	19	0.153	0.092		0.0	4.9	77.2		17.9	

PROJECT: Lab Testing

SITE: Champlain to Hudsdon Power Express

Terracon
30 Corporate Cir Ste 201
Albany, NY

PROJECT NUMBER: JB215256H

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

EXHIBIT: B-3

Kiewit

MEMORANDUM

DATE: January 26, 2023

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 7 - Package 4B - HDD Crossing 64A – Revision 1
Champlain Hudson Power Express Project
Glenville, 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 in Glenville, New York. The approximate station for the start of HDD crossing Number 64A is STA 45139+50 (42.8395° N, 73.9421° W).

The geotechnical data at this HDD crossing is attached. The available data is from the previous investigation by AECOM and data from a recent investigation by Atlantic Testing Laboratories (ATL), 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 4B, Glenville to Scotia, New York, dated June 15, 2022.

Contact us if you have questions or require additional information.

HDD 64A

Borings K-294.9-2.6, K-294.9-2.7, SCH-5

Segment 7 - Design Package 4B

CHPE Segment 7 Package 4B
Soil Boring Coordinates and Elevations

Firm	Boring	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet)
TRC*	B169.1-1	1469045.0	651801.8	236.7
AECOM**	SCH-1	1466449.8	649931.4	279.8
	SCH-2	1464095.5	648426.9	288.3
	SCH-3	1462008.4	645522.0	286.8
	SCH-3A	1461257.5	644144.0	287.3
	SCH-4	1460618.5	643021.4	285.4
	SCH-5	1459621.8	641171.4	279.3
	SCH-6	1457944.8	638238.9	241.7
	SCH-6A	1457817.7	637889.5	249.6
	SCH-7	1458325.7	636073.8	271.1
	SCH-8	1459763.1	633330.0	287.2
	SCH-9	1460902.6	631152.2	297.0
	SCH-10	1462154.8	628796.0	290.3
	SCH-10A	1461888.1	629265.0	291.0
	SCH-11	1463366.6	626127.1	289.2
	SCH-12	1462321.8	625339.2	227.3
	SCH-13	1461493.8	624804.4	229.1
	SCH-13A	1460855.7	624513.9	272.0
	SCH-13B	1460233.8	624596.1	295.4
	SCH-14	1459768.5	625134.5	281.3
	SCH-15	1457493.3	626917.2	338.6
	SCH-15A	1456046.5	627705.8	352.4
	SCH-16	1455146.0	627794.1	350.1
	SCH-17	1451579.9	627027.1	357.8
	SCH-18	1447982.8	626167.9	354.4
NYS DOT ***	DAB-6(2)	1460628.7	625081.5	248
	DH-24S	1460655.9	625133.7	237
	DH-25S	1460602.7	625066.5	236
	DH-26S	1460543.7	624985.5	235
	DH-27S	1460696.2	625101.3	236
	DH-28S	1460650.3	625027.7	235
	DH-29S	1460597.5	624949.4	234.5

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.

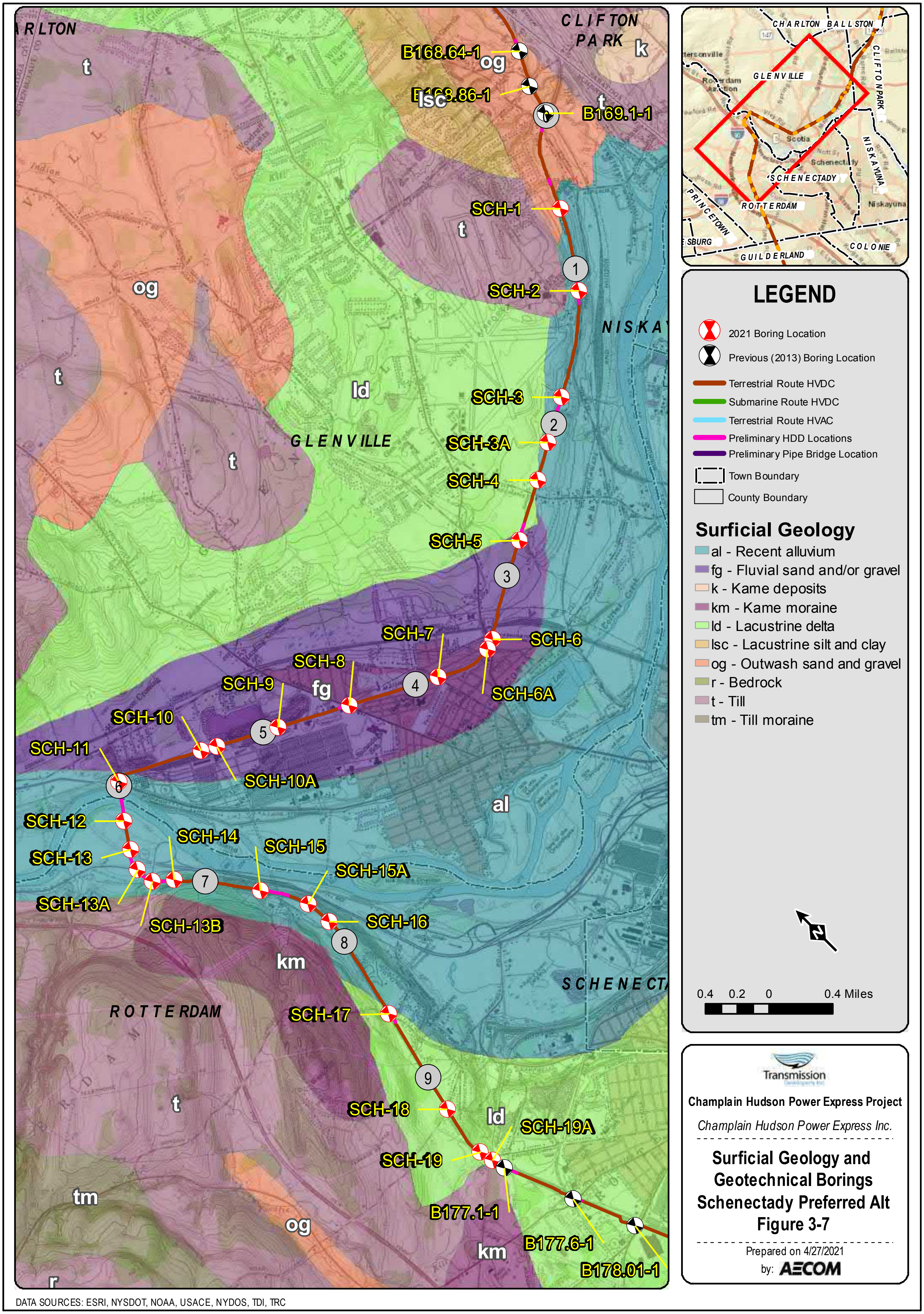
** AECOM boring coordinates and elevations as shown in Table 1-6 in AECOM report.

*** NYS DOT boring coordinates and elevations are approximated from drawing D257014 Sheet 170 "GENERAL SUBSURFACE PROFILE, STRUCTURE #3 - RAMP TWY OVER I-890"

**** 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.



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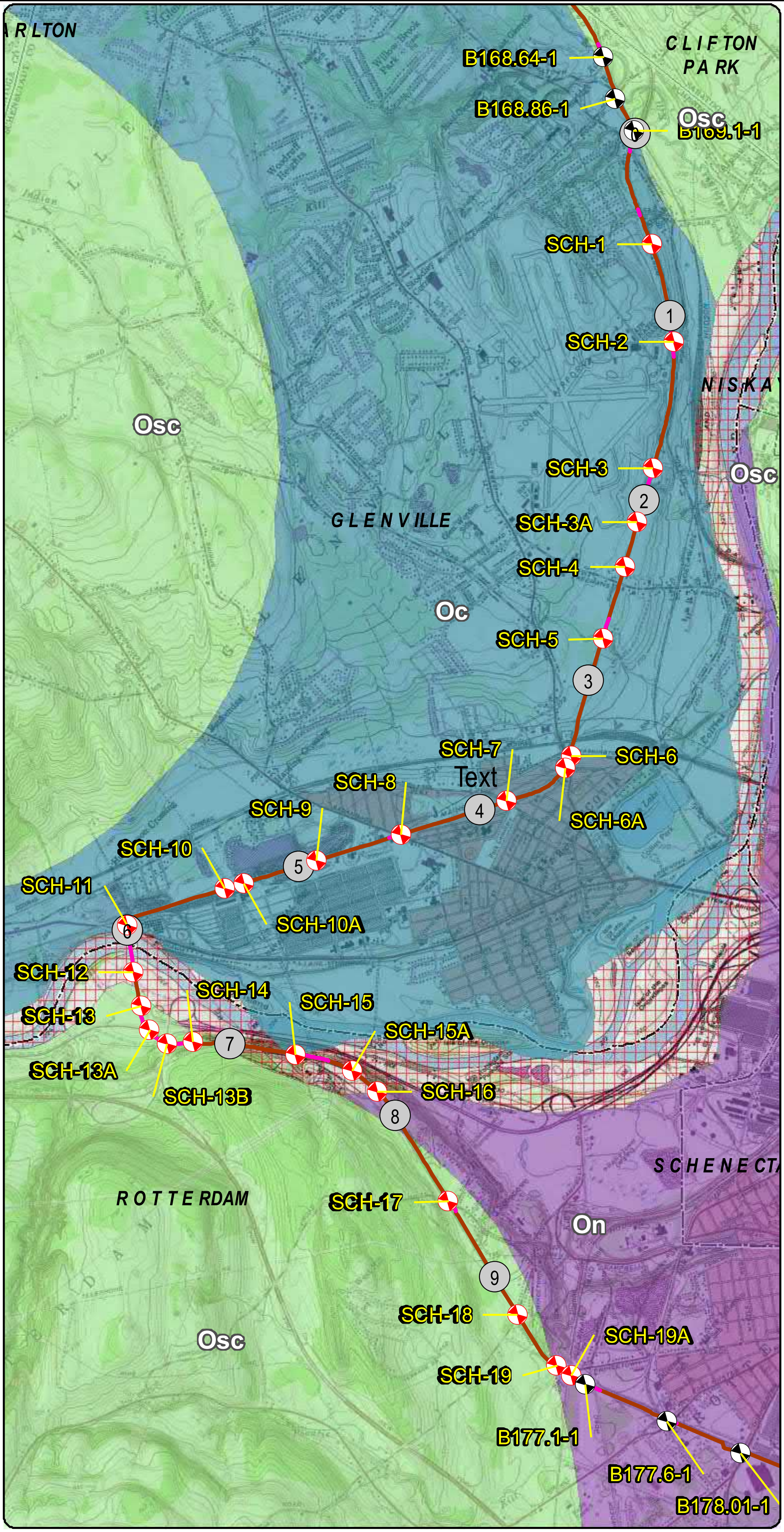

DATA SOURCES: ESRI, NYSDOT, NOAA, USACE, NYDOS, TDI, TRC

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

- No Label
- Oc - Canajoharie Shale
- On - Normanskill Shale
- Osc - Schenectady Formation

* Schenectady Formation includes: graywacke, sandstone, siltstone, shale

0.4 0.2 0 0.4 Miles

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

Bedrock Geology and Geotechnical Borings Schenectady Preferred Alt

Figure 4-7

Prepared on 4/29/2021

by: AECOM

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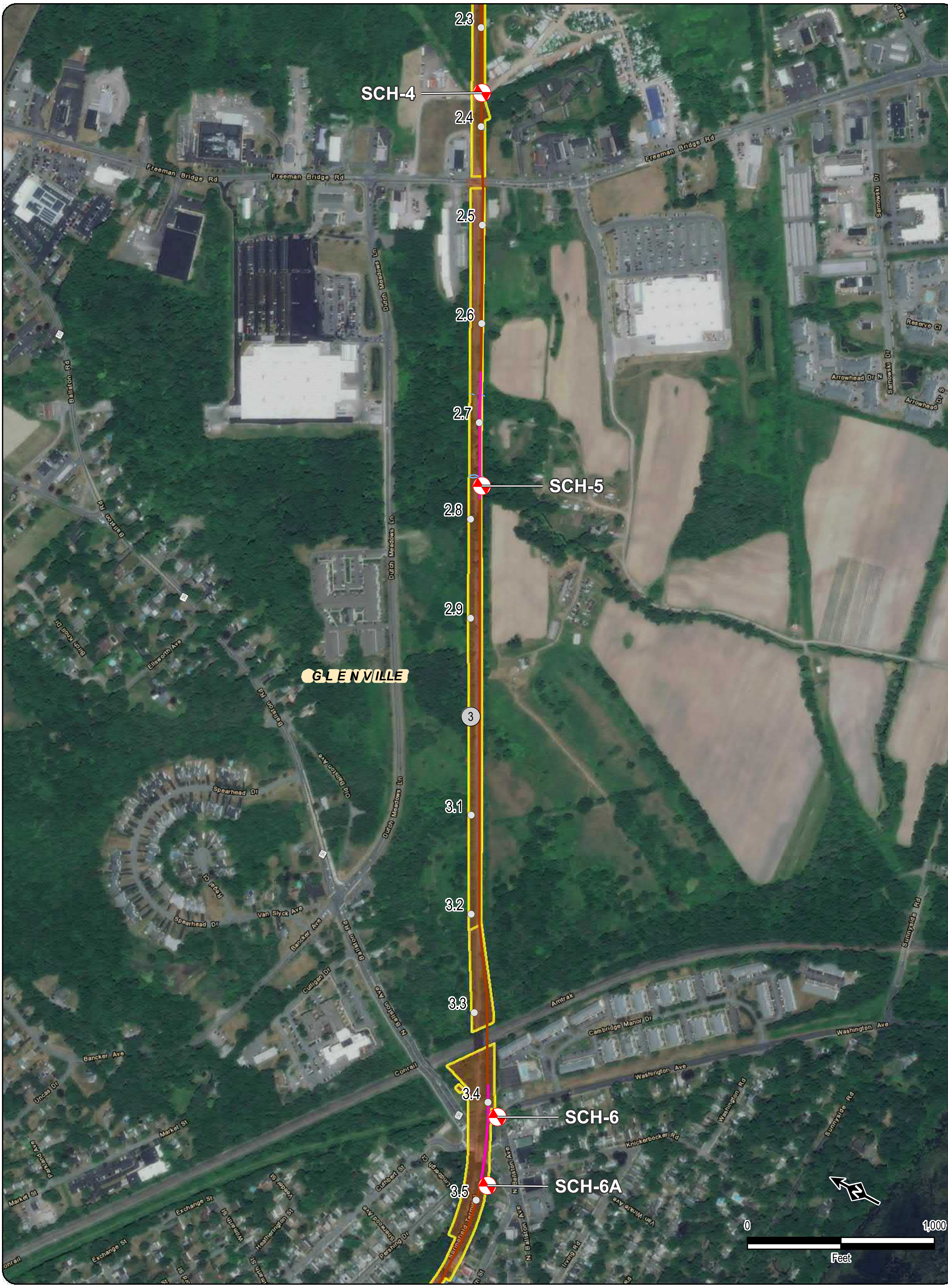

LEGEND

- 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

Transmission Developers Inc.

Champlain Hudson Power Express Project

Champlain Hudson Power Express Inc.

BORING LOCATION PLAN

Schenectady Preferred Alternative

Figure A-7

Sheet 3 of 8

Prepared by: AECOM 4/27/2021

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

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BORING CONTRACTOR: ADT	AECOM	SHEET 1 OF 2.
DRILLER: Matt Murtagh		PROJECT NAME: CHPE -
SOILS ENGINEER/GEOLOGIST: Mike Izdebski		PROJECT NO.: 60323056
		HOLE NO.: **SCH-5**
		START DATE: 3/17/2021
	Boring Log	FINISH DATE: 3/17/2021
LOCATION: Schenectady, NY MP 2.76		OFFSET: N/A

GROUND WATER OBSERVATIONS		CASING	SAMPLER	DRILL BIT	CORE BARREL	DRILL RIG: Geoprobe 7822DT
	TYPE	Flush Joint Steel	California Modified	Tricone Roller Bit	NQ	BORING TYPE: SPT/Core
	SIZE I.D.	4"	2.5"	- -	1 7/8"	BORING O.D.: 4.5"/3"
	SIZE O.D.	4.5"	3"	3 7/8"	3"	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						Sandy SILT	Brown fine to coarse SAND, some subrounded gravel, little silt, little cobbles, trace organics
1.0											SW		
2.0													2.0': Light brown clayey SILT, trace fine to coarse sand, trace organics
3.0											ML		
		3'-5'	S-1										TR-1; (3.0'-5.0')
4.0													
5.0													
		5'-7'	S-2	24"	21"	3	4	4	5	5	ML		Light Brown SILT, some fine sand, trace fine gravel, trace organics
6.0													
7.0													
		7'-9'	S-3	24"	9"	3	6	6	5	8	SP	SAND	Light brown fine to medium SAND, trace organics
8.0													
9.0													
		9'-11'	S-4	24"	24"	4	5	7	7	8	SP		Light brown, fine to medium SAND, little silt, trace organics
10.0													TR-2; (10.0'-10.5')
11.0													
		11'-'13'	S-5	24"	24"	7	12	9	8	14	SP		SAA
12.0												Till/Weathered SHALE	12.0': Gray SHALE fragments, some fine to coarse sand
13.0													13.0': SAA, trace sand
		13'-15'	S-6	12"	12"	10	50/5"						
14.0													
15.0													
		15'-17'	S-7	9"	9"	12	50/3"						Gray SHALE, highly fractured
16.0													
17.0													
		17'-22'	R-1	60"	55"	RQD: 42.5" = 71%						SHALE	Gray SHALE, thinly laminated, unweathered, @19.8' 45° fracture
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	AECOM	SHEET 2 OF 2
DRILLER: Matt Murtagh		PROJECT NAME: CHPE -
SOILS ENGINEER: Mike Izdebski	Boring Log	PROJECT NO.: 60323056
		HOLE NO.: **SCH-5**
		START DATE: 3/17/2021
		FINISH DATE: 3/17/2021
LOCATION: Schenectady, NY MP 2.76		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
									SHALE	TR-3; (20.4'-20.85')
21.0										
22.0		22'-27'	R-2	60"	58"	RQD: 54" = 90%				SAA
23.0										
24.0										
25.0										
26.0										
27.0		27'-32'	R-3	60"	54	RQD: 50" = 83%				SAA, 45° fracture @ 27.3' and 30.55'
28.0										
29.0										
30.0										TR-4; (29.5'-30.15')
31.0										
32.0		32'-37'	R-4	60"	62	RQD: 57.5" = 96%				SAA
33.0										
34.0										
35.0										
36.0										
37.0										Boring terminated at 36.75 fbg.
38.0										
39.0										
40.0										
41.0										
42.0										
43.0										
44.0										
45.0										

NOTES:

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

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

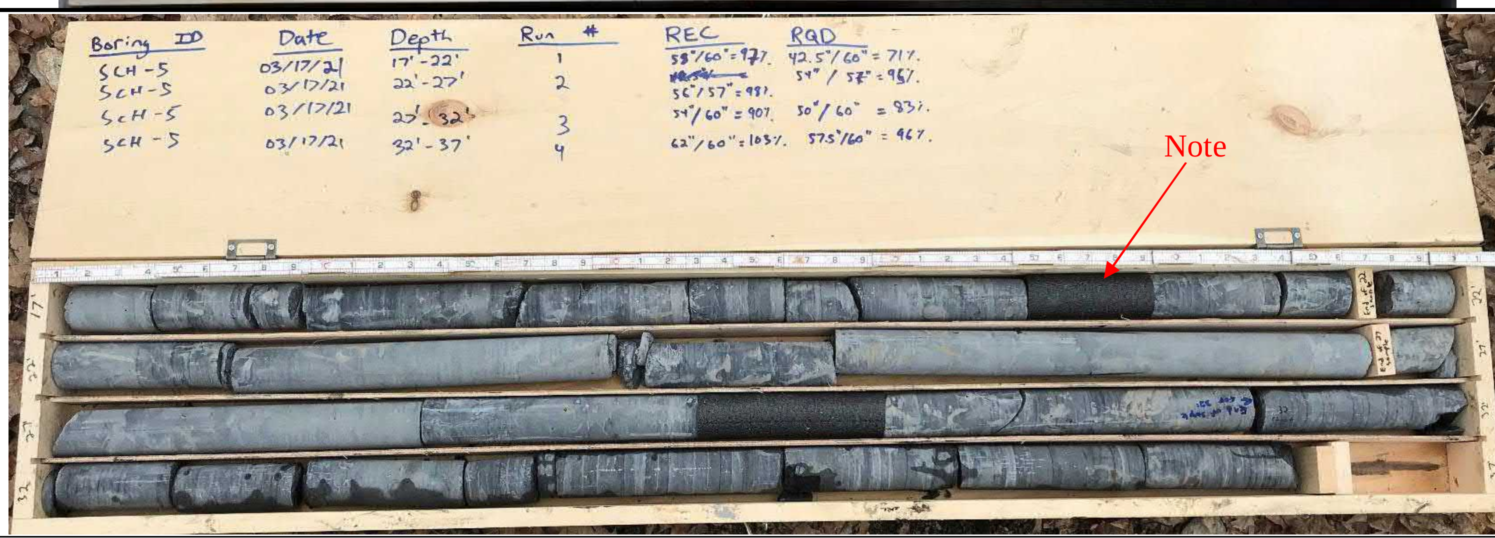
SAMPLE TYPE:	S= SPLIT SPOON	U=SHELBY TUBE	R=ROCK CORE	
PROPORTIONS:	TRACE=1-10%	LITTLE=10-20%	SOME=20-35%	AND=35-50%

ROCK CORE PHOTOGRAPHIC LOG

AECOM Project No: **60323056**
Project Name: **CHPE – Upstate New York Upland Geotechnical Investigation**
Location: **Schenectady Bypass Segment**

AECOM

Boring No.	**Depth (ft.)**	
SCH-3	35.0-40.0	

Boring No.	**Depth (ft.)**	
SCH-5	17.0-37.0	

Boring Location Plans Page 6 of 9	Drawn by: ADW	Scale: Not to scale	Project No.: CD10279	Date: May 2022

Champlain Hudson Power Express
Design Package 4B
Glenville to Scotia, 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-01-05-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**

Champlain Hudson Power Express, Design Package 4B

Various Locations, New York

Start Date: **3/29/2022** Finish Date: **3/30/2022**

Boring No.: **K-169.0-2.6** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
3/29/2022	PM	*7.1'	20.0'
3/30/2022	AM	*6.5'	20.0'

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

Coordinates
Northing **1460021**
Easting **641876.07**

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

Ground Elev.: **282.7**

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

CLASSIFICATION OF MATERIAL

f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

DEPTH	METHOD OF ADVANCE	SAMPLE NO.	DEPTH OF SAMPLE From	To	SAMPLE TYPE	BLOWS ON SAMPLER PER 6" 2" O.D. SAMPLER	DEPTH OF CHANGE	CLASSIFICATION OF MATERIAL	Recovery (Inches)
0–2	CASING	1	0.0	2.0	SS	6 7 7 10		Greyish-Black cmf SAND; some cm GRAVEL; trace SILT (moist, non-plastic) SW	6
2–4		2	2.0	4.0	SS	8 6 7 6	4.0	Blackish-Brown cmf SAND; some cm GRAVEL; trace SILT (moist, non-plastic) SW	8
4–6		3	4.0	6.0	SS	2 1 1 1	6.0	Grey mf SAND; little CLAY; trace f GRAVEL; trace SILT (moist, slightly plastic) SC	10
6–8		4	6.0	8.0	SS	5 8 9 10		Grey cmf SAND; little mf GRAVEL; trace SILT (wet, non-plastic) SW	16
8–10		5	8.0	10.0	SS	4 5 7 8		Grey c-mf SAND; little f GRAVEL; trace SILT (wet, non-plastic) w = 16.1%, % Fines = 9.4% SP	21
14–16		6	14.0	16.0	SS	24 10 6 7	17.0	Similar Soil (wet, non-plastic) SP	4
19–21	WET ROTARY	7	19.0	21.0	SS	3 3 5 7	22.0	Advanced casing to 20.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole. Grey SILT; little f SAND; trace CLAY (wet, very slightly plastic) ML	17
24–25		8	24.0	26.0	SS	4 3 2 2		Grey CLAY; some SILT; trace f SAND (moist, plastic) w = 26.7%,	16

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

Drillers: **Jeffrey Donovan; Chase Bertrand**

Inspector: **James LaMarco (ATL)**

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: **K-169.0-2.6** Report No.: **CD10279D-01-05-22** 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								LL = 26, PL = 14, PI = 12, % Fines = 97.6% CL	
27							27.0		
28		ST-1A	28.0	30.0	SS	6 10 15 19		(3" Brass Lined Split Spoon) Grey SILT; trace CLAY; trace f SAND (wet, very slightly plastic) ML	12
30		ST-1B	30.0	32.0	SS	14 17 19 19	32.0	(3" Brass Lined Split Spoon) Similar Soil (wet, very slightly plastic) ML	23
32		9	32.0	34.0	SS	7 9 14 19		(3" Brass Lined Split Spoon) Grey f SAND; some SILT (wet, non-plastic) w = 22.7%, LL = NP, PL = NP, PI = NP % Fines = 24.2% SM	20
36							36.0		
38		10	38.0	40.0	SS	7 8 8 10	40.0	Grey SILT; some CLAY; little mf+ SAND (wet, moderately plastic) ML	24
41								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.

Depth scale: 26–62

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Report No.: **CD10279D-01-05-22**

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

Boring Location: **See Boring Location Plan**

Project: **Subsurface Investigation**
Champlain Hudson Power Express, Design Package 4B
Various Locations, New York

Start Date: **3/28/2022** Finish Date: **3/29/2022**

Boring No.: **K-169.0-2.7** Sheet **1** of **2**

Groundwater Observations

Date	Time	Depth	Casing
3/29/2022	AM	*5.9'	10.0'

Coordinates
Northing **1459794.22**
Easting **641457.26**

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

Ground Elev.: **280.6**

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

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

CLASSIFICATION OF MATERIAL

f - fine; m - medium; c - coarse
and - 35-50%; some - 20-35%; little - 10-20%; trace - 0-10%

Depth (ft)	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)
0–2	CASING	1	0.0	2.0	SS	5 6 7 4	2.0	Grey cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic) FILL SW	10
2–4		2	2.0	4.0	SS	2 3 4 5	4.0	Brown mf SAND; trace CLAY; trace SILT (moist, very slightly plastic) SP	24
4–6		3	4.0	6.0	SS	4 5 6 6		Brown mf+ SAND; and SILT; trace CLAY (moist, very slightly plastic) SM	24
6–8		4	6.0	8.0	SS	9 6 6 8		Brown mf+ SAND; and SILT; trace CLAY (moist, very slightly plastic) w = 23.1%, % Fines = 53.0% SM	20
8–10		5	8.0	10.0	SS	4 5 5 6		Similar Soil (moist, very slightly plastic) SM	16
10–12	WET ROTARY						12.0	Advanced casing to 10.0 feet and began advancing 3 7/8" tri-cone roller bit wet rotary open hole within the borehole.	
14–16		6	14.0	16.0	SS	7 9 7 9	17.0	Grey mf SAND; trace SILT (wet, non-plastic) SP	6
19–21		7	19.0	21.0	SS	3 2 2 3		Grey CLAY; some SILT; trace f SAND (moist, plastic) w = 29.5%, LL = 36, PL = 19, PI = 17, % Fines = 98.7% CL	22
24–25		8	24.0	26.0	SS	4 4 6 7		Similar Soil (moist, plastic) CL	20

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

Drillers: **Jeffrey Donovan; Chase Bertrand**
Inspector: **James LaMarco (ATL)**

ATLANTIC TESTING LABORATORIES, Limited

Subsurface Investigation

Boring No.: K-169.0-2.7   Report No.: CD10279D-01-05-22   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		ST-1	28.0	30.0	SS	4 5 9 10		(3" Brass Lined Split Spoon) Grey CLAY; some SILT; little mf SAND (moist, plastic) w = 39.3%, LL = 25, PL = 13, PI = 12, % Fines = 89.4% CL	20
32							32.0		
34		9	34.0	35.9	SS	25 37 39 50/5"		Grey cmf SAND; some mf GRAVEL; little SILT (moist, non-plastic) SW	23
38		10	38.0	39.3	SS	23 39 50/3"		Similar Soil (moist, non-plastic) SW	15
39							39.3		

Boring terminated at 39.3 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 4B).GPJ ATL4-08.GDT 6/7/22

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-169.0-2.0	S-2	2.0-4.0	Brown cmf+ SAND; some mf GRAVEL; trace SILT	--	12.1	--	--	--	--	--	--	--	--	--	--	--
	S-4	6.0-8.0	Brown mf+ SAND; little SILT	13.0	24.5	--	--	--	--	--	--	--	--	--	--	--
	S-7	18.0-20.0	Grey SILT; little CLAY; trace f SAND	96.5	28.9	37	20	17	--	--	--	--	--	--	--	--
	S-9	22.0-24.0	Grey CLAY; some SILT; trace f SAND	97.9	29.5	34	20	14	--	--	--	--	--	--	--	--
K-169.0-2.6	S-5	8.0-10.0	Grey c-mf SAND; little f GRAVEL; trace SILT	9.4	16.1	--	--	--	--	--	--	--	--	--	--	--
	S-8	24.0-26.0	Grey CLAY; some SILT; trace f SAND	97.6	26.7	26	14	12	--	--	--	--	--	--	--	--
	S-9	32.0-34.0	Grey f SAND; some SILT	24.2	22.7	NP	NP	NP	--	--	--	--	--	--	--	--
K-169.0-2.7	S-4	6.0-8.0	Brown mf+ SAND; and SILT; trace CLAY	53.0	23.1	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Grey CLAY; some SILT; trace f SAND	98.7	29.5	36	19	17	--	--	--	--	--	--	--	--
	ST-1	28.0-30.0	Grey CLAY; some SILT; little mf SAND	89.4	39.3	25	13	12	--	--	--	--	--	--	--	--
K-169.0-4.4	S-3/4	4.0-8.0	Brown cmf SAND; trace f GRAVEL; trace SILT	--	--	--	--	--	--	300	20	8.6	139,320	--	--	--
	S-5	8.0-10.0	Greish-Brown c-m+f SAND; trace SILT; trace mf+ GRAVEL	9.4	5.4	--	--	--	--	--	--	--	--	--	--	--
	ST-1c	27.0-29.0	Brownish-Grey c-mf+ SAND; little SILT; trace m GRAVEL	17.0	15.8	--	--	--	--	--	--	--	--	--	--	--
K-169.0-4.5	S-3	4.0-6.0	Brown c-m+f SAND; little SILT; trace f GRAVEL	17.0	10.6	--	--	--	--	--	--	--	--	--	--	--
	S-7	19.0-21.0	Greyish-Brown c-mf+ SAND; little SILT; little mf+ GRAVEL	19.0	11.5	--	--	--	--	--	--	--	--	--	--	--
	S-8	29.0-31.0	Grey mf+ SAND; little SILT	12.0	17.7	--	--	--	--	--	--	--	--	--	--	--
K-169.0-6.0	S-6	13.0-15.0	Brown mf+ SAND; trace SILT	--	21.3	--	--	--	--	--	--	--	--	--	--	--
	S-9	28.0-30.0	Brown f SAND; little SILT	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-11	38.0-40.0	Brown f SAND; trace SILT	--	26.0	--	--	--	--	--	--	--	--	--	--	--
	S-13	48.0-50.0	Brown f SAND; little SILT	--	24.0	--	--	--	--	--	--	--	--	--	--	--
	S-15	58.0-60.0	Brown f SAND; little SILT	--	23.8	--	--	--	--	--	--	--	--	--	--	--
	S-17	68.0-70.0	Brown f SAND; little SILT	--	27.8	--	--	--	--	--	--	--	--	--	--	--
K-169.0-6.1	S-4	6.0-8.0	Grey cmf GRAVEL; some cmf SAND; little CLAY	--	8.4	--	--	--	--	--	--	--	--	--	--	--
	S-10	33.0-35.0	Grey cmf+ SAND; trace SILT; trace f GRAVEL	--	25.1	--	--	--	--	--	--	--	--	--	--	--
	S-14	53.0-55.0	Grey f SAND; little SILT	--	22.3	--	--	--	--	--	--	--	--	--	--	--
	S-18	73.0-75.0	Grey cmf+ SAND; little SILT; trace mf GRAVEL	--	19.1	--	--	--	--	--	--	--	--	--	--	--

ATLANTIC TESTING LABORATORIES

WBE certified company

LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS

ASTM D 2216

PROJECT INFORMATION

Client:	Kiewit Intrastructure Co.	**ATL Report No.:**	CD10279E-14-04-22
Project:	Champlain Hudson Power Express	**Report Date:**	April 29, 2022
	United Cable Installation	**Date Received:**	April 19, 2022
	Various Locations, New York		

TEST DATA

Boring No.	Sample No.	Depth (ft)	Moisture Content (%)
K-169.0-0.1A	S-4	6-8	10.4
	S-8	27-29	14.4
K-169.0-2.6	S-5	8-10	16.1
	S-8	24-26	26.7
	S-9	32-34	22.7
K-169.0-2.7	S-4	6-8	23.1
	S-7	19-21	29.5
	ST-1	28-30	39.3
K-169.0-4.4	S-5 [1]	8-10	5.4
	ST-1c [1]	27-29	15.8
K-169.0-4.5	S-3	4-6	10.6
	S-7 [1]	19-21	11.5
	S-8	29-31	17.7
K-169.0-6.4	S-4 [1]	6-8	6.2
	S-6 [1]	14-16	9.4
	ST-1c [1]	27-29	6.0
	S-10 [1]	39-41	22.0

Remarks

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

Reviewed By: ______________________ Date: 04/29/22

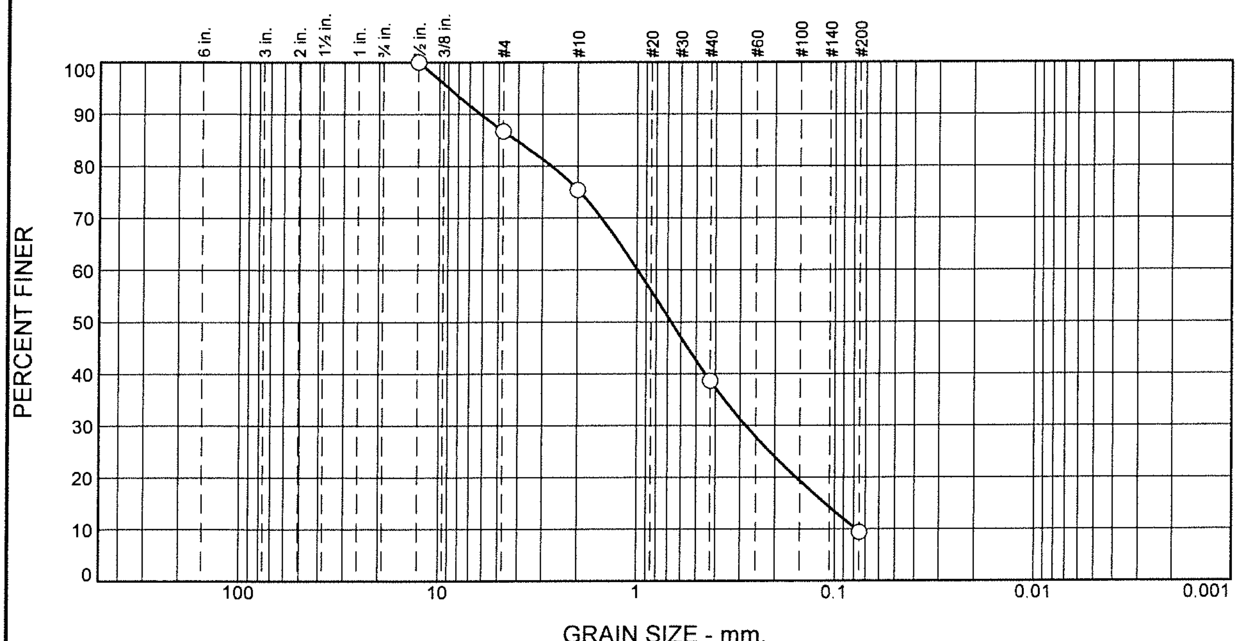
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-01-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/29/22

Sample No: K-169.0-2.6 **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	13	12	36	30	9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
1/2"	100		
#4	87		
#10	75		
#40	39		
#200	9.4		

Soil Description

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

Atterberg Limits

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

Coefficients

D_{85}= 4.1103 D_{60}= 0.9948 D_{50}= 0.6740
D_{30}= 0.2808 D_{15}= 0.1118 D_{10}= 0.0783
C_u= 12.71 C_c= 1.01

Classification

USCS= AASHTO=

Remarks

Moisture Content= 16.1%

* (no specification provided)

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: [signature]

Date: 04/29/22

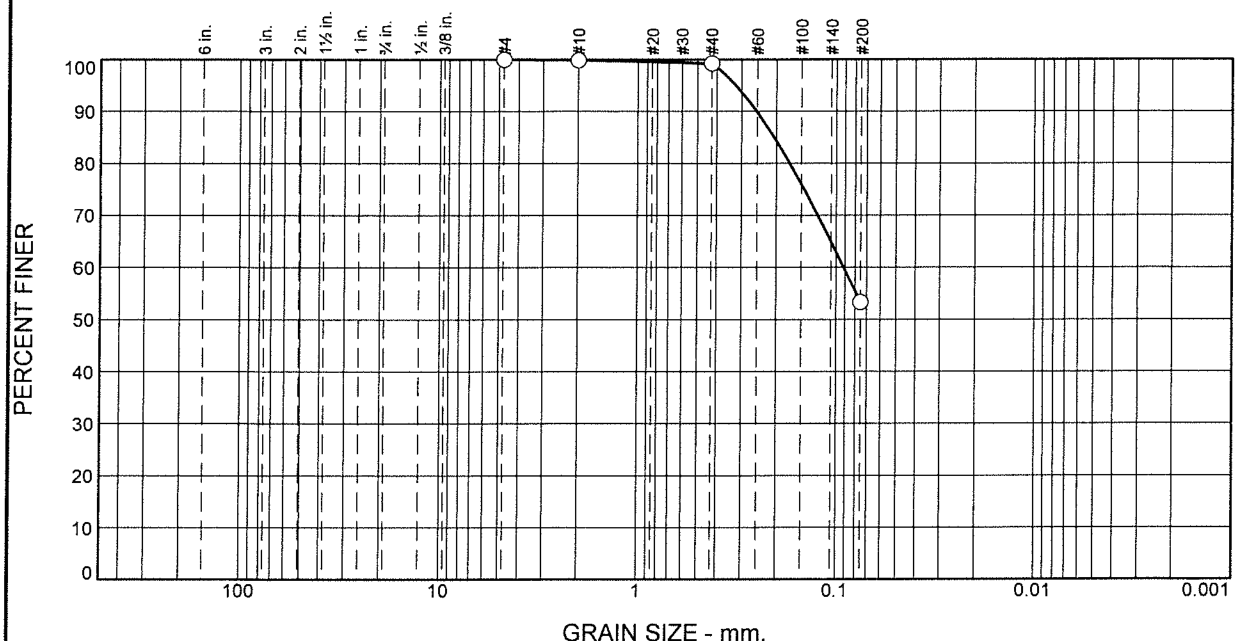
ATLANTIC TESTING LABORATORIES

Particle Size Distribution Report

Project: Champlain Hudson Power Express United Cable Install **Report No.:** CD10279E-14-04-22

Client: Kiewit Intrastructure Co. **Date:** 04/29/22

Sample No: K-169.0-2.7 **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	46	53	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC. (X)
#4	100		
#10	100		
#40	99		
#200	53		

* (no specification provided)

Soil Description

Brown mf+ SAND; and SILT; trace CLAY

Atterberg Limits

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

Coefficients

D_{85}= 0.2060 D_{60}= 0.0915 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 23.1%

Figure

ATLANTIC TESTING LABORATORIES, LIMITED

Reviewed by: [signature]

Date: 04/29/22

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.
Project: Champlain Hudson Power Express
United Cable Installation
Various Locations, New York

ATL Report No.: CD10279E-14-04-22
Report Date: April 29, 2022
Test Date: April 19, 2022
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-169.0-2.6	S-8	24-26	A	10	77.67	97.6
K-169.0-2.6	S-9	32-34	A	10	110.87	24.2
K-169.0-2.7	S-7	19-21	A	10	64.37	98.7
K-169.0-2.7	ST-1	28-30	A	10	212.60	89.4

Reviewed By: ____________________

Date: 04/29/22

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-14-04-22
Report Date: April 29, 2022
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TEST DATA

Boring No.	Sample No.	LL	PL	PI
K-169.0-2.6	S-8	26	14	12
K-169.0-2.6	S-9	NP	NP	NP
K-169.0-2.7	S-7	36	19	17
K-169.0-2.7	ST-1	25	13	12

SAMPLE INFORMATION

Boring No.	Sample No.	Maximum Grain Size (mm)	Estimated Amount of Sample Retained on No. 40 Sieve (%)	As Received Moisture Content (%)
K-169.0-2.6	S-8	0.074	0	26.7
K-169.0-2.6	S-9	0.074	0	22.7
K-169.0-2.7	S-7	0.074	0	29.5
K-169.0-2.7	ST-1	2	5	39.3

PREPARATION INFORMATION

Boring No.	Sample No.	Preparation	Method of Removing Oversized Material
K-169.0-2.6	S-8	Air Dry	Not Necessary
K-169.0-2.6	S-9	Air Dry	Not Necessary
K-169.0-2.7	S-7	Air Dry	Not Necessary
K-169.0-2.7	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: [signature]

Date: 04/29/22

Appendix C

Calculations

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 64AA
	P4B
	Start Date: 06-07-2024
	End Date: 06-07-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64AA 10-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 284.00) ft
End Coordinate	(720.00, 0.00, 283.00) ft
Project Length	720.00 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: 105.0000 (dry), 115.0000 (sat) [lb/ft3]

Phi: 30.00, S.M.: 200.00, 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, Silt (M), ML

From Assistant

Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]

Phi: 28.00, S.M.: 50.00, Coh: 0.00 [psi]

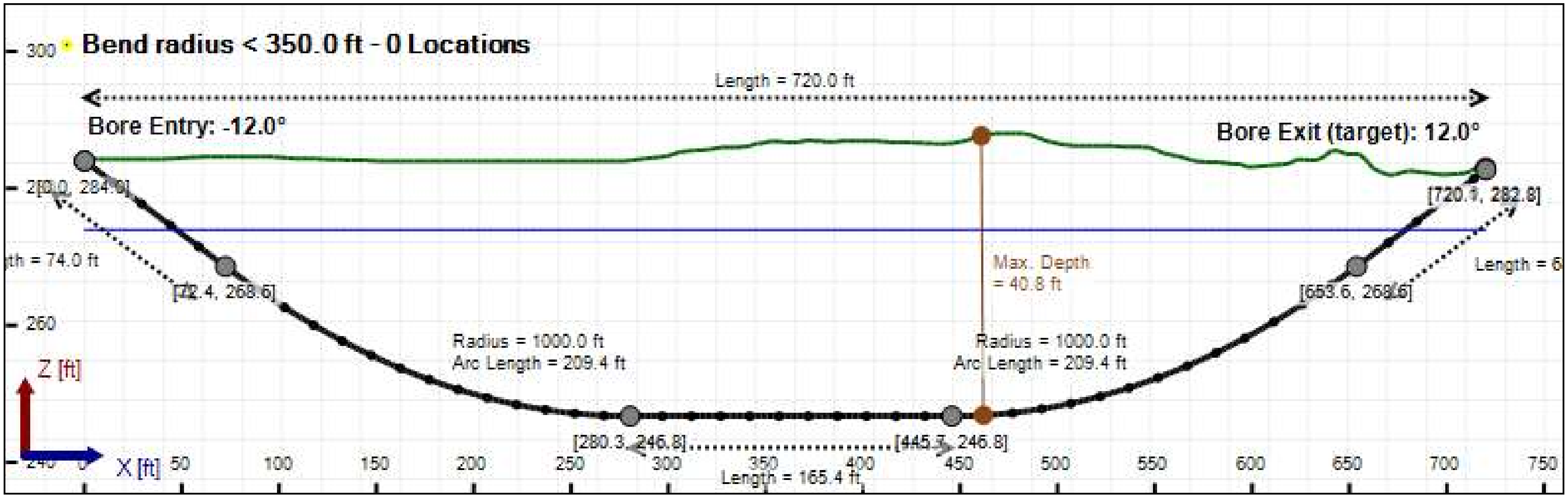
Soil Layer #4 USCS, Silt (M), ML

From Assistant

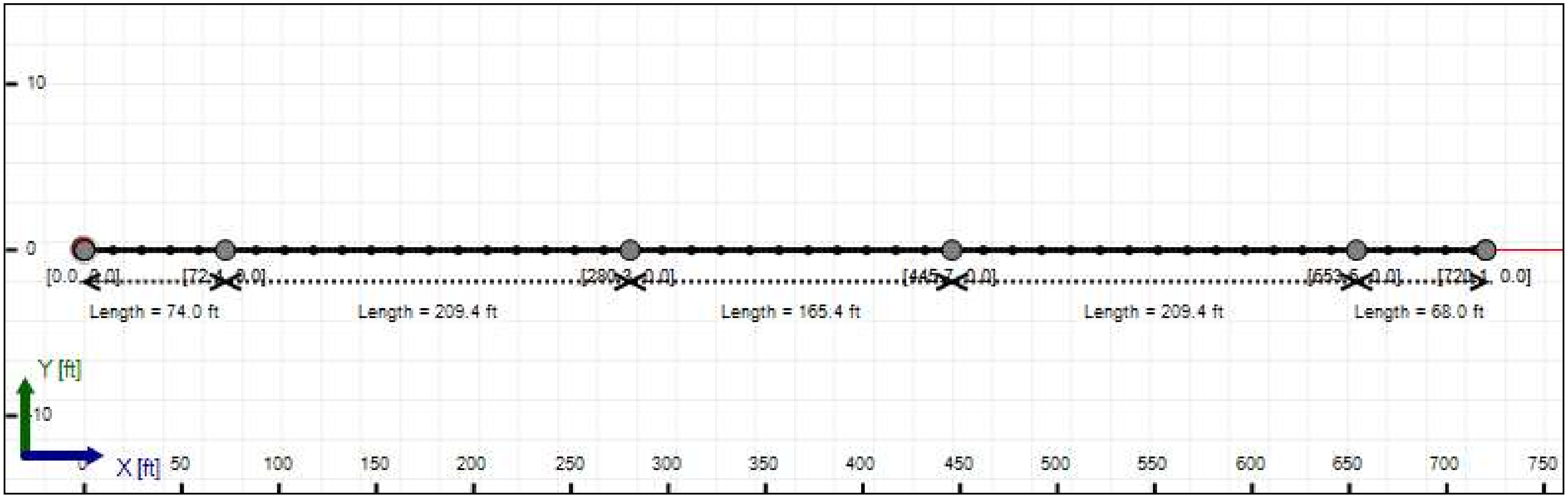
Unit Weight: 90.0000 (dry), 110.0000 (sat) [lb/ft3]

Phi: 32.00, S.M.: 100.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



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Load Verifier Input Summary:

Pipe Application: Electrical Cable

Pipe Type: HDPE

Classification: IPS

Pipe OD: 10" (10.75")

Pipe DR: 9

Pipe Length: 735.00 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	3.5	19.1
Water Pressure	11.8	11.8
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	15.3	30.8
Deflection		
Earth Load Deflection	1.116	5.197
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.248	5.329
Compressive Stress [psi]		
Compressive Wall Stress	68.9	138.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	12807.2	12807.2
Pullback Stress [psi]	357.2	357.2
Pullback Strain	6.212E-3	6.212E-3
Bending Stress [psi]	25.8	25.8
Bending Strain	4.479E-4	4.479E-4
Tensile Stress [psi]	382.9	382.9
Tensile Strain	7.108E-3	7.108E-3

Net External Pressure = 20.5 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.248	7.5	6.0	OK
Unconstrained Collapse [psi]	24.6	125.3	5.1	OK
Compressive Wall Stress [psi]	68.9	1150.0	16.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	34.5	234.4	6.8	OK
Tensile Stress [psi]	382.9	1200.0	3.1	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	83.036 psi	61.888 psi
1	8.00 in	12.00 in	82.944 psi	61.480 psi
2	12.00 in	16.13 in	82.811 psi	60.909 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): 120.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

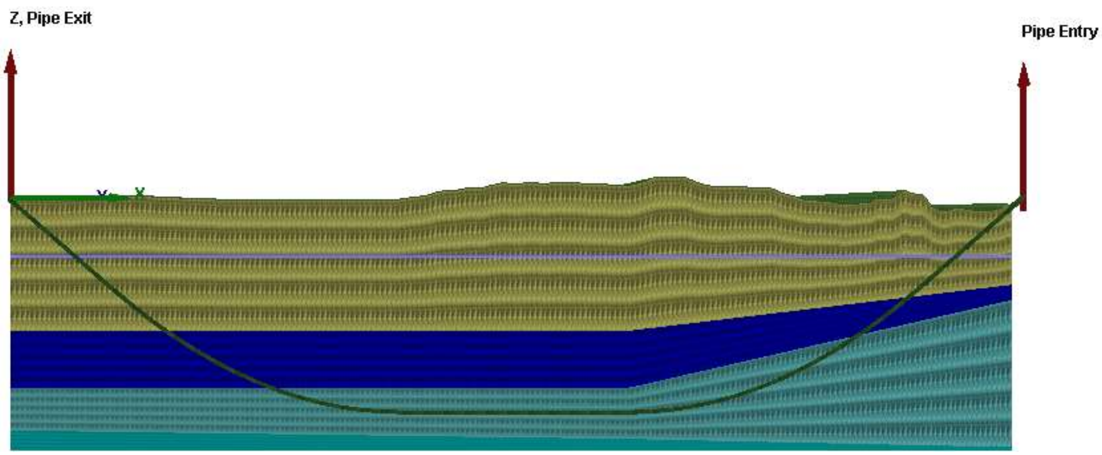
Rheological model: Power-Law

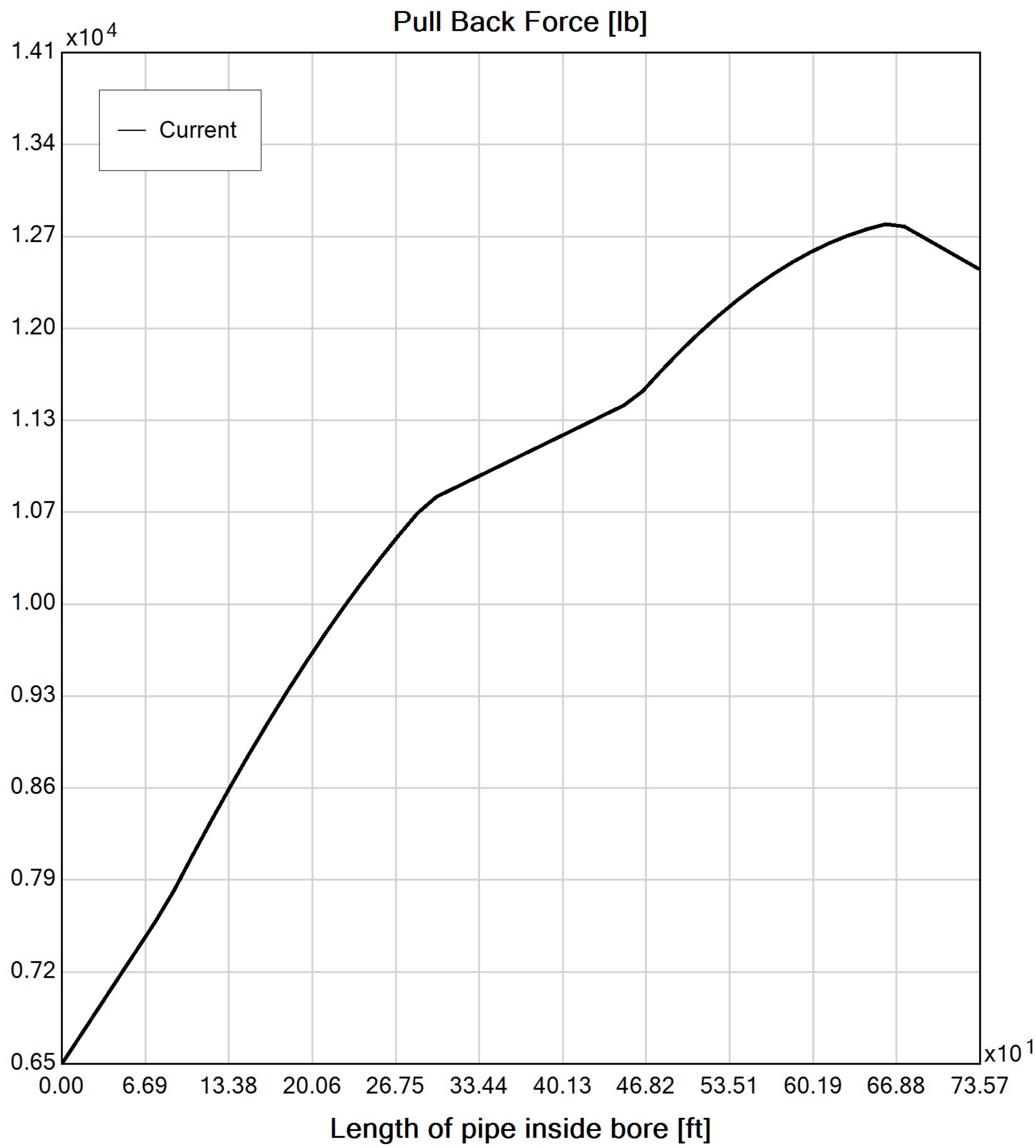
Fluid Consistency Index (K): 63.17

Power Law Exponent (n): 0.14

Effective Viscosity (cP): 333.0

Virtual Site





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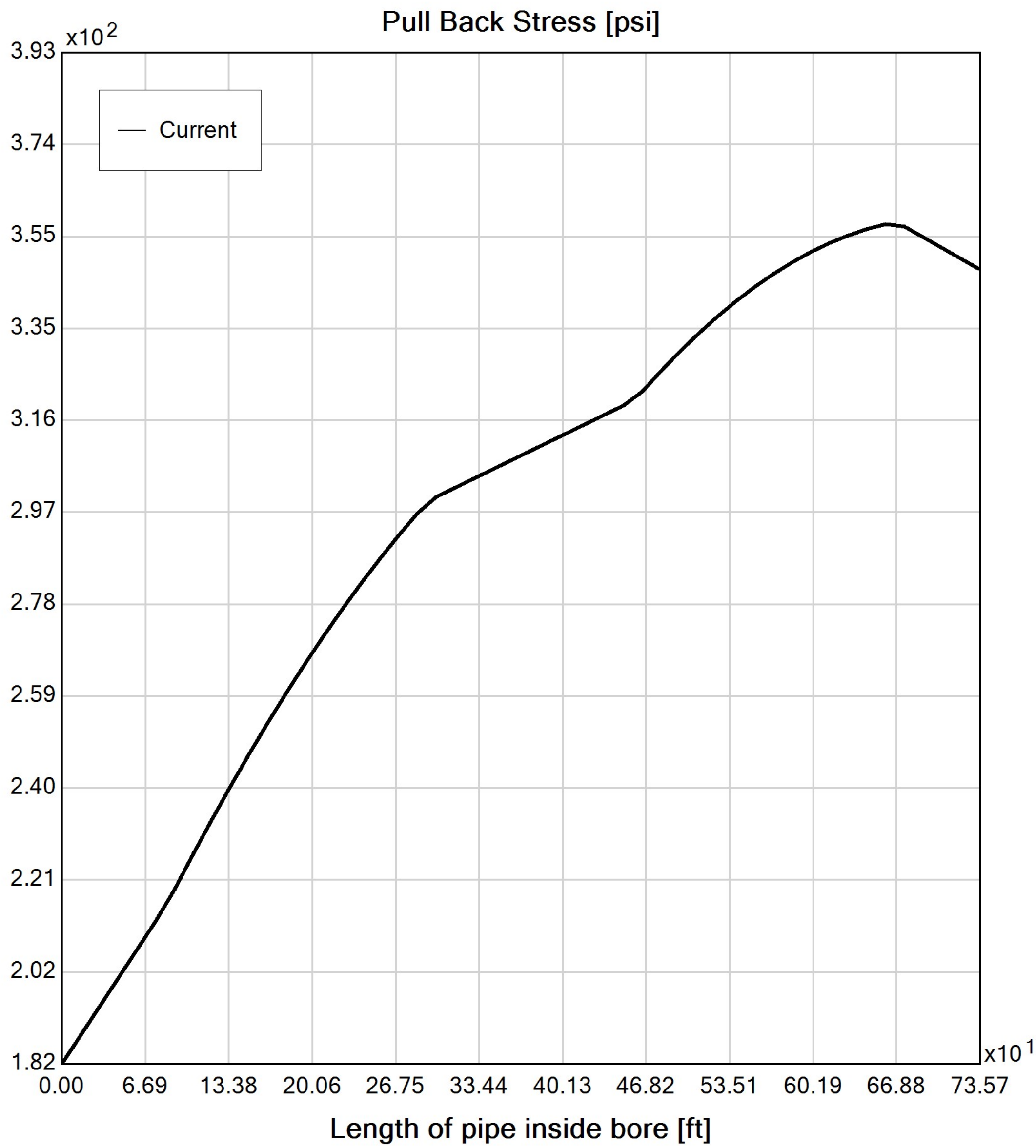
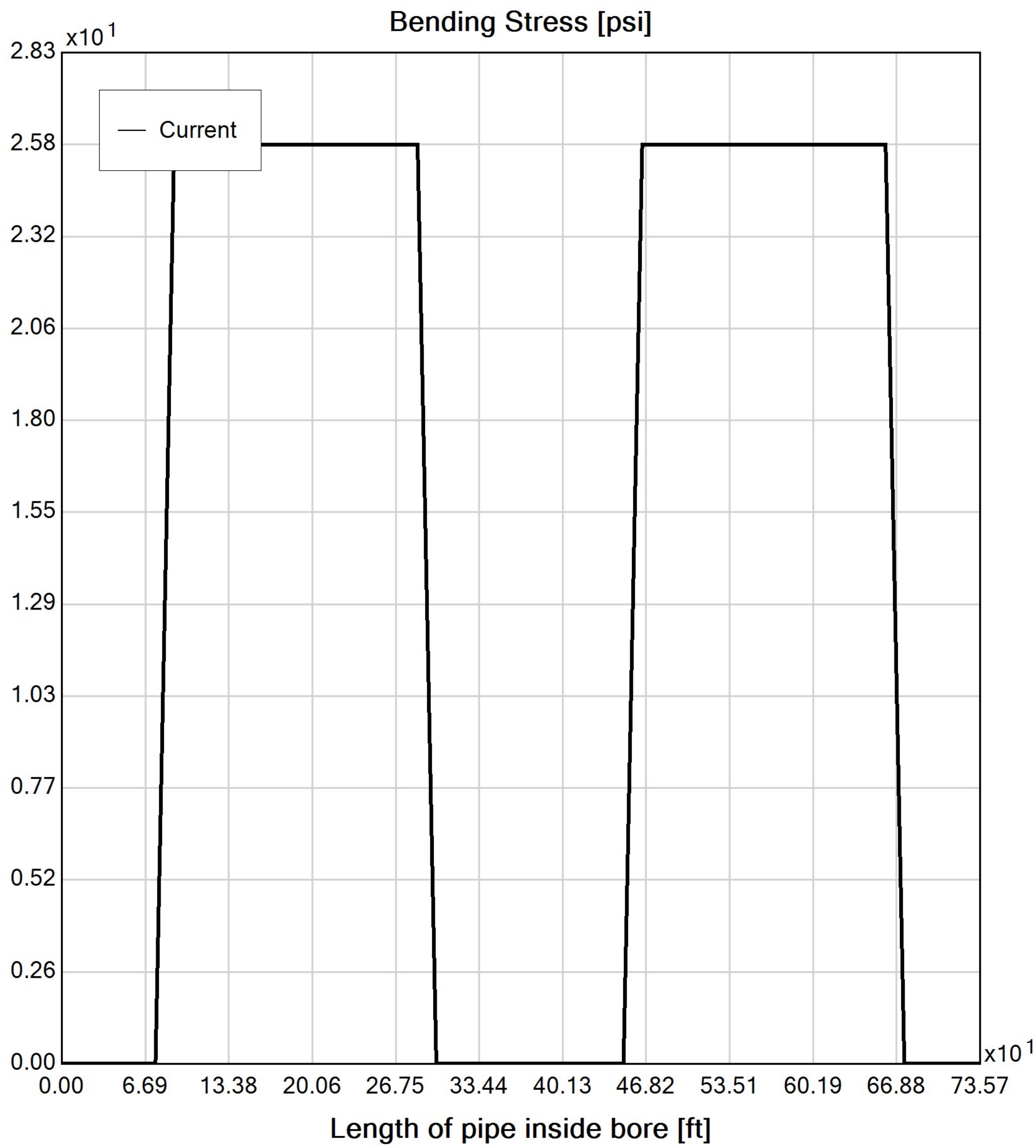
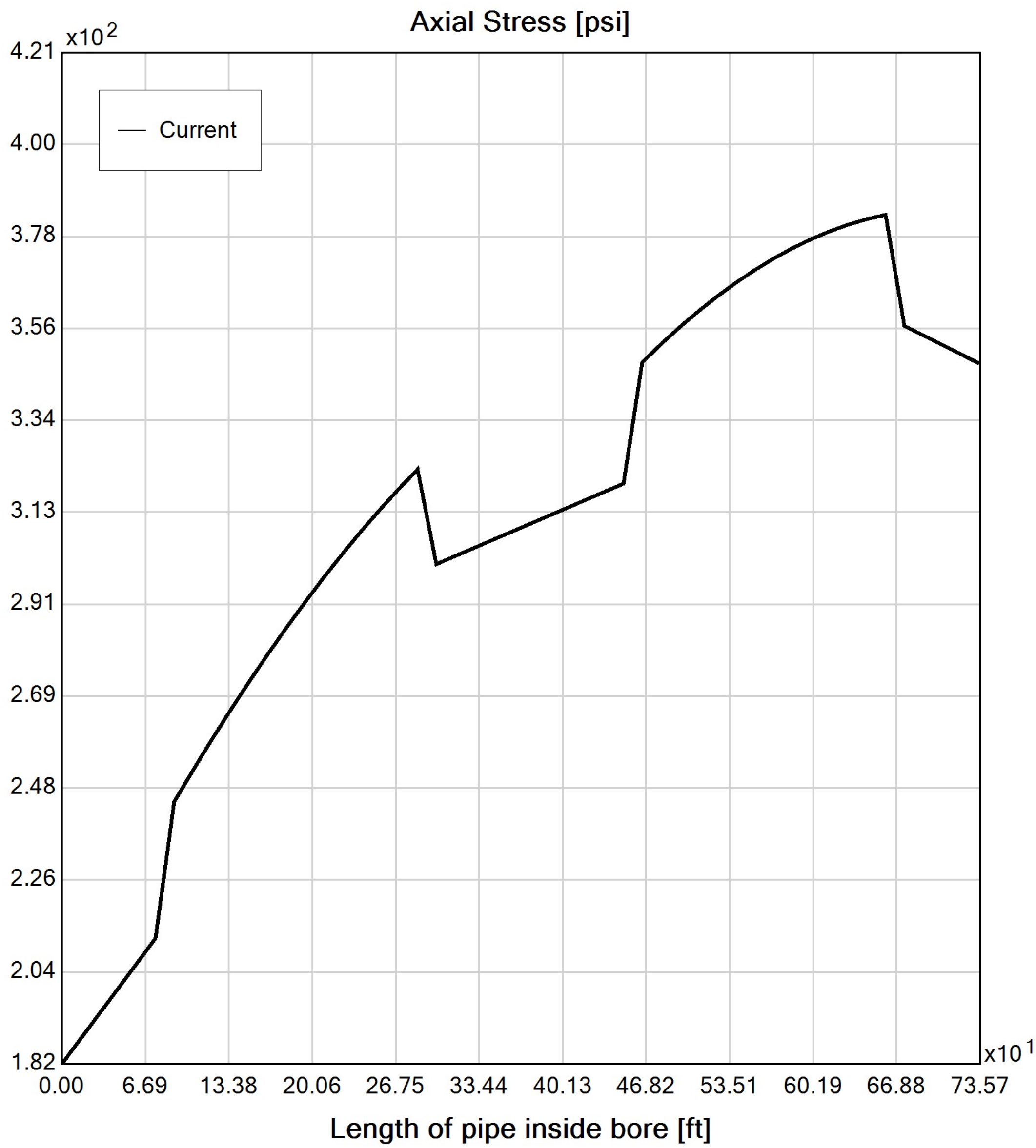
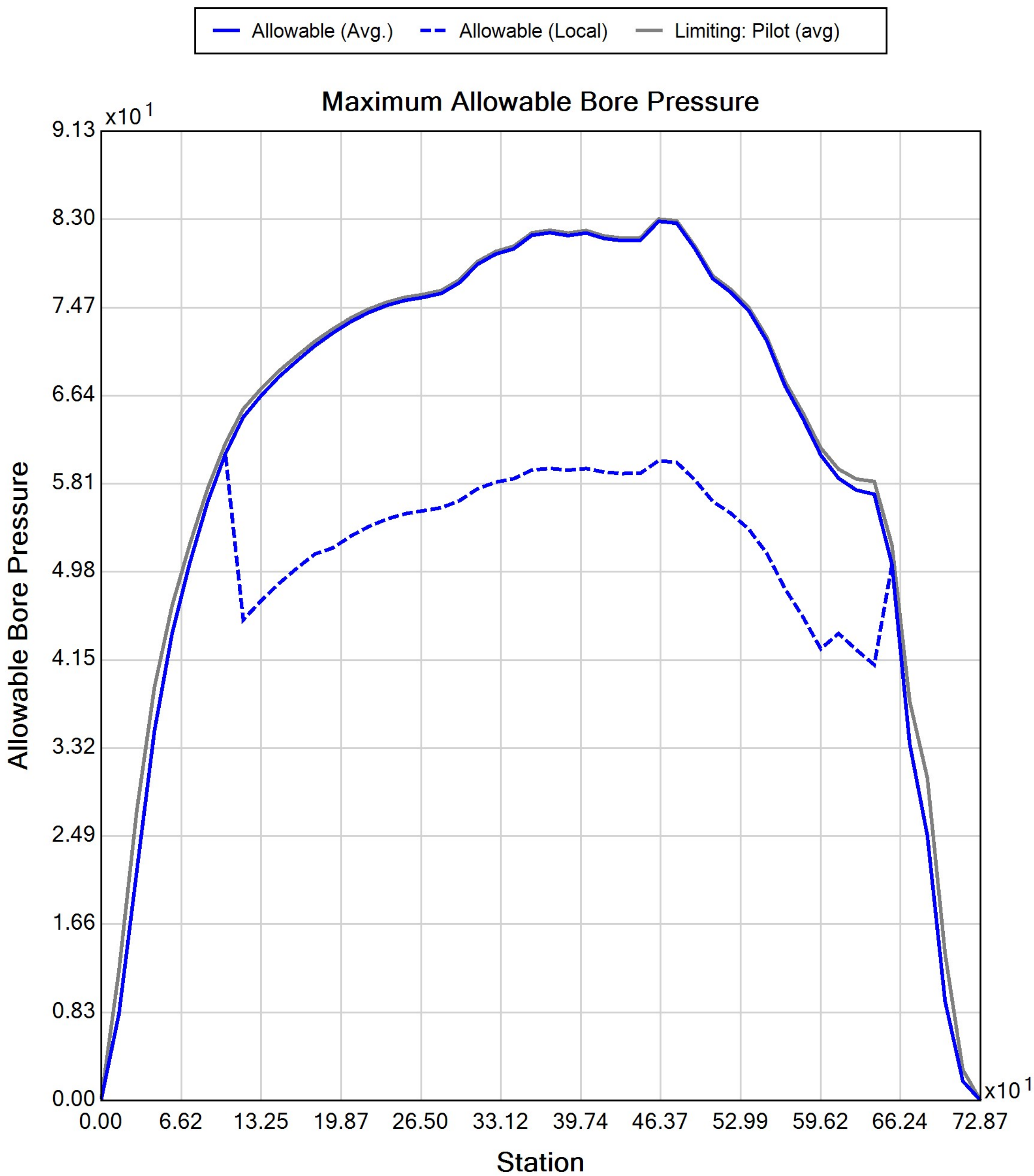


Pull Back Stress [psi]
x10 2
3.93
3.74
3.55
3.35
3.16
2.97
2.78
2.59
2.40
2.21
2.02
1.82
Current
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]



Bending Stress [psi]
x10 1
2.83
2.58
2.32
2.06
1.80
1.55
1.29
1.03
0.77
0.52
0.26
0.00
Current
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]


Axial Stress [psi]
x10 2
Current
4.21
4.00
3.78
3.56
3.34
3.13
2.91
2.69
2.48
2.26
2.04
1.82
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]



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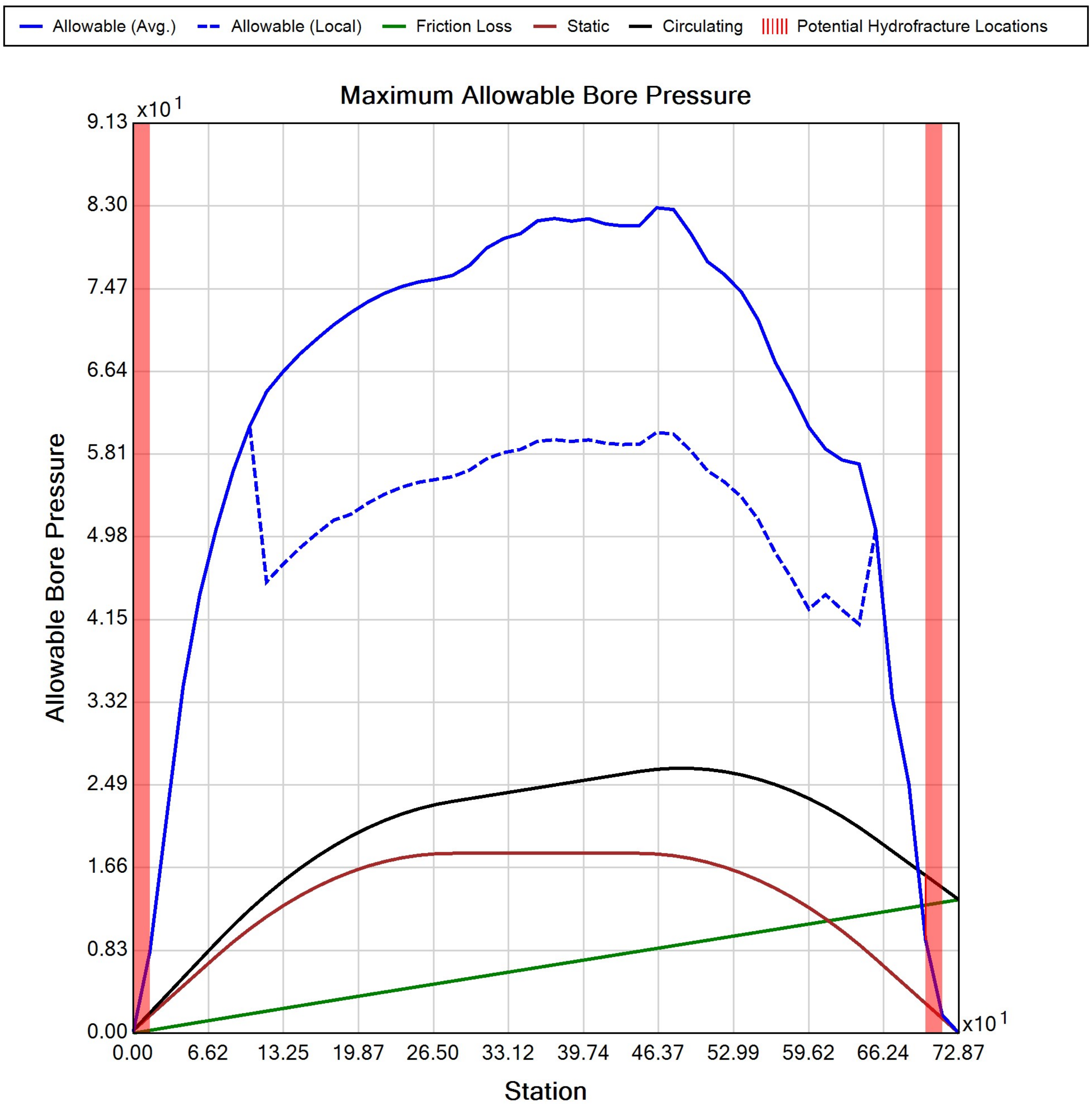
Allowable (Avg.)
Allowable (Local)
Friction Loss
Static
Circulating
Potential Hydrofracture Locations
Maximum Allowable Bore Pressure
x10 1
9.13
8.30
7.47
6.64
5.81
4.98
4.15
3.32
2.49
1.66
0.83
0.00
Allowable Bore Pressure
0.00
6.62
13.25
19.87
26.50
33.12
39.74
46.37
52.99
59.62
66.24
72.87
x10 1
Station

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Project Summary

General:	CHPE HDD 64AA
	P4B
	Start Date: 06-07-2024
	End Date: 06-07-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64AA 2-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 284.00) ft
End Coordinate	(720.00, 0.00, 283.00) ft
Project Length	720.00 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: 735.00 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	1.4	19.1
Water Pressure	11.8	11.8
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.2	30.8
Deflection		
Earth Load Deflection	0.568	5.197
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.597	5.226
Compressive Stress [psi]		
Compressive Wall Stress	59.4	138.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	734.7	734.7
Pullback Stress [psi]	419.8	419.8
Pullback Strain	7.301E-3	7.301E-3
Bending Stress [psi]	5.7	5.7
Bending Strain	9.896E-5	9.896E-5
Tensile Stress [psi]	425.5	425.5
Tensile Strain	7.499E-3	7.499E-3

Net External Pressure = 20.5 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.597	7.5	12.6	OK
Unconstrained Collapse [psi]	24.6	133.2	5.4	OK
Compressive Wall Stress [psi]	59.4	1150.0	19.4	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	34.5	232.7	6.7	OK
Tensile Stress [psi]	425.5	1200.0	2.8	OK

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General:	CHPE HDD 64AA
	P4B
	Start Date: 06-07-2024
	End Date: 06-07-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64AA 10-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 284.00) ft
End Coordinate	(720.00, 0.00, 283.00) ft
Project Length	720.00 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

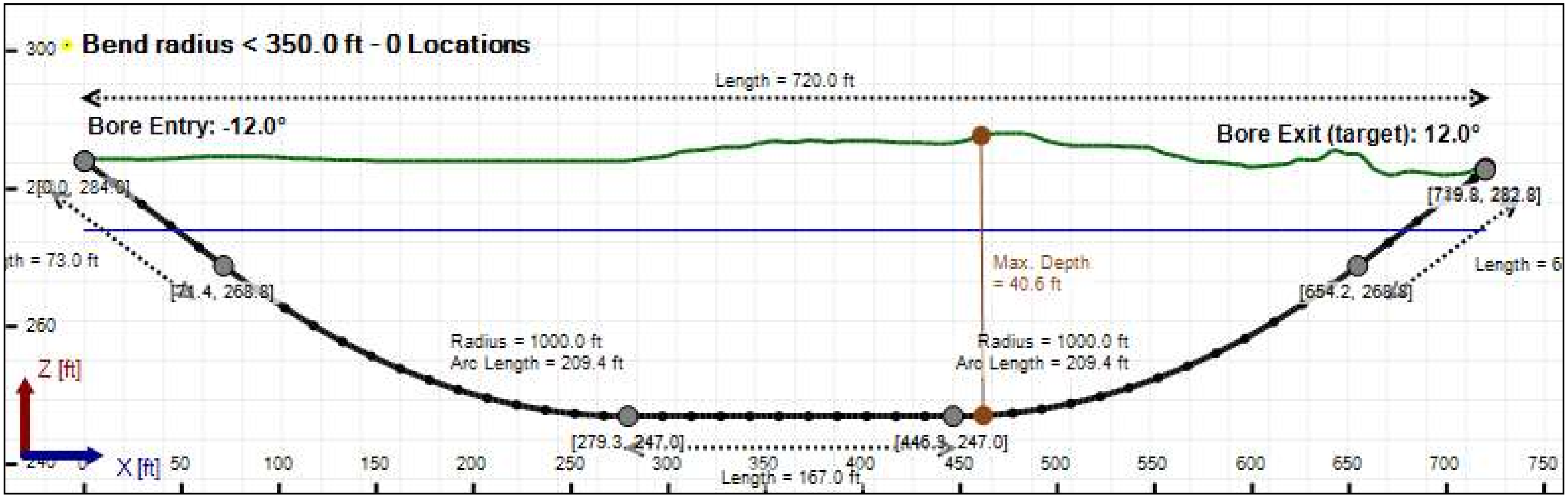
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 200.00, Coh: 0.00 [psi]

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]

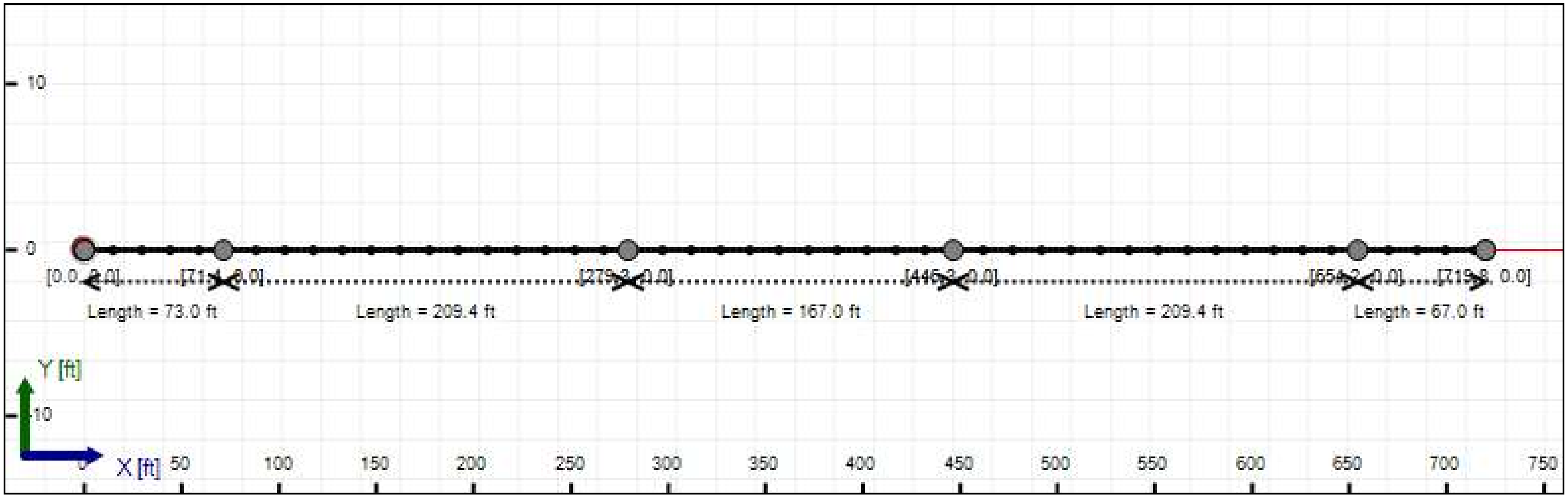
Soil Layer #3 USCS, Silt (M), ML
From Assistant
Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 28.00, S.M.: 50.00, Coh: 0.00 [psi]

Soil Layer #4 USCS, Silt (M), ML
From Assistant
Unit Weight: 90.0000 (dry), 110.0000 (sat) [lb/ft3]
Phi: 32.00, S.M.: 100.00, 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: 735.00 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	3.5	19.0
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	15.2	30.7
Deflection		
Earth Load Deflection	1.116	5.183
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.248	5.315
Compressive Stress [psi]		
Compressive Wall Stress	68.5	138.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	12802.8	12802.8
Pullback Stress [psi]	357.1	357.1
Pullback Strain	6.210E-3	6.210E-3
Bending Stress [psi]	25.8	25.8
Bending Strain	4.479E-4	4.479E-4
Tensile Stress [psi]	382.8	382.8
Tensile Strain	7.105E-3	7.105E-3

Net External Pressure = 20.6 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.248	7.5	6.0	OK
Unconstrained Collapse [psi]	24.5	125.3	5.1	OK
Compressive Wall Stress [psi]	68.5	1150.0	16.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	34.5	234.4	6.8	OK
Tensile Stress [psi]	382.8	1200.0	3.1	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	82.878 psi	61.837 psi
1	8.00 in	12.00 in	82.785 psi	61.428 psi
2	12.00 in	16.13 in	82.650 psi	60.855 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): 120.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

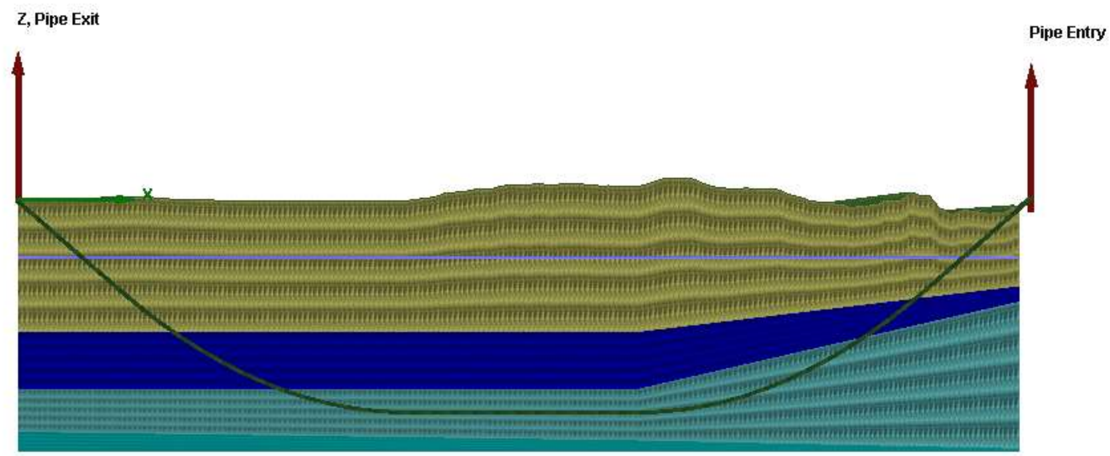
Rheological model: Power-Law

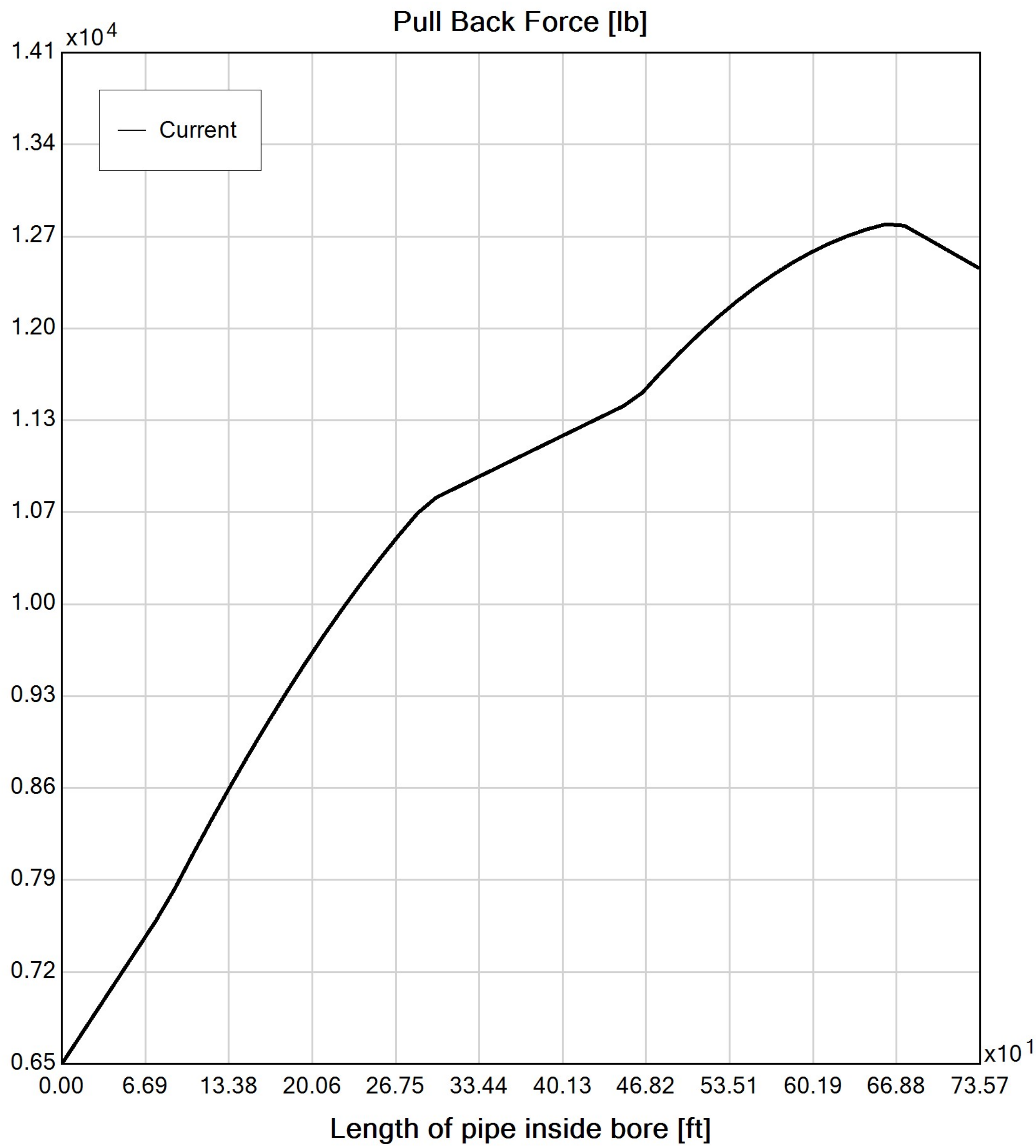
Fluid Consistency Index (K): 63.17

Power Law Exponent (n): 0.14

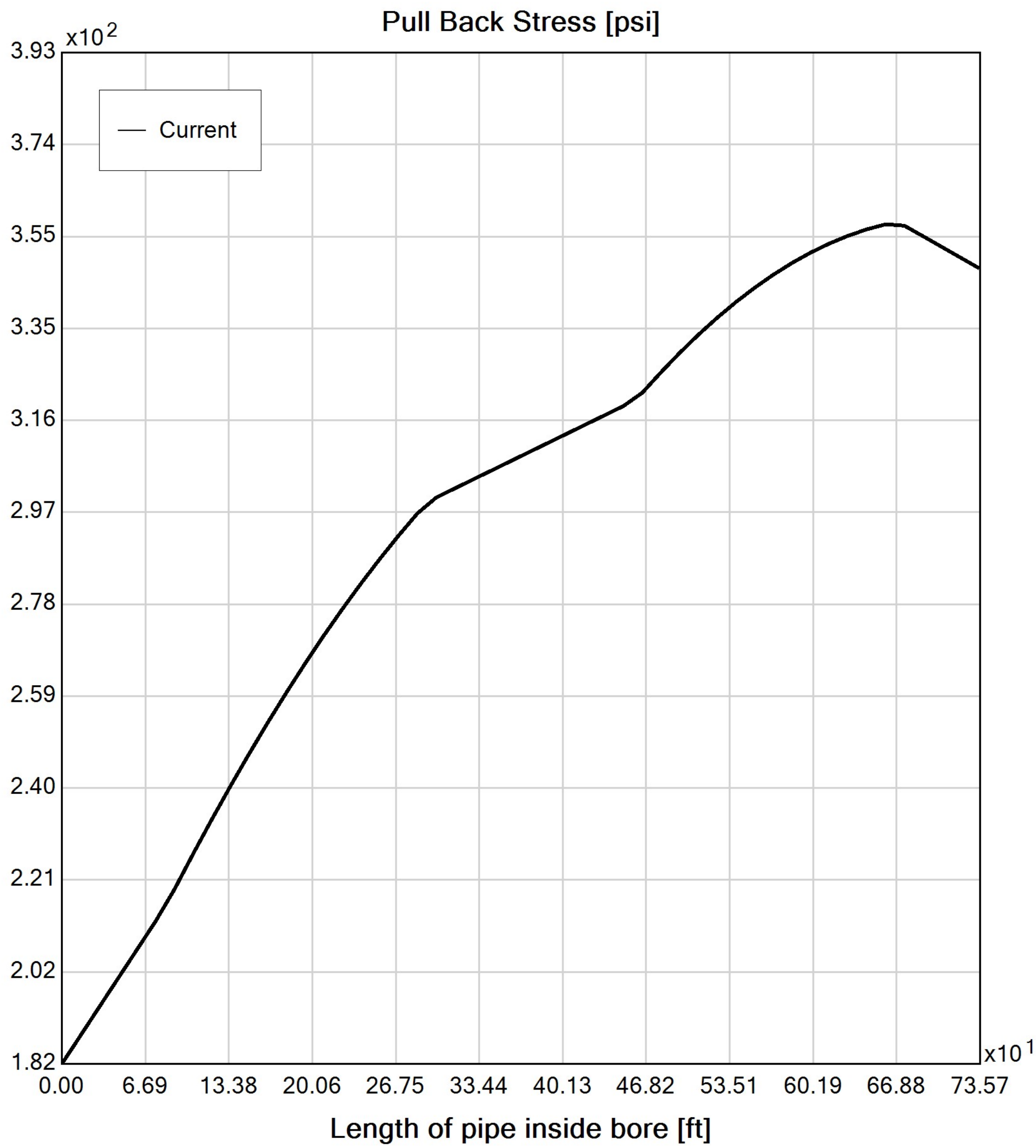
Effective Viscosity (cP): 333.0

Virtual Site

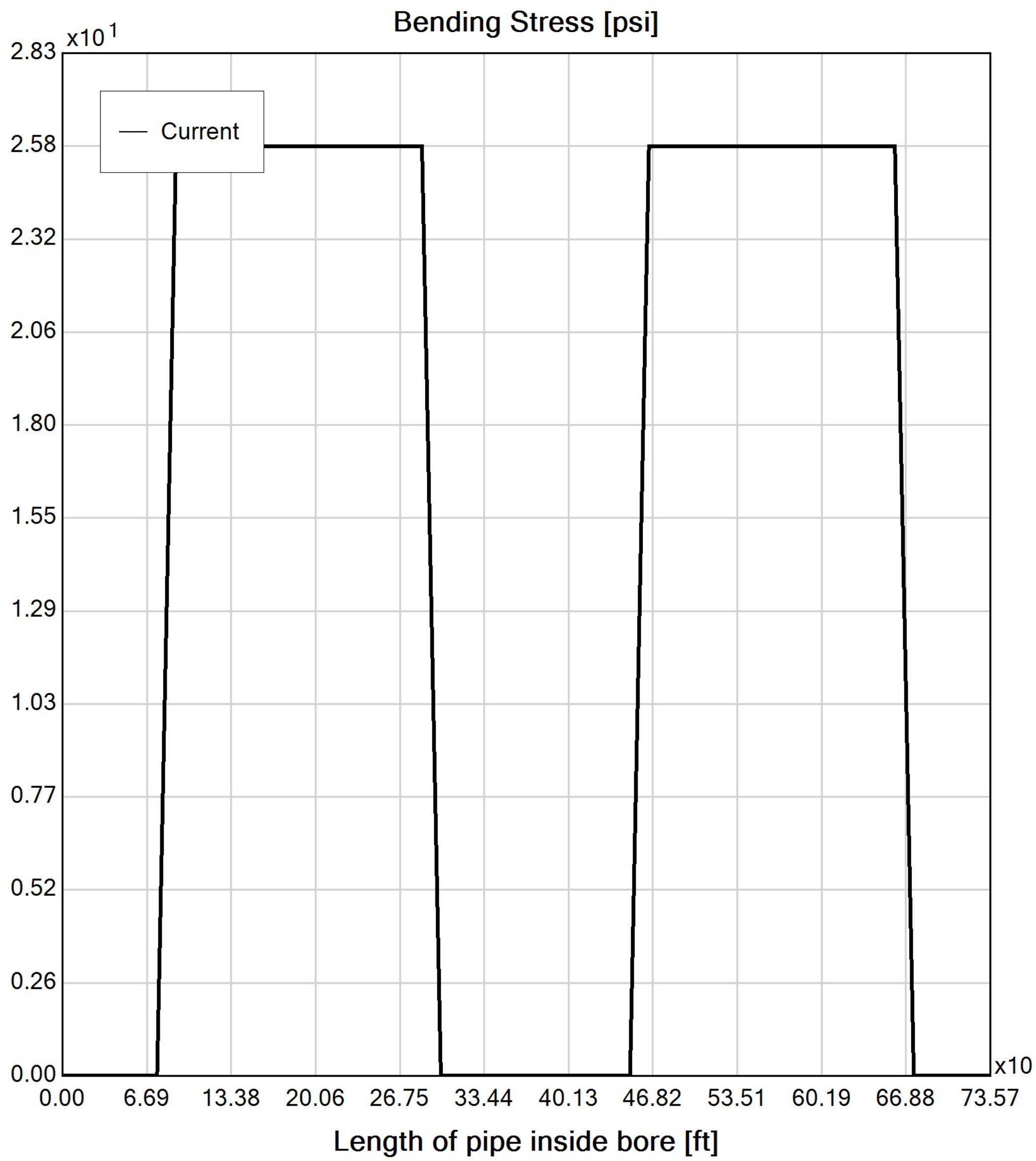




Pull Back Force [lb]
x10 4
1.41
1.34
1.27
1.20
1.13
1.07
1.00
0.93
0.86
0.79
0.72
0.65
Current
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]



Pull Back Stress [psi]
x10 2
3.93
3.74
3.55
3.35
3.16
2.97
2.78
2.59
2.40
2.21
2.02
1.82
Current
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]



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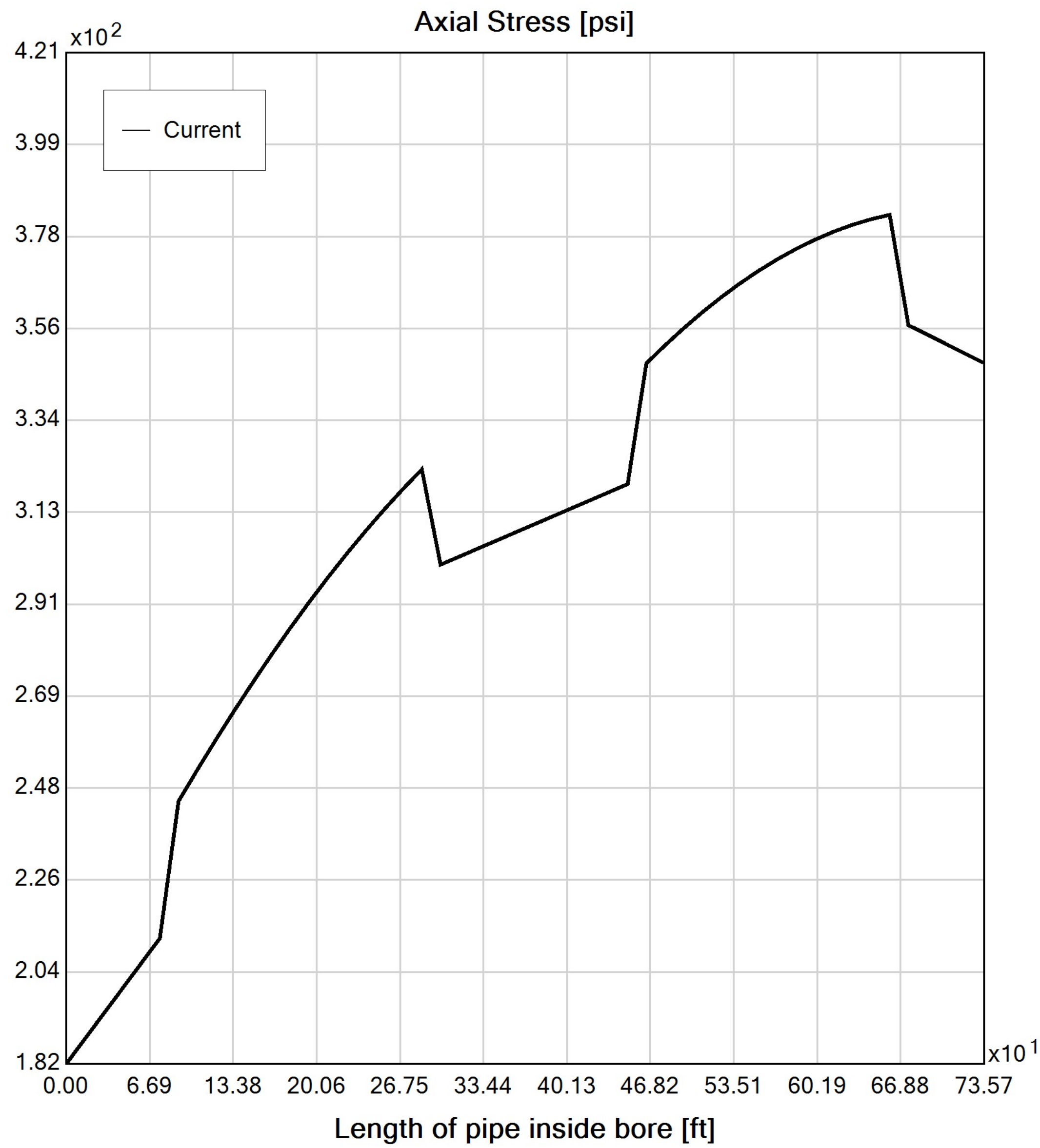
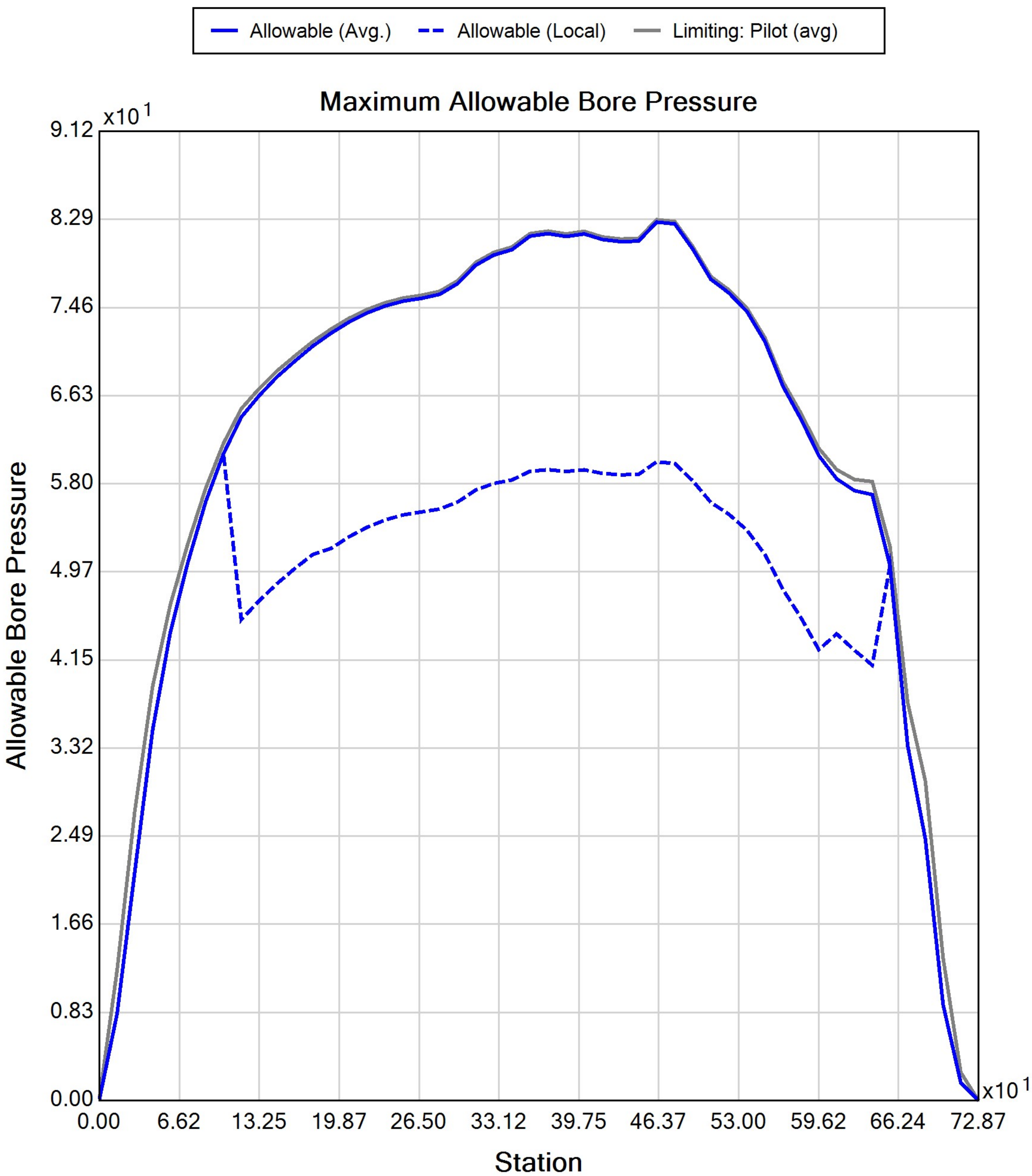

Axial Stress [psi]
x10 2
4.21
3.99
3.78
3.56
3.34
3.13
2.91
2.69
2.48
2.26
2.04
1.82
Current
x10 1
0.00
6.69
13.38
20.06
26.75
33.44
40.13
46.82
53.51
60.19
66.88
73.57
Length of pipe inside bore [ft]



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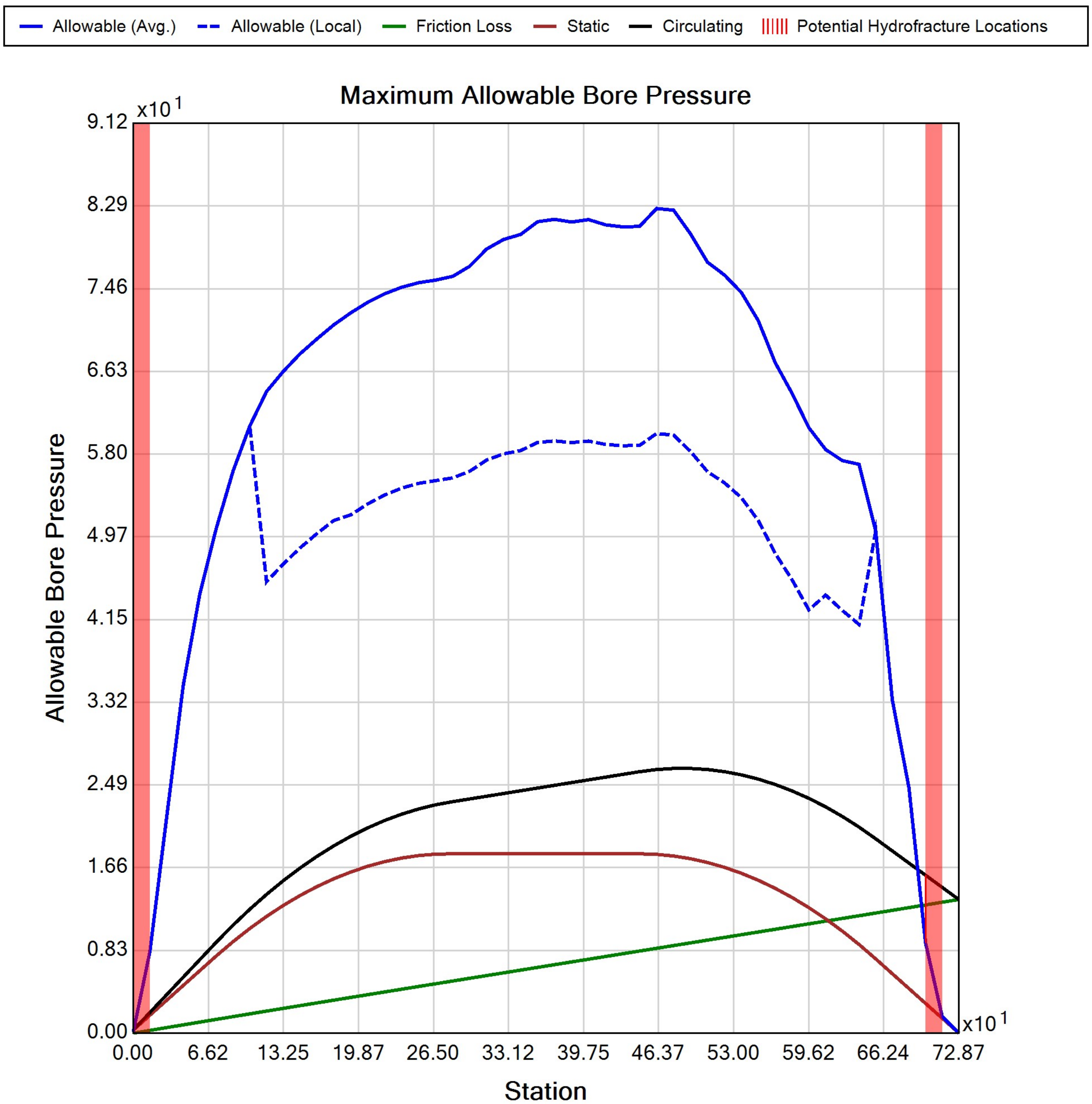

Allowable (Avg.)
Allowable (Local)
Friction Loss
Static
Circulating
Potential Hydrofracture Locations
Maximum Allowable Bore Pressure
x10 1
9.12
8.29
7.46
6.63
5.80
4.97
4.15
3.32
2.49
1.66
0.83
0.00
Allowable Bore Pressure
0.00
6.62
13.25
19.87
26.50
33.12
39.75
46.37
53.00
59.62
66.24
72.87
x10 1
Station

Generated Output

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Project Summary

General:	CHPE HDD 64AA
	P4B
	Start Date: 06-07-2024
	End Date: 06-07-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64AA 2-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 284.00) ft
End Coordinate	(720.00, 0.00, 283.00) ft
Project Length	720.00 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: 735.00 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	1.4	19.0
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.1	30.7
Deflection		
Earth Load Deflection	0.568	5.183
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.597	5.212
Compressive Stress [psi]		
Compressive Wall Stress	59.0	138.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	734.5	734.5
Pullback Stress [psi]	419.7	419.7
Pullback Strain	7.299E-3	7.299E-3
Bending Stress [psi]	5.7	5.7
Bending Strain	9.896E-5	9.896E-5
Tensile Stress [psi]	425.4	425.4
Tensile Strain	7.496E-3	7.496E-3

Net External Pressure = 20.6 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.597	7.5	12.6	OK
Unconstrained Collapse [psi]	24.5	133.2	5.4	OK
Compressive Wall Stress [psi]	59.0	1150.0	19.5	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	34.5	232.7	6.8	OK
Tensile Stress [psi]	425.4	1200.0	2.8	OK

Generated Output

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Project Summary

General:	CHPE HDD 64A REV 1
	P4B
	Start Date: 05-10-2024
	End Date: 05-10-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64A 10-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 283.00) ft
End Coordinate	(1193.00, 0.00, 279.00) ft
Project Length	1193.00 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, 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]

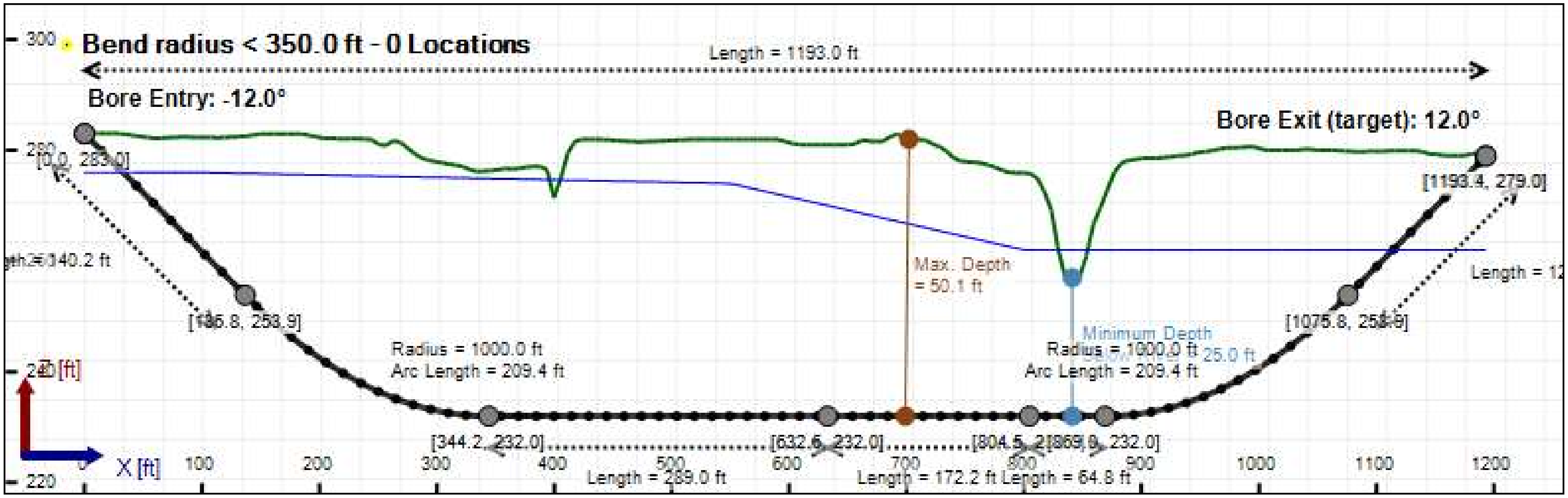
Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks

From Assistant

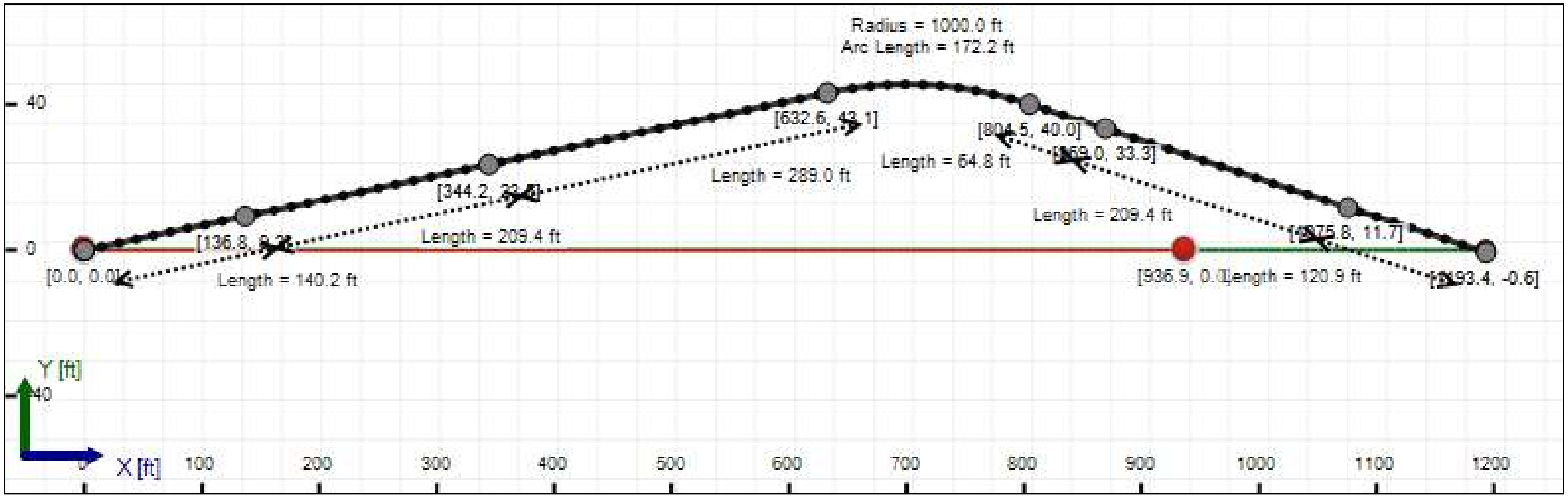
Unit Weight: 160.0000 (dry), 170.0000 (sat) [lb/ft3]

Phi: 37.00, S.M.: 2000.00, Coh: 3000.00 [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: 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	3.4	36.2
Water Pressure	18.4	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	21.8	48.9
Deflection		
Earth Load Deflection	1.723	9.868
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.855	10.000
Compressive Stress [psi]		
Compressive Wall Stress	98.2	220.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	21503.8	21503.8
Pullback Stress [psi]	599.7	599.7
Pullback Strain	1.043E-2	1.043E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	599.7	622.9
Tensile Strain	1.043E-2	1.128E-2

Net External Pressure = 28.3 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.855	7.5	4.0	OK
Unconstrained Collapse [psi]	33.1	117.8	3.6	OK
Compressive Wall Stress [psi]	98.2	1150.0	11.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	43.2	219.7	5.1	OK
Tensile Stress [psi]	622.9	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	8.00 in	2007.315 psi	2023.773 psi
1	8.00 in	12.00 in	2006.393 psi	2023.496 psi
2	12.00 in	16.13 in	2005.054 psi	2023.094 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): 120.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

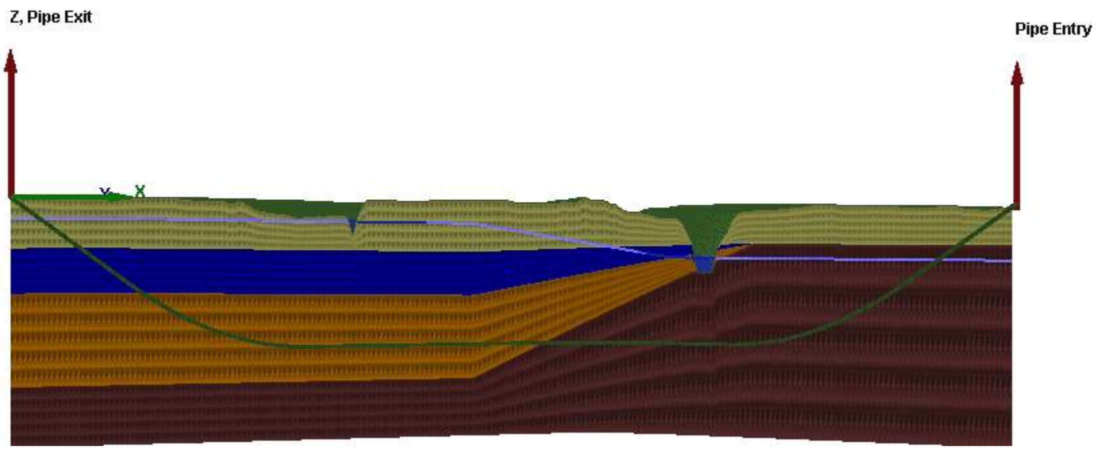
Rheological model: Bingham-Plastic

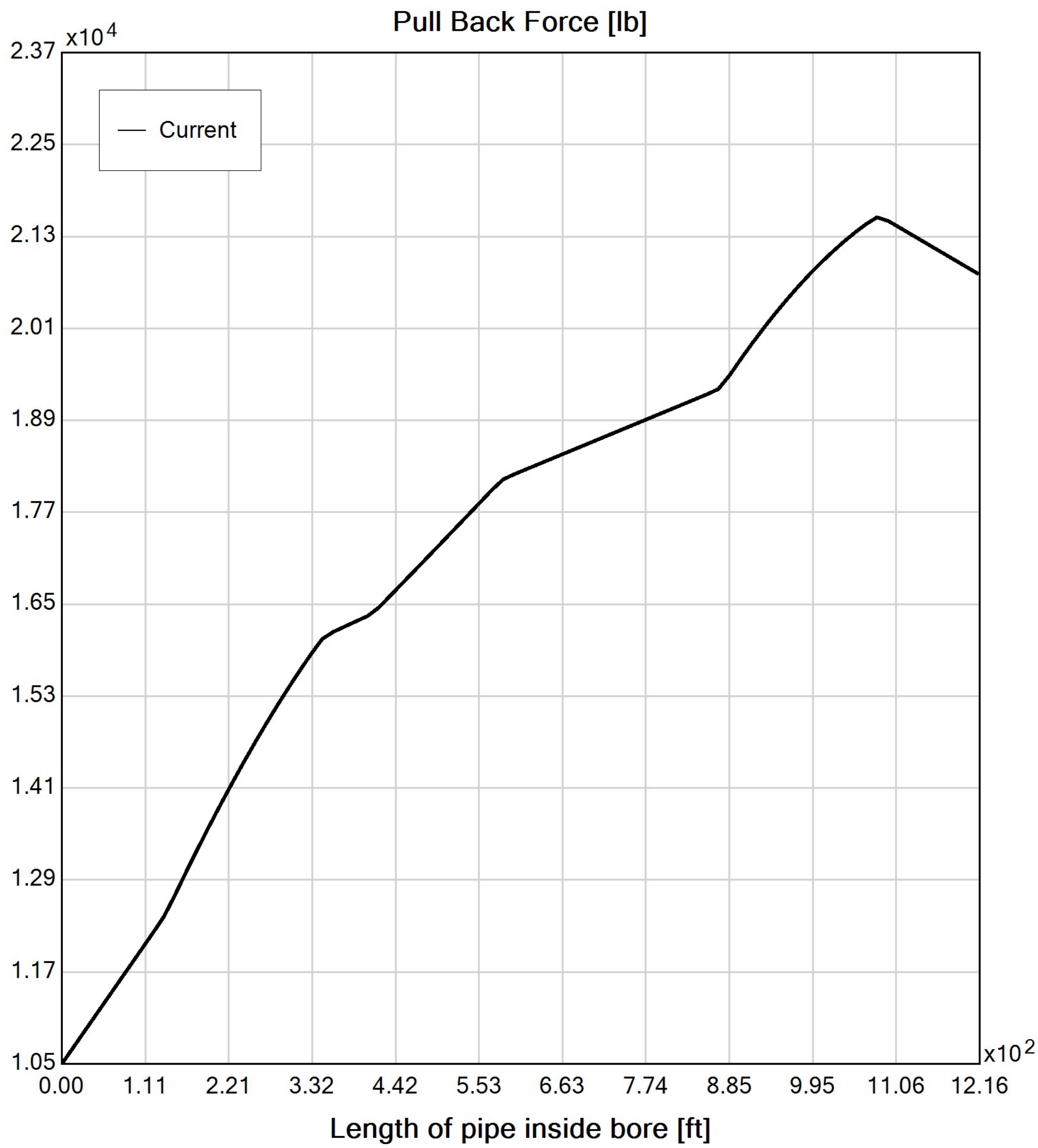
Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

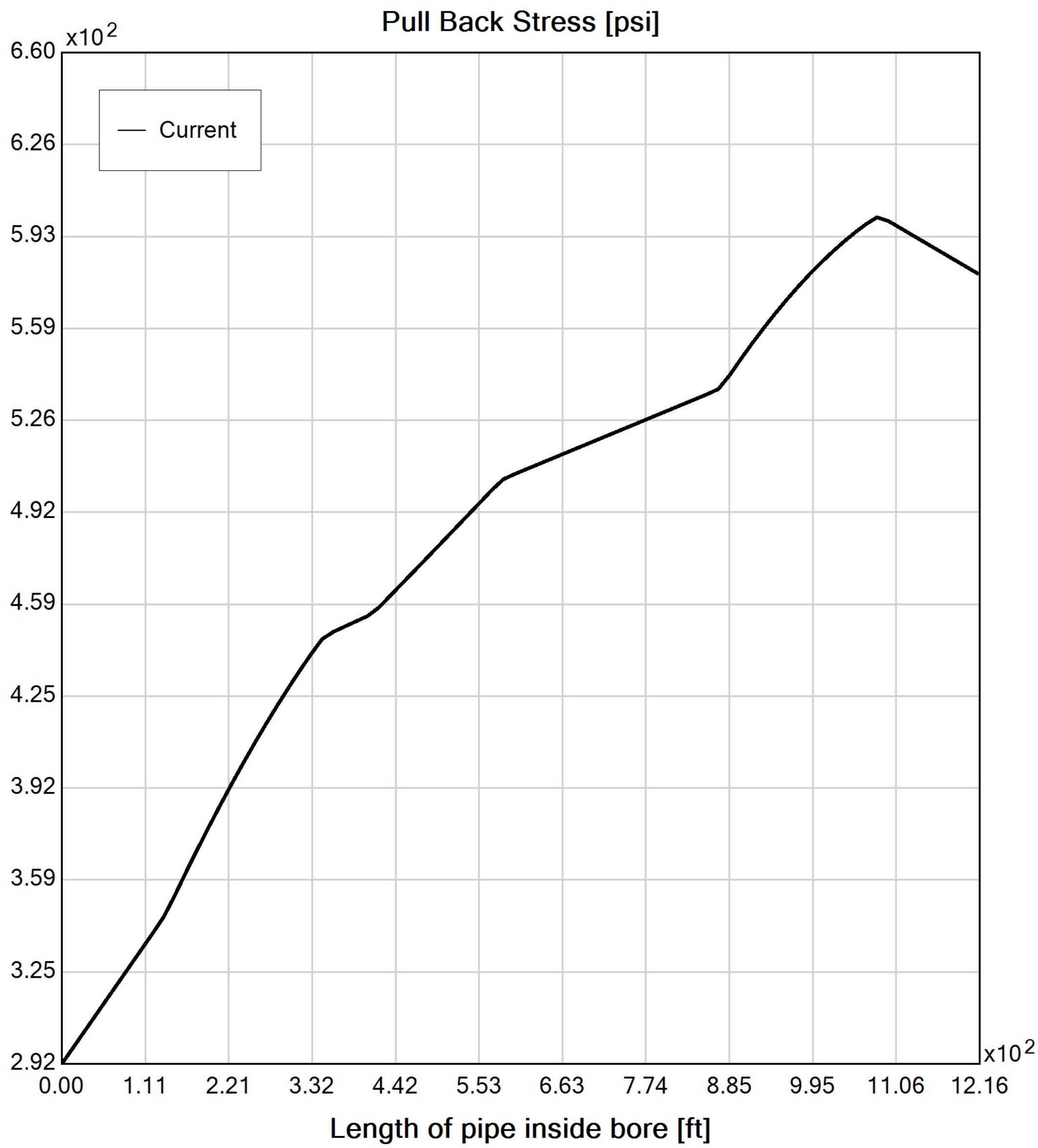
Effective Viscosity (cP): 417.7

Virtual Site

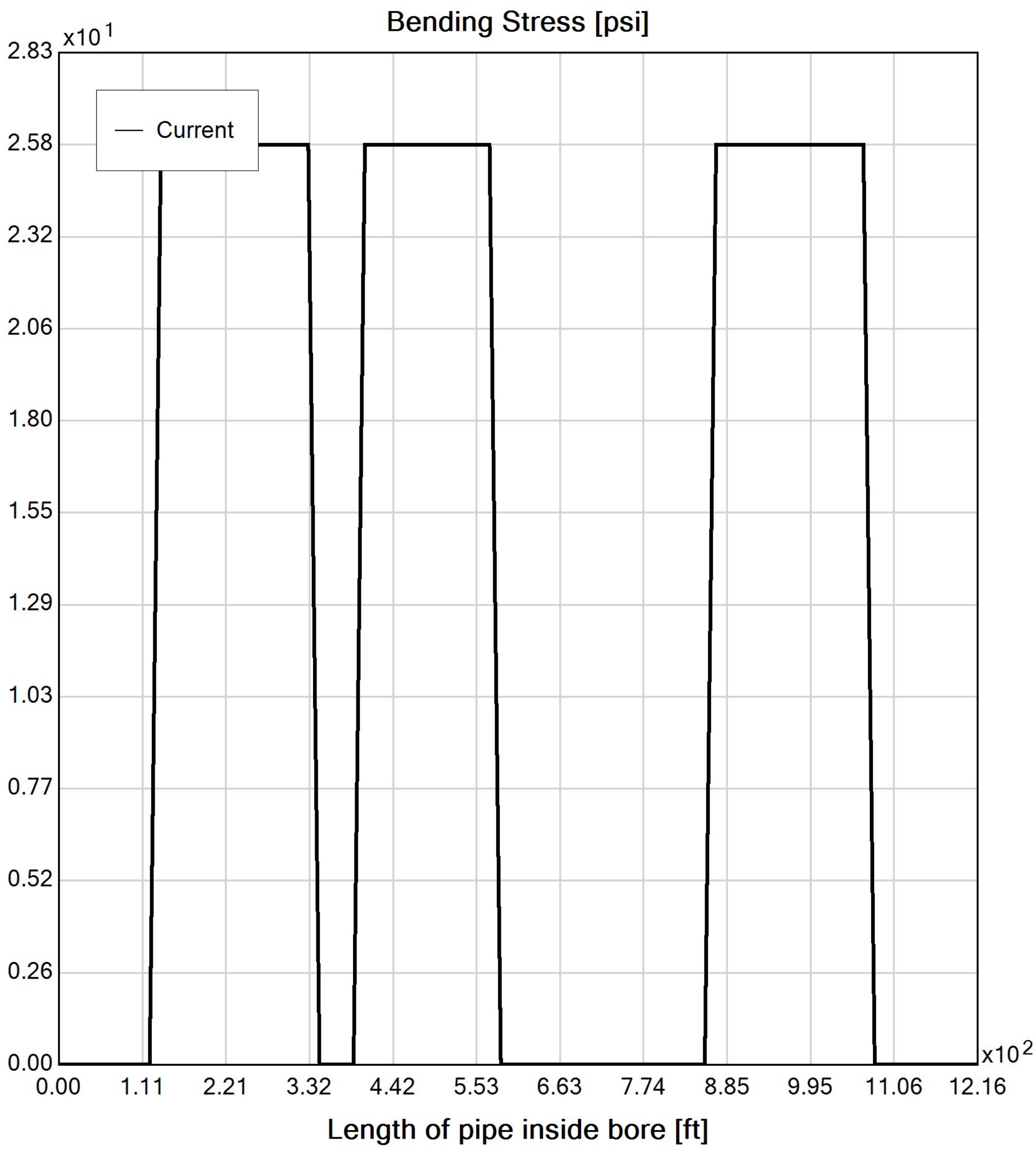




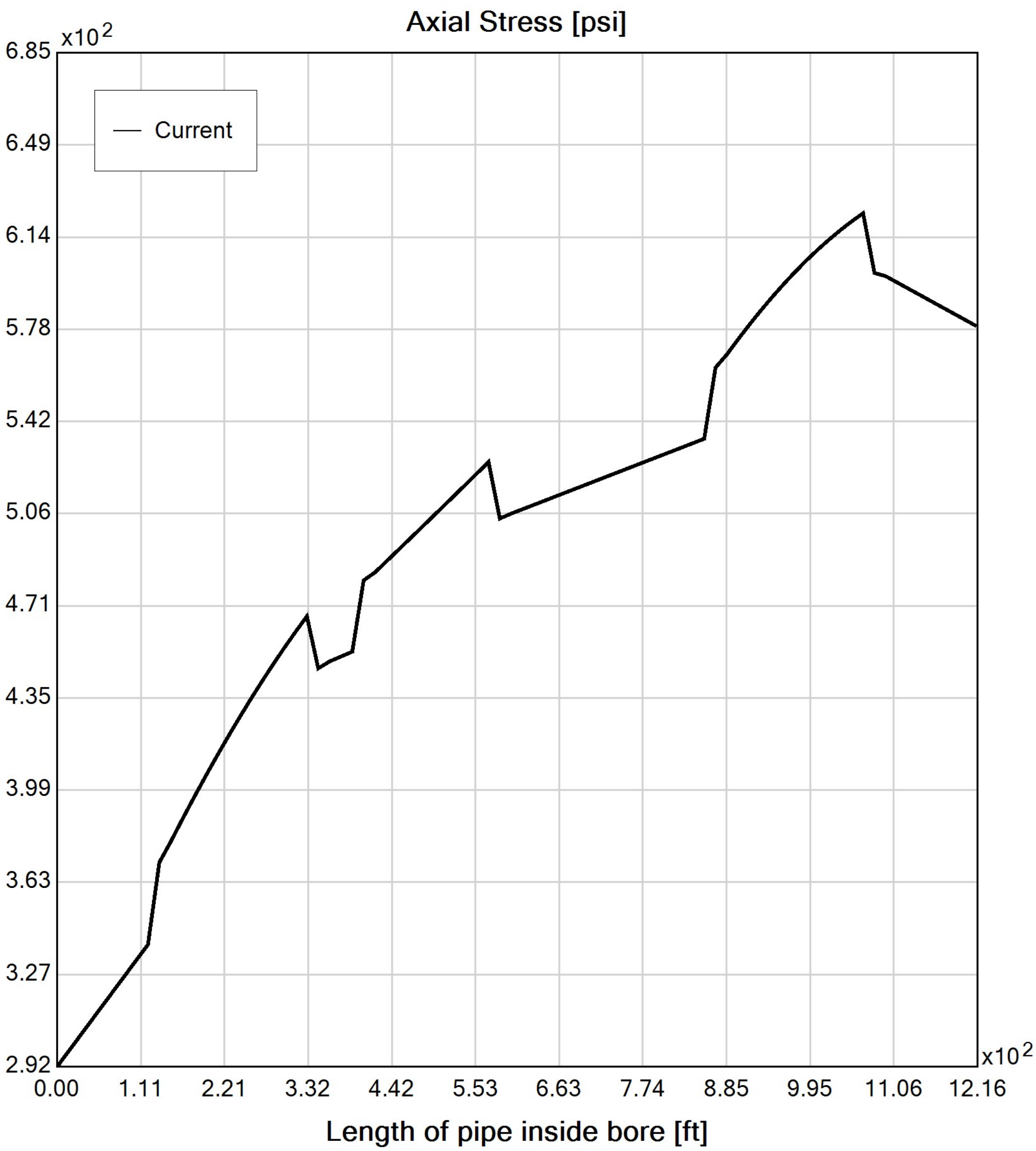
Pull Back Force [lb]
x10^4
2.37
2.25
2.13
2.01
1.89
1.77
1.65
1.53
1.41
1.29
1.17
1.05
Current
x10^2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]

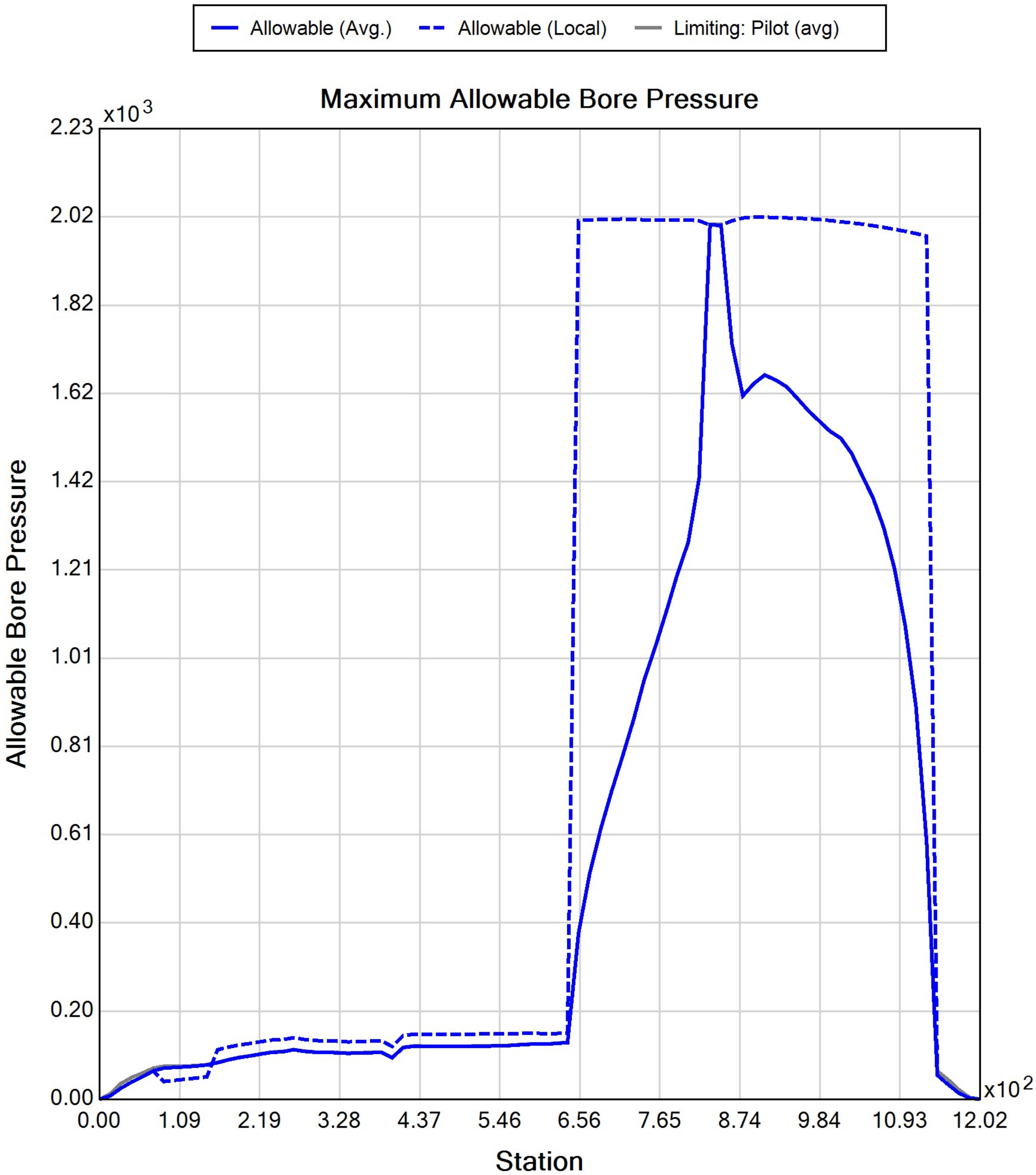


Pull Back Stress [psi]
x10 2
6.60
6.26
5.93
5.59
5.26
4.92
4.59
4.25
3.92
3.59
3.25
2.92
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]

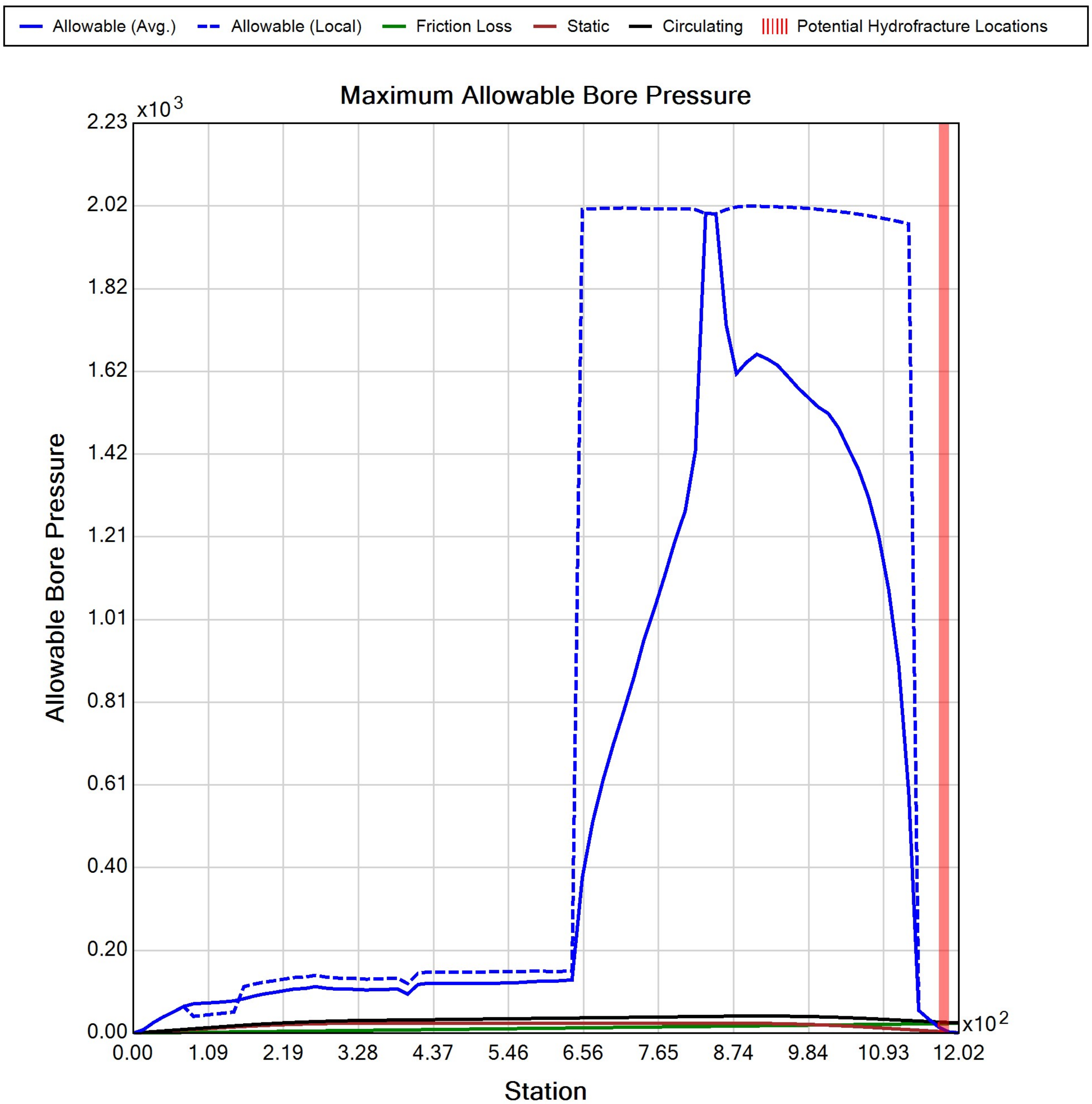


Bending Stress [psi]
x10 1
2.83
2.58
2.32
2.06
1.80
1.55
1.29
1.03
0.77
0.52
0.26
0.00
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]


Axial Stress [psi]
x10 2
6.85
6.49
6.14
5.78
5.42
5.06
4.71
4.35
3.99
3.63
3.27
2.92
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]



Allowable (Avg.)
Allowable (Local)
Limiting: Pilot (avg)
Maximum Allowable Bore Pressure
x10 3
2.23
2.02
1.82
1.62
1.42
1.21
1.01
0.81
0.61
0.40
0.20
0.00
Allowable Bore Pressure
0.00
1.09
2.19
3.28
4.37
5.46
6.56
7.65
8.74
9.84
10.93
12.02
x10 2
Station



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Project Summary

General:	CHPE HDD 64A REV 1
	P4B
	Start Date: 05-10-2024
	End Date: 05-10-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64A 2-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 283.00) ft
End Coordinate	(1193.00, 0.00, 279.00) ft
Project Length	1193.00 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	1.2	36.2
Water Pressure	18.6	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	19.8	48.9
Deflection		
Earth Load Deflection	0.723	9.868
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.752	9.897
Compressive Stress [psi]		
Compressive Wall Stress	89.2	220.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1159.2	1159.2
Pullback Stress [psi]	662.3	662.3
Pullback Strain	1.152E-2	1.152E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	662.3	665.4
Tensile Strain	1.152E-2	1.167E-2

Net External Pressure = 28.3 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.752	7.5	10.0	OK
Unconstrained Collapse [psi]	33.2	130.0	3.9	OK
Compressive Wall Stress [psi]	89.2	1150.0	12.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	43.2	217.6	5.0	OK
Tensile Stress [psi]	665.4	1200.0	1.8	OK

Vermeer | BoreAid®

Generated Output

WARNING: The accuracy of the data obtained by the BoreAid® system is highly dependent upon accurate data gathering, data input and proper use of the software. Vermeer is not responsible for that information. BoreAid® data is not intended to replace the need for future on-site utility locating, measuring and verification procedures, which are essential for accurate placement of new underground installations and avoidance of existing utilities.

CALL YOUR ONE-CALL SYSTEM FIRST

WARNING: Always contact your local One-Call system before the start of your digging project. The BoreAid® system is intended to be used with other utility locating methods, such as the use of the One-Call system and the exposing of existing utilities by potholing.

Locate utilities before drilling. Call 811 (U.S. only) or 1-888-258-0808 (U.S. or Canada) or local utility companies or national regulating authority.

Before you start any digging project, do not forget to call the local One-Call system in your area and any utility company that does not subscribe to the One-Call system. For areas not represented by One-Call Systems International, contact the appropriate utility companies or national regulating authority to locate and mark the underground installations. If you do not call, you may have an accident or suffer injuries; cause interruption of services; damage the environment; or experience job delays.

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 64A REV 1
	P4B
	Start Date: 06-06-2024
	End Date: 06-06-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64A 10-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 283.00) ft
End Coordinate	(1196.00, 0.00, 279.00) ft
Project Length	1196.00 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

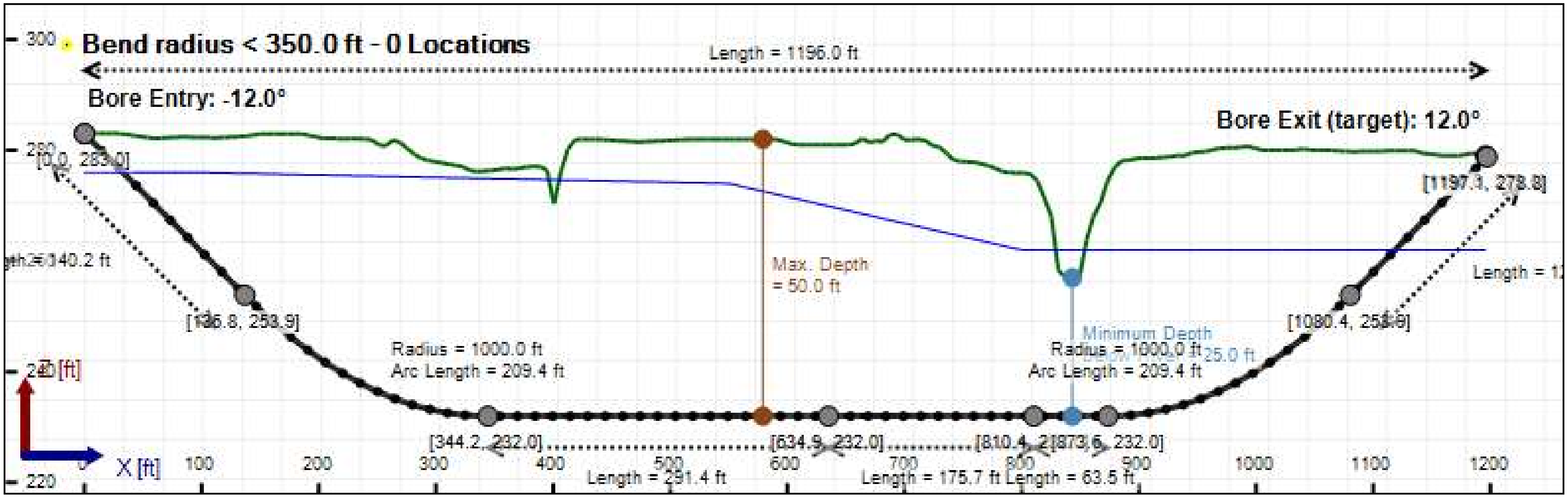
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

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]

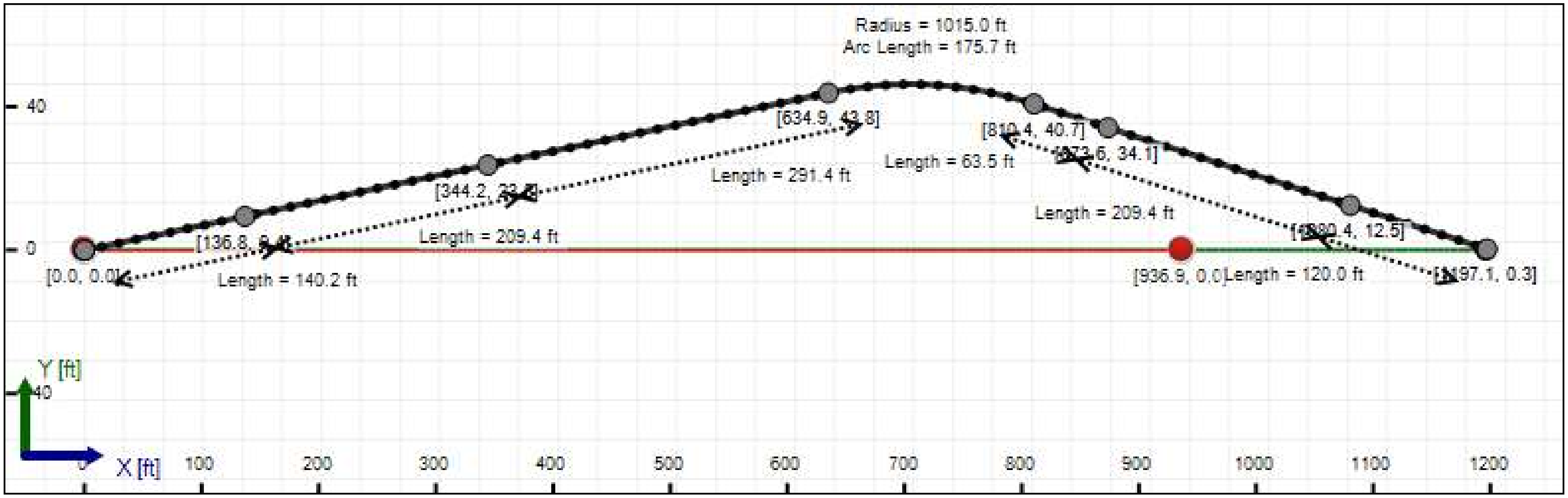
Soil Layer #3 USCS, Sand (S), SW
From Assistant
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, Coh: 0.00 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 160.0000 (dry), 170.0000 (sat) [lb/ft3]
Phi: 37.00, S.M.: 2000.00, Coh: 3000.00 [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: 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	3.4	36.4
Water Pressure	18.4	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	21.8	49.1
Deflection		
Earth Load Deflection	1.723	9.903
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.855	10.035
Compressive Stress [psi]		
Compressive Wall Stress	98.2	221.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	21439.0	21439.0
Pullback Stress [psi]	597.9	597.9
Pullback Strain	1.040E-2	1.040E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	597.9	621.1
Tensile Strain	1.040E-2	1.125E-2

Net External Pressure = 28.3 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.855	7.5	4.0	OK
Unconstrained Collapse [psi]	33.0	117.3	3.5	OK
Compressive Wall Stress [psi]	98.2	1150.0	11.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	43.2	219.8	5.1	OK
Tensile Stress [psi]	621.1	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	8.00 in	2007.316 psi	2023.970 psi
1	8.00 in	12.00 in	2006.393 psi	2023.695 psi
2	12.00 in	16.13 in	2005.055 psi	2023.295 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): 120.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

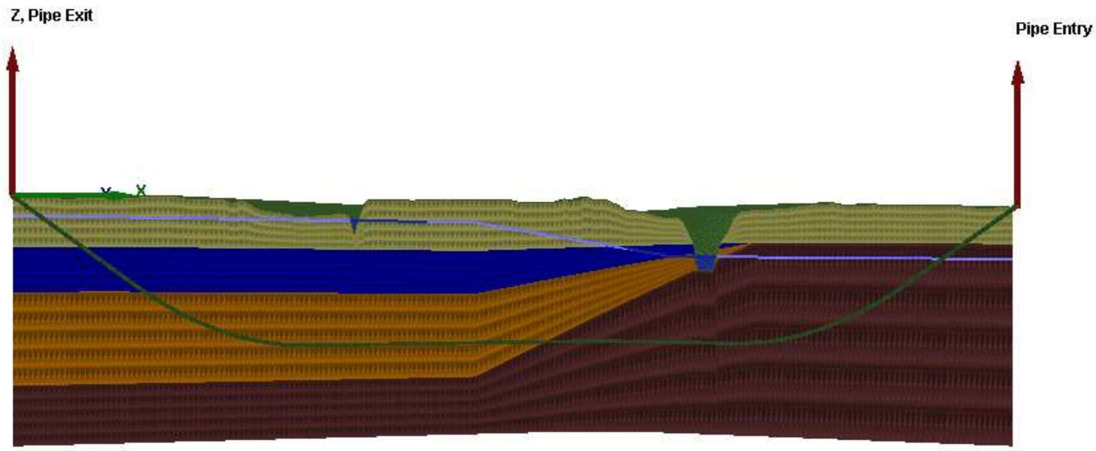
Rheological model: Bingham-Plastic

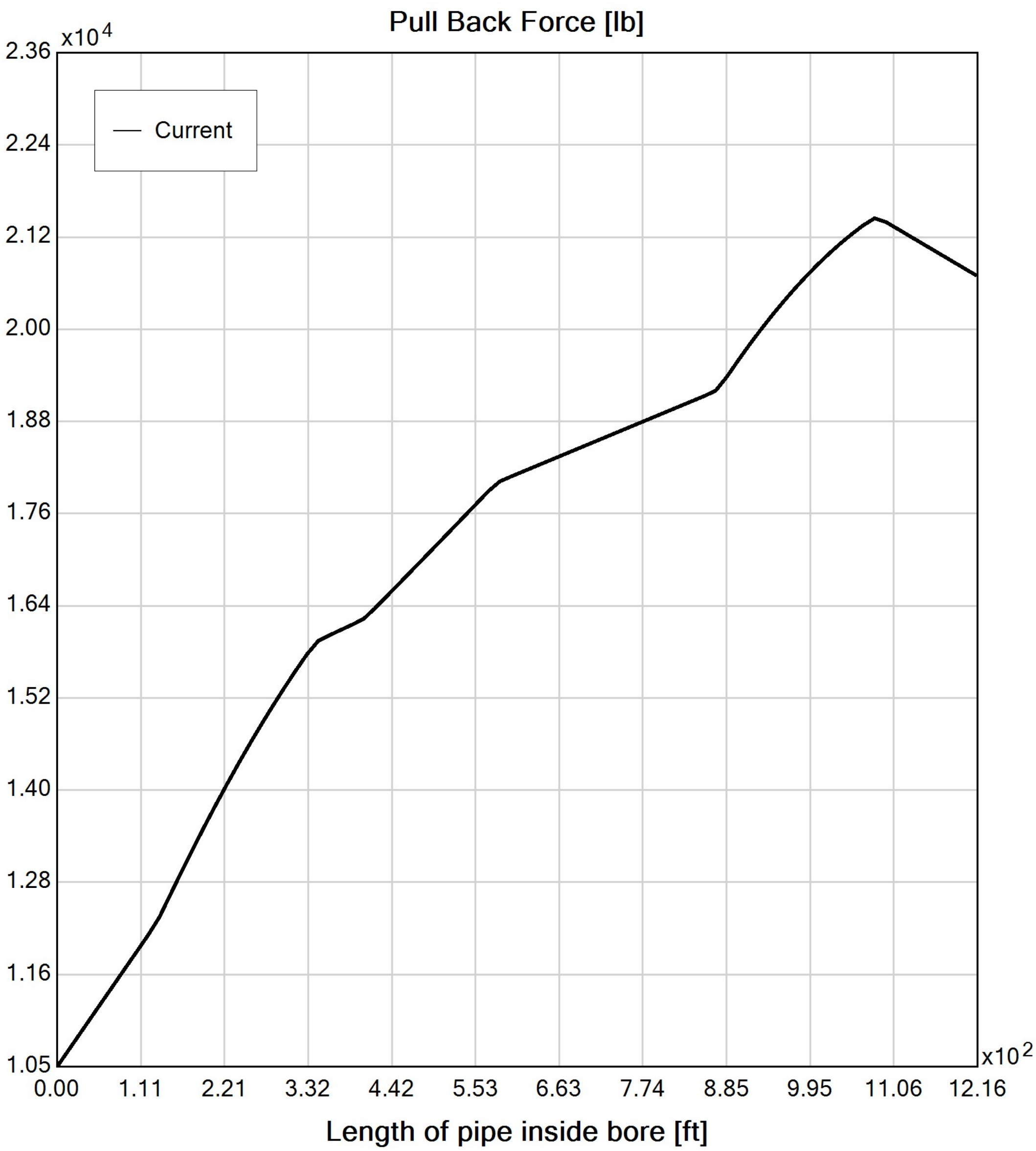
Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

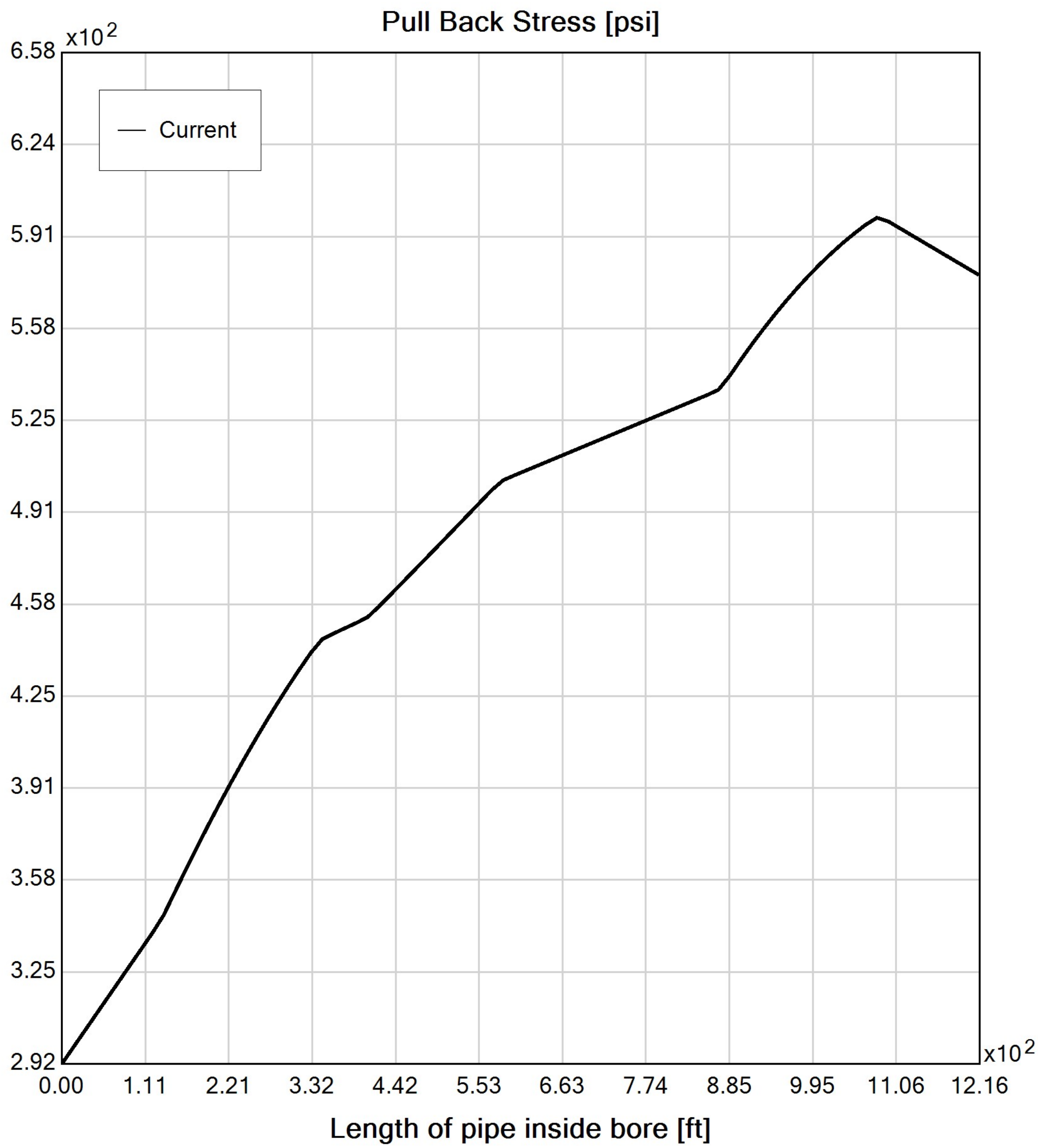
Effective Viscosity (cP): 417.7

Virtual Site

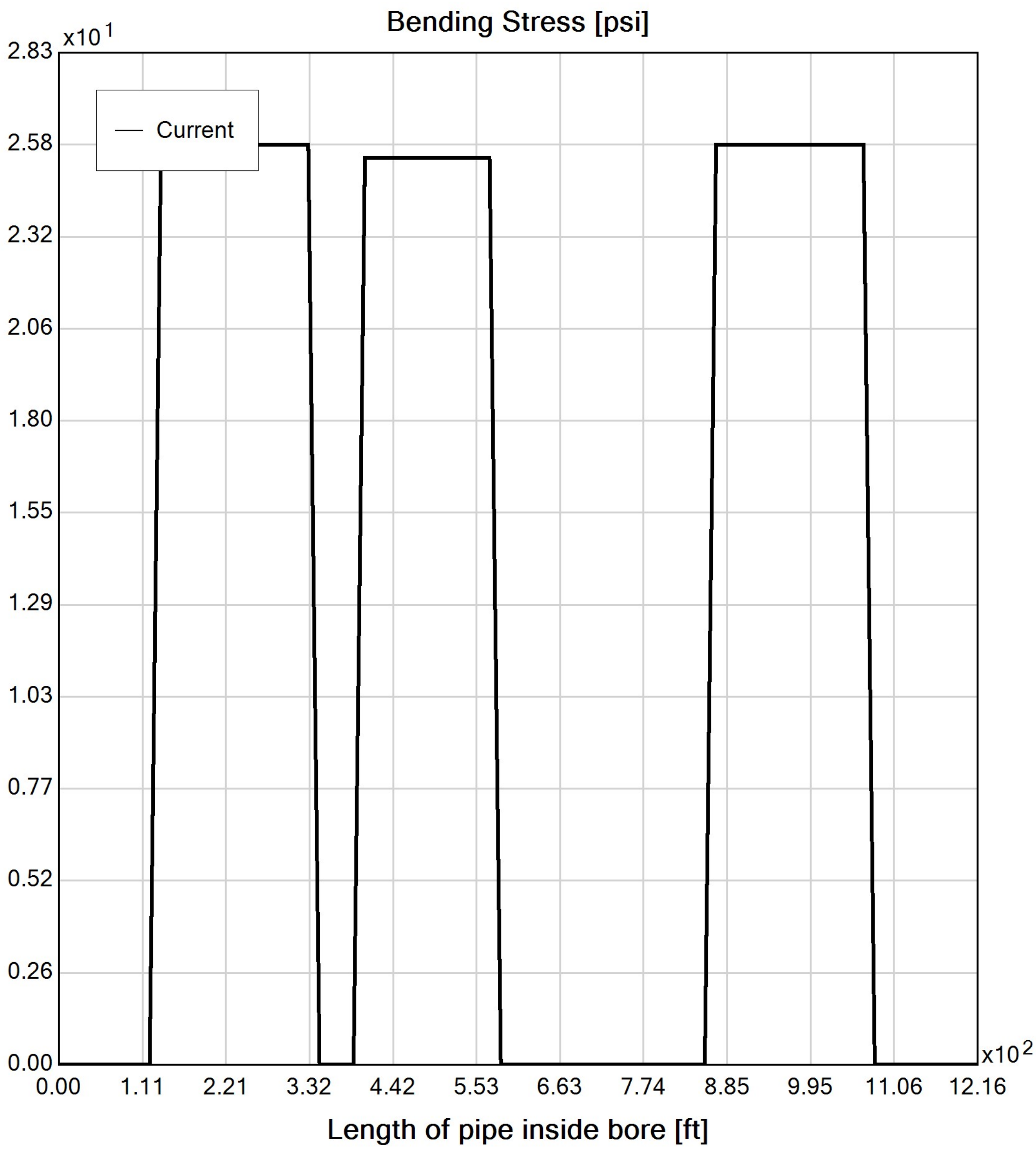


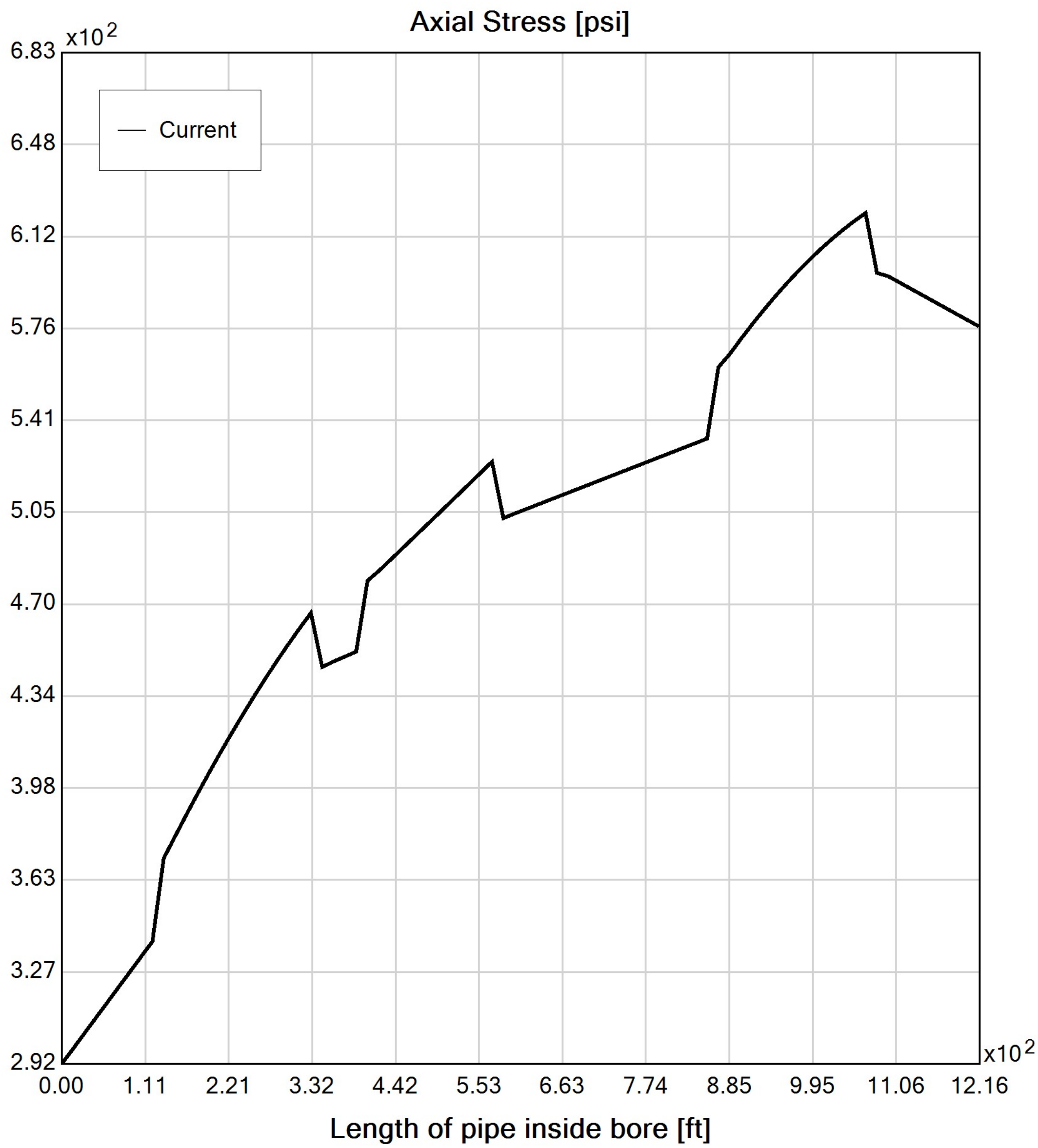


Pull Back Force [lb]
x10^4
2.36
2.24
2.12
2.00
1.88
1.76
1.64
1.52
1.40
1.28
1.16
1.05
Current
x10^2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]

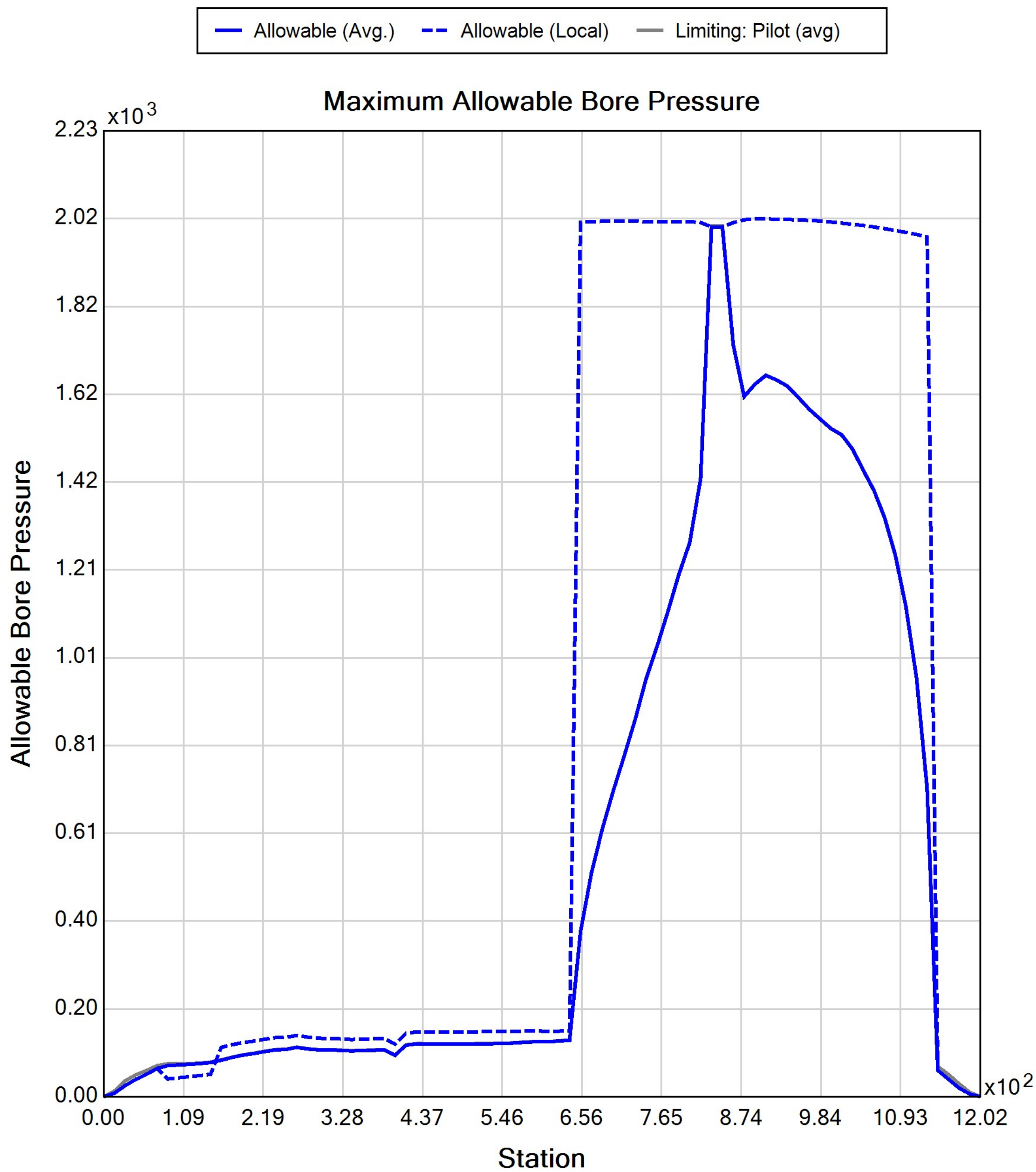


Pull Back Stress [psi]
x10 2
6.58
6.24
5.91
5.58
5.25
4.91
4.58
4.25
3.91
3.58
3.25
2.92
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]

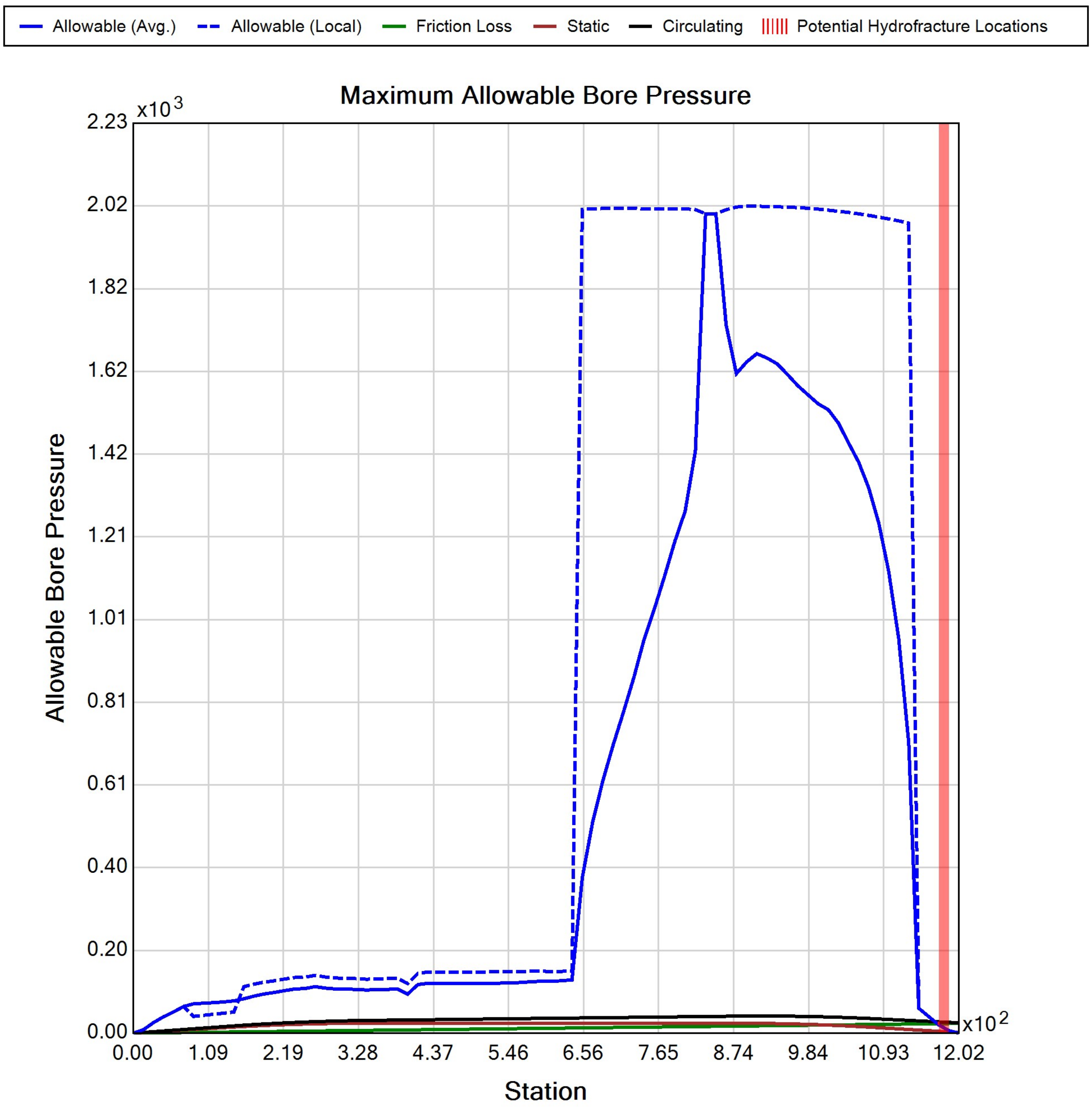

Bending Stress [psi]
x10 1
2.83
2.58
2.32
2.06
1.80
1.55
1.29
1.03
0.77
0.52
0.26
0.00
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]



Axial Stress [psi]
x10 2
6.83
6.48
6.12
5.76
5.41
5.05
4.70
4.34
3.98
3.63
3.27
2.92
Current
x10 2
0.00
1.11
2.21
3.32
4.42
5.53
6.63
7.74
8.85
9.95
11.06
12.16
Length of pipe inside bore [ft]



Powered by Vermeer | BoreAid


Allowable (Avg.)
Allowable (Local)
Friction Loss
Static
Circulating
Potential Hydrofracture Locations
Maximum Allowable Bore Pressure
x10^3
2.23
2.02
1.82
1.62
1.42
1.21
1.01
0.81
0.61
0.40
0.20
0.00
Allowable Bore Pressure
0.00
1.09
2.19
3.28
4.37
5.46
6.56
7.65
8.74
9.84
10.93
12.02
x10^2
Station

Generated Output

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Project Summary

General:	CHPE HDD 64A REV 1
	P4B
	Start Date: 06-06-2024
	End Date: 06-06-2024
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	NDC-0063 HDD 64A 2-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 283.00) ft
End Coordinate	(1196.00, 0.00, 279.00) ft
Project Length	1196.00 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	1.2	36.4
Water Pressure	18.6	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	19.8	49.1
Deflection		
Earth Load Deflection	0.722	9.903
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.751	9.932
Compressive Stress [psi]		
Compressive Wall Stress	89.2	221.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1156.0	1156.0
Pullback Stress [psi]	660.5	660.5
Pullback Strain	1.149E-2	1.149E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	660.5	663.6
Tensile Strain	1.149E-2	1.164E-2

Net External Pressure = 28.3 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

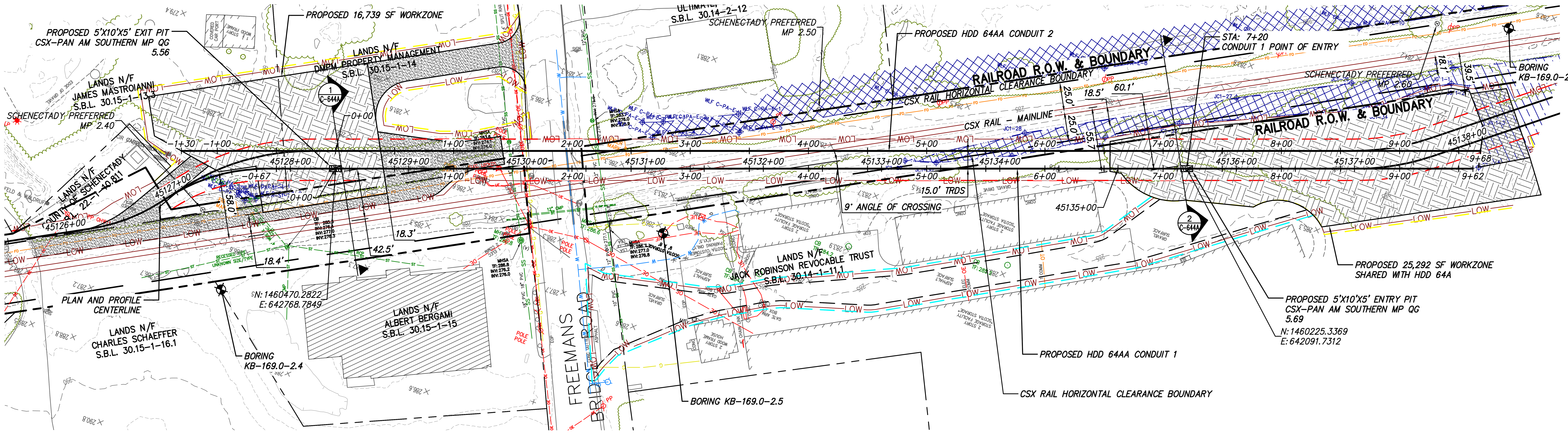
	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.751	7.5	10.0	OK
Unconstrained Collapse [psi]	33.2	130.0	3.9	OK
Compressive Wall Stress [psi]	89.2	1150.0	12.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	43.2	217.7	5.0	OK
Tensile Stress [psi]	663.6	1200.0	1.8	OK

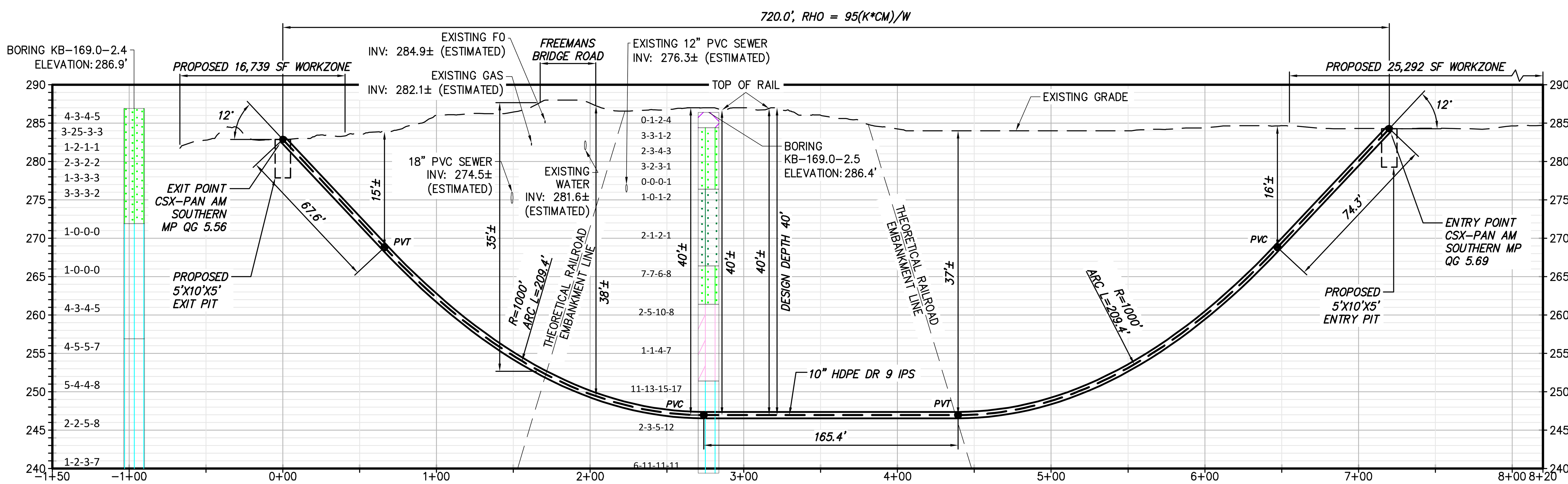
Appendix D

HDD Design Drawings



PROPOSED HDD 64AA PLAN VIEW

CONDUIT 1



PROPOSED HDD 64AA PROFILE

CONDUIT 1

NOTE:
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BORING LOG STRIP LEGEND
B101
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/90%
11000psi =UCS
2D strip logs shown at 10x exaggeration
3D strip logs have no exaggeration

Legend

ASPHALT	Asphalt
Bedrock	Bedrock
Boulder	Boulder
CH	Fat CLAY
CH-MH	SILTY Fat CLAY
CL	Lean CLAY
CL-ML	SILTY CLAY
CONCRETE	Concrete
Fill	Fill
GC	CLAYEY GRAVEL
GC-GM	SILTY CLAYEY GRAVEL
GM	SILTY GRAVEL
GP	Poorly Graded GRAVEL
GP-GC	Poorly Graded Gravel with CLAY
GP-GM	Poorly Graded GRAVEL with SILT
GW	Well Graded GRAVEL
GW-GC	Well Graded GRAVEL with CLAY
GW-GM	Well Graded GRAVEL with SILT
Limestone	Limestone
MH	Elastic SILT
ML	SILT
OH	ORGANIC Fat CLAY
OL	ORGANIC Lean CLAY
OL/OH	ORGANIC SOIL
PT	PEAT
Rock	Rock
Sandstone	Sandstone
SC	CLAYEY SAND
SC-SM	SILT, CLAYEY SAND
SHALE	Shale
SILTSTONE	Siltstone
SM	SILTY SAND
SP	Poorly Graded SAND
SP-SC	Poorly Graded SAND with CLAY
SP-SM	Poorly Graded SAND with SILT
SW	Well graded SAND
SW-SC	Well Graded SAND with CLAY
SW-SM	Well Graded SAND with SILT
Topsoil	Topsoil
USGS 601	Gravel or Conglomerate 1
USGS 654	Subgraywacke
USGS 670	Interbedded Sandstone and Shale
USGS 702	Quartzite
USGS 705	Schist
USGS 705	Schist
USGS 708	Gneiss
USGS 708	Gneiss
USGS 718	Granite 1
Void	Void
Water	Water
Weathered Rock	Undefined
Water Table	Water Table during drilling
Delayed Water Table	Water Table after drilling

CHPE Champlain Hudson Power Express

PROJECT NO.: 21162 — Kiewit

PROJECT NO.: 066076 — Drawing Copyright © 2023 CHA, III Winners Circle, PO Box 5269, Albany, NY 12205-0269, 518.453.4500 - www.chacompanies.com

ALTERED ON:

AFFIXED ON: 06/12/2024

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LANDSCAPE ARCHITECT OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

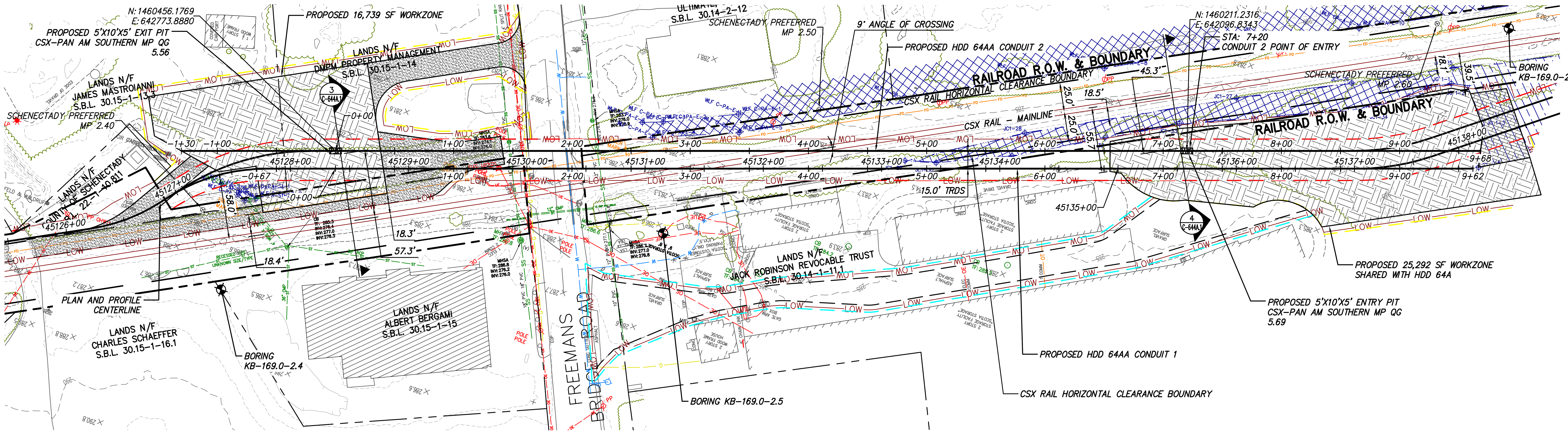
No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
0	06/12/2024	NDC-0063: ISSUED FOR CONSTRUCTION SUBMISSION	MCS	JEO

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN
PLAN AND PROFILE - HDD 64AA, CONDUIT 1

DRAWN BY: KDL DESIGNED BY: MCS APPROVED BY: JEO SCALE AS NOTED DATE: 07/28/2023

PERMIT DRAWING NO. C-304B

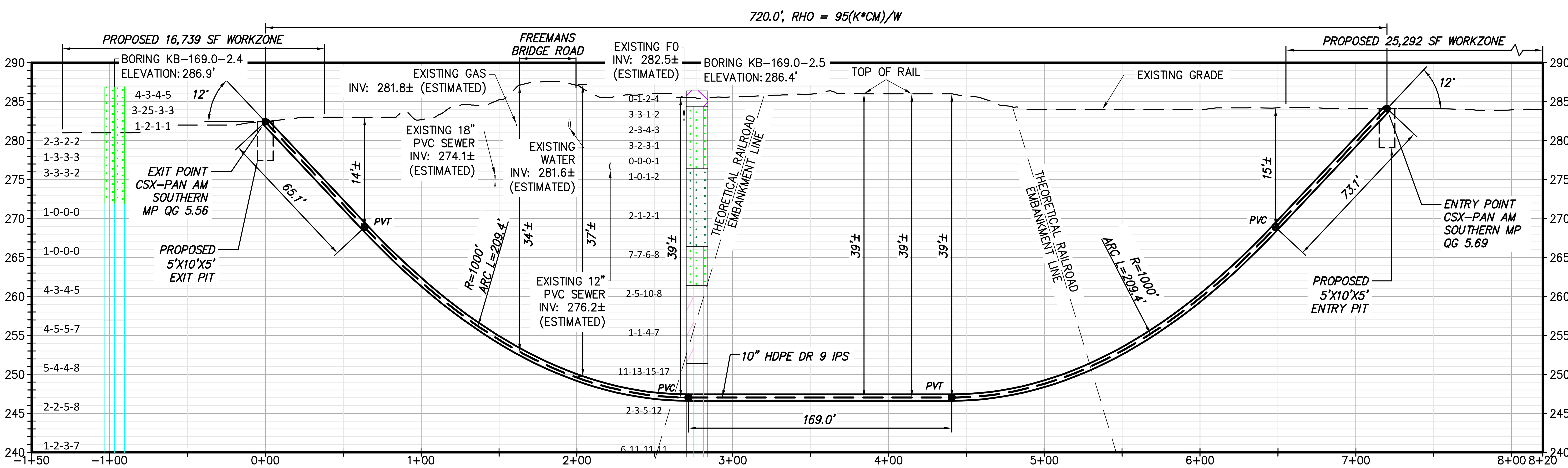
DRAWING NO. C-304B



Scale in feet (0, 50, 100)

PROPOSED HDD 64AA PLAN VIEW

CONDUIT 2



Scale in feet (0, 50, 100; 0, 10, 20)

PROPOSED HDD 64AA PROFILE

CONDUIT 2

NOTE:
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BORING LOG STRIP LEGEND

B101
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/90%
11000psi =UCS
2D strip logs shown at 10x exaggeration
3D strip logs have no exaggeration

Legend

ASPHALT	Asphalt
Bedrock	Bedrock
Boulder	Boulder
CH	Fat CLAY
CH-MH	SILTY Fat CLAY
CL	Lean CLAY
CL-ML	SILTY CLAY
CONCRETE	Concrete
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GC-GM	SILTY CLAYEY GRAVEL
GM	SILTY GRAVEL
GP	Poorly Graded GRAVEL
GP-GC	Poorly Graded Gravel with CLAY
GP-GM	Poorly Graded GRAVEL with SILT
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GW-GC	Well Graded GRAVEL with CLAY
GW-GM	Well Graded GRAVEL with SILT
Limestone	Limestone
MH	Elastic SILT
ML	SILT
OH	ORGANIC Fat CLAY
OL	ORGANIC Lean CLAY
OL/OH	ORGANIC SOIL
PT	PEAT
Rock	Rock
Sandstone	Sandstone
SC	CLAYEY SAND
SC-SM	SILT, CLAYEY SAND
SHALE	Shale
SILTSTONE	Siltstone
SM	SILTY SAND
SP	Poorly Graded SAND
SP-SC	Poorly Graded SAND with CLAY
SP-SM	Poorly Graded SAND with SILT
SW	Well graded SAND
SW-SC	Well Graded SAND with CLAY
SW-SM	Well Graded SAND with SILT
Topsoil	Topsoil
USGS 601	Gravel or Conglomerate 1
USGS 654	Subgraywacke
USGS 670	Interbedded Sandstone and Shale
USGS 702	Quartzite
USGS 705	Schist
USGS 705	Schist
USGS 708	Gneiss
USGS 708	Gneiss
USGS 718	Granite 1
Void	Void
Water	Water
Weathered Rock	Undefined
Water Table	Water Table during drilling
Delayed Water Table	Water Table after drilling

CHPE Champlain Hudson Power Express | Kiewit | CHA

PROJECT NO.: 21162 | PROJECT NO.: 066076 | ALTERED ON: | AFFIXED ON: 06/12/2024

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Albany, NY 12205-0269
518.453.4500 - www.chacompanies.com

STATE OF NEW YORK — JEFFREY O'DONNELL — 087450 — LICENSED PROFESSIONAL ENGINEER

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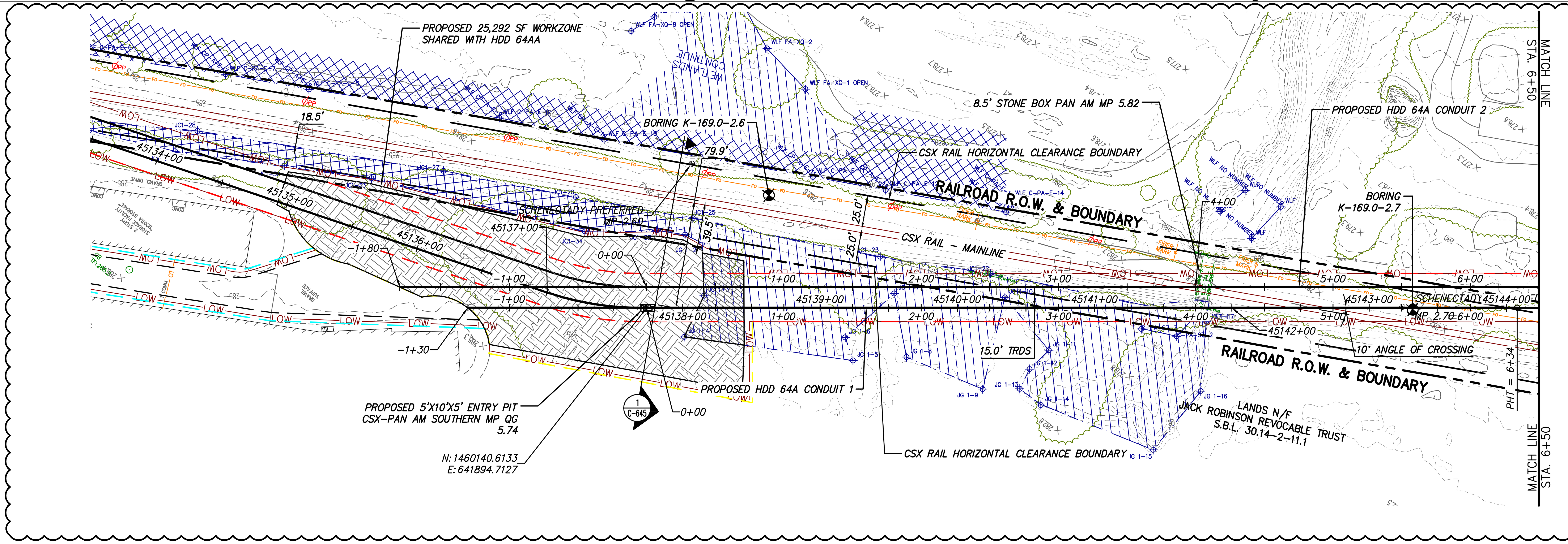
No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
0	06/12/2024	NDC-0063: ISSUED FOR CONSTRUCTION SUBMISSION	MCS	JEO

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN
PLAN AND PROFILE - HDD 64AA, CONDUIT 2

DRAWN BY: KDL | DESIGNED BY: MCS | APPROVED BY: JEO | SCALE: AS NOTED | DATE: 07/28/2023

PERMIT DRAWING NO. C-304C

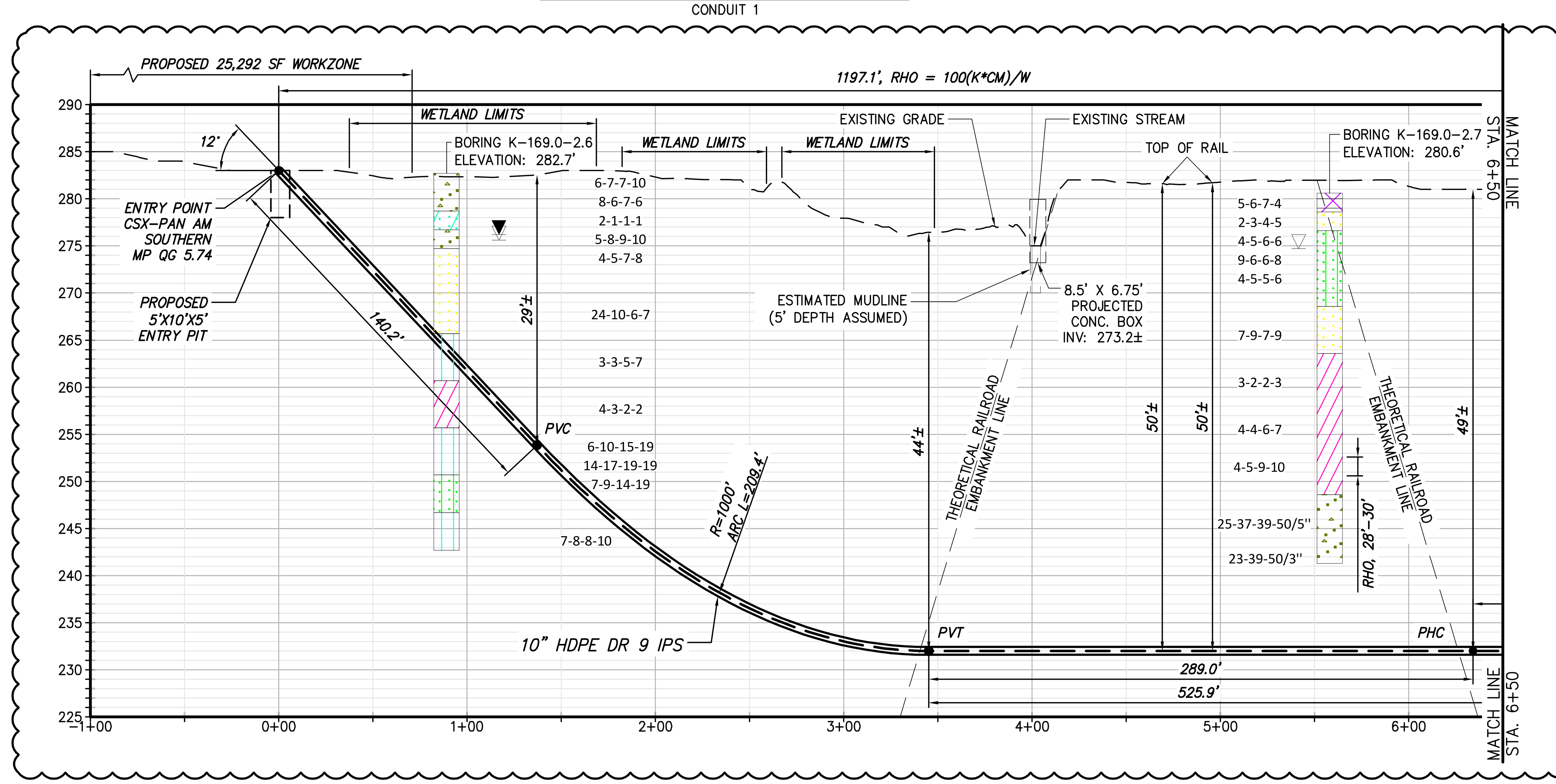
DRAWING NO. C-304C



Scale in feet

PROPOSED HDD 64A PLAN VIEW

CONDUIT 1



PROPOSED HDD 64A PROFILE

CONDUIT 1

Scale in feet

NOTE:

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BORING LOG STRIP LEGEND

B101

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Recovery %/RQD % = 95%/90%

11000psi =UCS

2D strip logs shown at 10x exaggeration

3D strip logs have no exaggeration

Legend		
	ASPHALT	Asphalt
	Bedrock	Bedrock
	Boulder	Boulder
	CH	Fat CLAY
	CH-MH	SILTY Fat CLAY
	CL	Lean CLAY
	CL-ML	SILTY CLAY
	CONCRETE	Concrete
	Fill	Fill
	GC	CLAYEY GRAVEL
	GC-GM	SILTY CLAYEY GRAVEL
	GM	SILTY GRAVEL
	GP	Poorly Graded GRAVEL
	GP-GC	Poorly Graded Gravel with CLAY
	GP-GM	Poorly Graded GRAVEL with SILT
	GW	Well Graded GRAVEL
	GW-GC	Well Graded GRAVEL with CLAY
	GW-GM	Well Graded GRAVEL with SILT
	Limestone	Limestone
	MH	Elastic SILT
	ML	SILT
	OH	ORGANIC Fat CLAY
	OL	ORGANIC Lean CLAY
	OL/OH	ORGANIC SOIL
	PT	PEAT
	Rock	Rock
	Sandstone	Sandstone
	SC	CLAYEY SAND
	SC-SM	SILT, CLAYEY SAND
	SHALE	Shale
	SILTSTONE	Siltstone
	SM	SILTY SAND
	SP	Poorly Graded SAND
	SP-SC	Poorly Graded SAND with CLAY
	SP-SM	Poorly Graded SAND with SILT
	SW	Well graded SAND
	SW-SC	Well Graded SAND with CLAY
	SW-SM	Well Graded SAND with SILT
	Topsoil	Topsoil
	USGS 601	Gravel or Conglomerate 1
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	USGS 670	Interbedded Sandstone and Shale
	USGS 702	Quartzite
	USGS 705	Schist
	USGS 705	Schist
	USGS 708	Gneiss
	USGS 708	Gneiss
	USGS 718	Granite 1
	Void	Void
	Water	Water
	Weathered Rock	Undefined
▼	Water Table	Water Table during drilling
▽	Delayed Water Table	Water Table after drilling

CHPE Champlain Hudson Power Express

PROJECT NO.: 21162 — Kiewit

PROJECT NO.: 066076 — CHA

III Winners Circle, PO Box 5269
Albany, NY 12205-0269
518.453.4500 - www.chacompanies.com

ALTERED ON:

AFFIXED ON: 06/12/2024

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No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
1	06/12/2024	NDC-0063: HDD 64AA, 64A REDESIGN	MCS	JEO
0	07/28/2023	ISSUED FOR CONSTRUCTION SUBMISSION	SPB	JEO

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN
PLAN AND PROFILE - HDD 64A, CONDUIT 1

DRAWN BY: CJL DESIGNED BY: CJL APPROVED BY: JEO

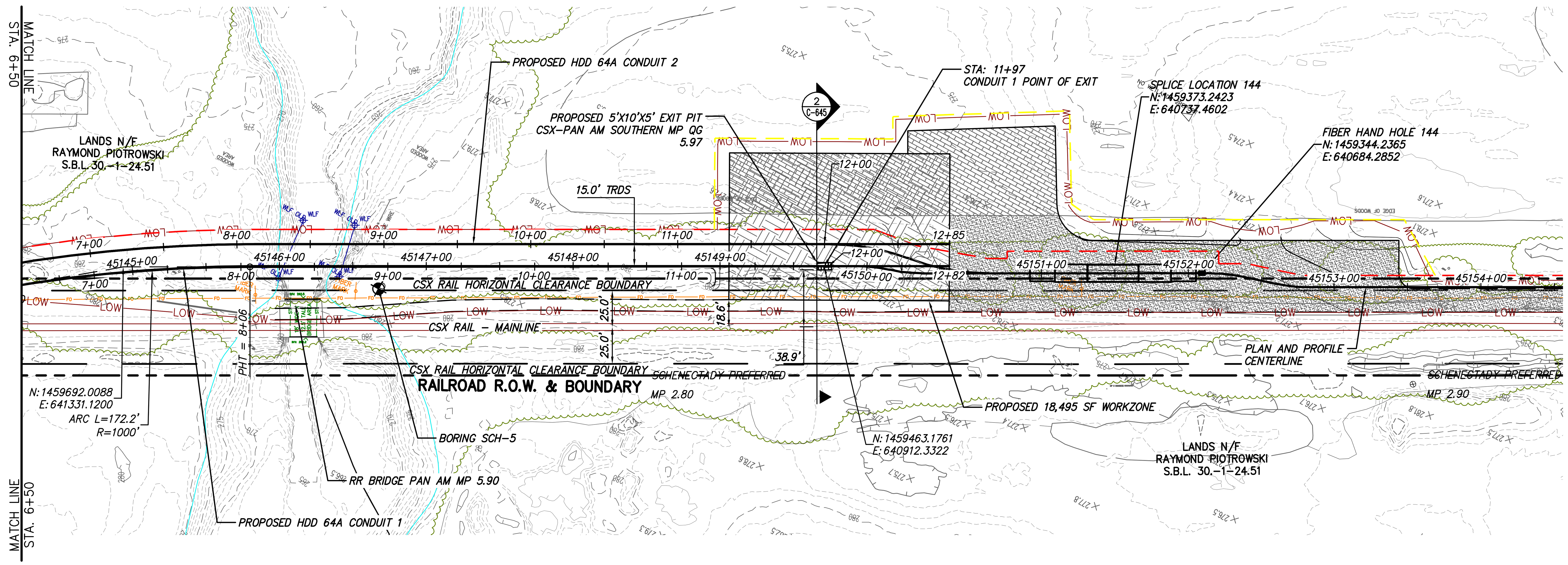
SCALE AS NOTED DATE: 07/28/2023

PERMIT DRAWING NO. C-305-A

DRAWING NO. C-305

1 2 3 4

A

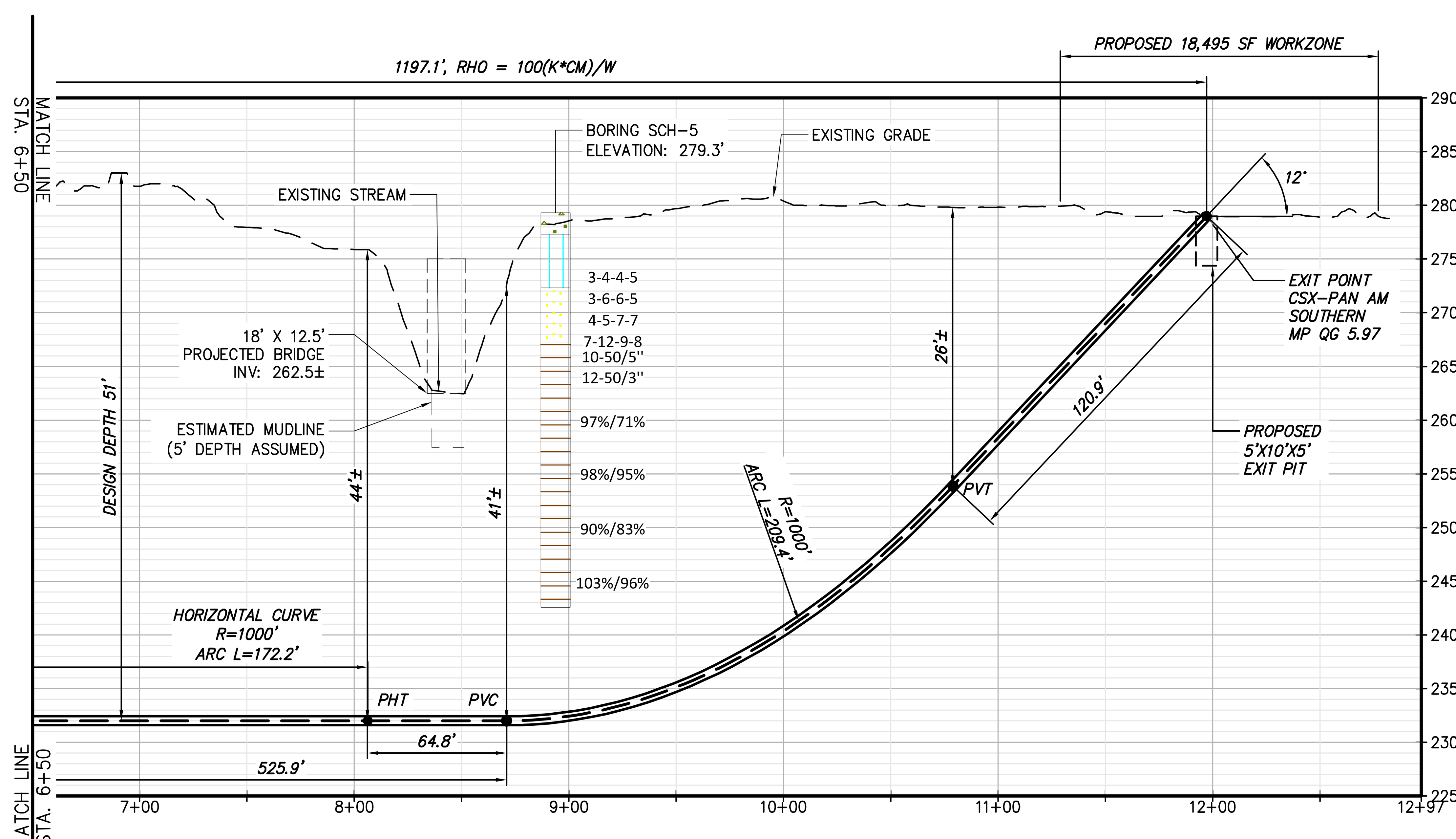


Scale in feet 0 50 100

PROPOSED HDD 64A PLAN VIEW

CONDUIT 1

B



Scale in feet 0 50 100; 0 10 20

PROPOSED HDD 64A PROFILE

CONDUIT 1

NOTE:
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BORING LOG STRIP LEGEND

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USGS 718	Granite 1
Void	Void
Water	Water
Weathered Rock	Undefined
Water Table	Water Table during drilling
Delayed Water Table	Water Table after drilling

CHPE Champlain Hudson Power Express

PROJECT NO.: 21162 — Kiewit

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ALTERED ON:

AFFIXED ON: 06/12/2024

STATE OF NEW YORK — JEFFREY E. O'DONNELL — 087450 — LICENSED PROFESSIONAL ENGINEER

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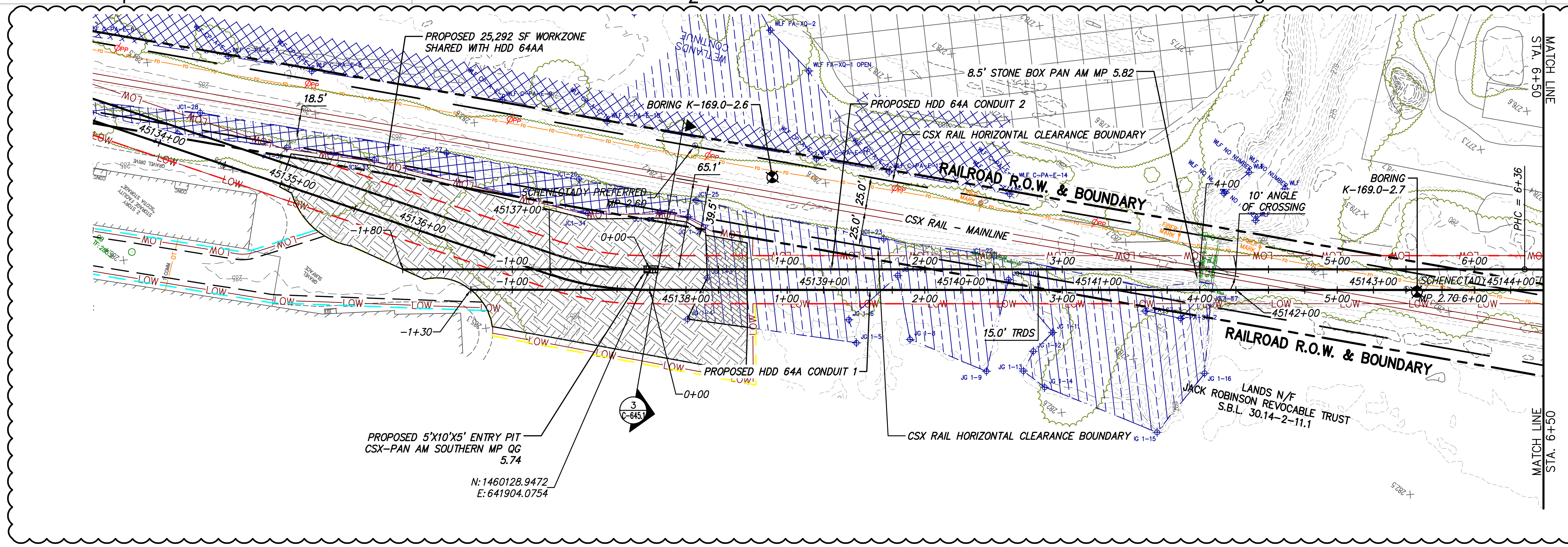
CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN
PLAN AND PROFILE - HDD 64A, CONDUIT 1

DRAWN BY: CJL DESIGNED BY: CJL APPROVED BY: JEO SCALE AS NOTED DATE: 07/28/2023

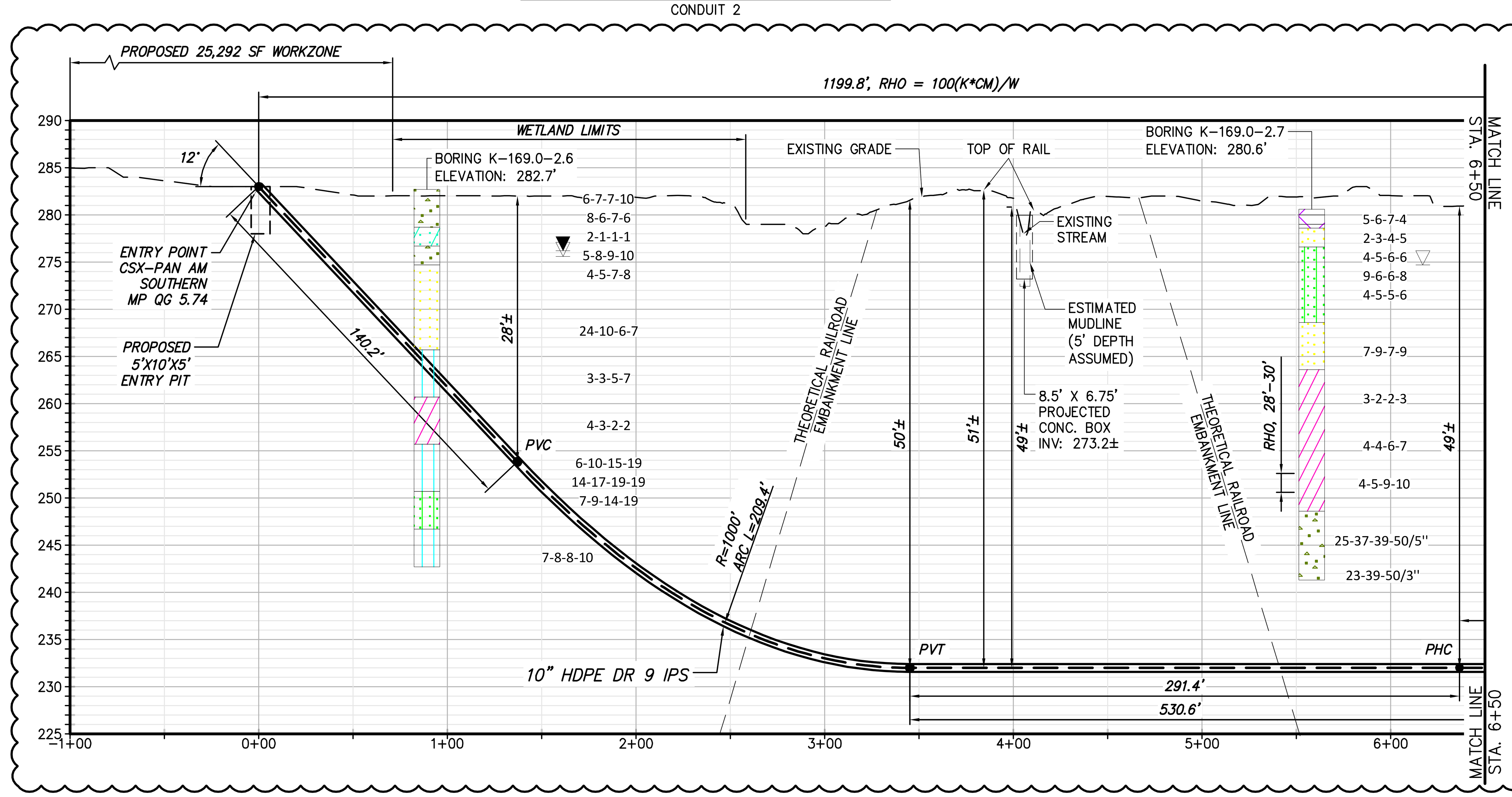
PERMIT DRAWING NO. C-305.1

DRAWING NO. C-305.1



PROPOSED HDD 64A PLAN VIEW

CONDUIT 2



PROPOSED HDD 64A PROFILE

CONDUIT 2

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CHPE Champlain Hudson Power Express

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ALTERED ON:

AFFIXED ON: 06/12/2024

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CHAMPLAIN HUDSON POWER EXPRESS

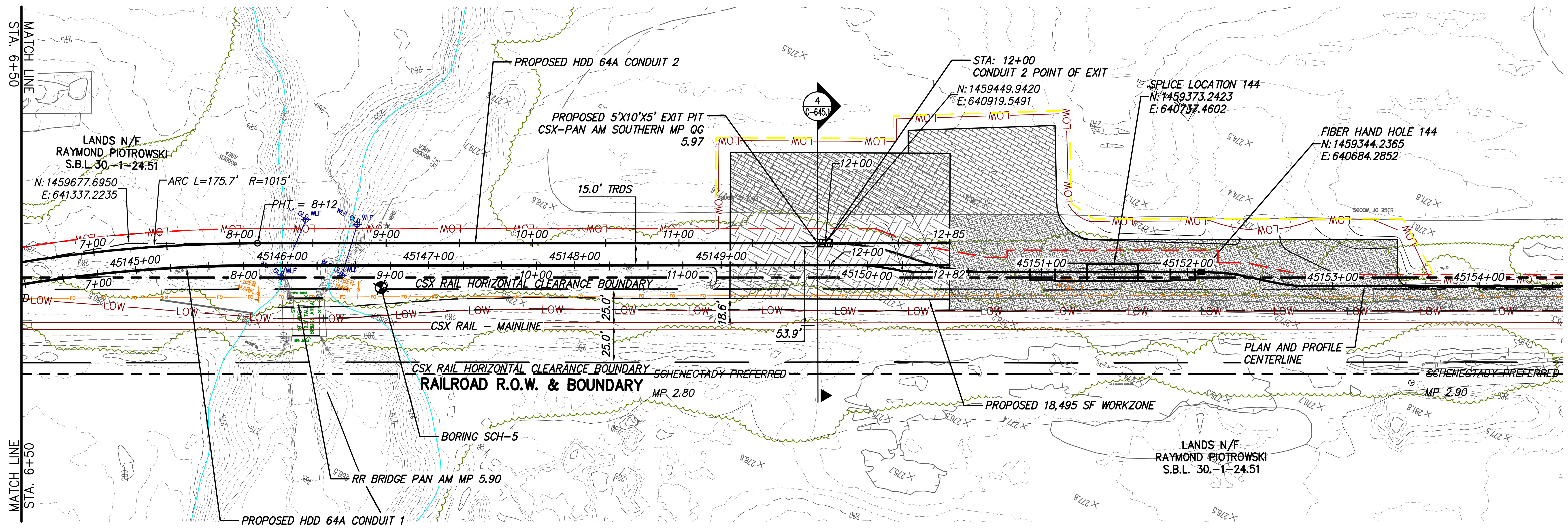
SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN

PLAN AND PROFILE - HDD 64A, CONDUIT 2

PERMIT DRAWING NO. C-305A-A

DRAWING NO. C-305A

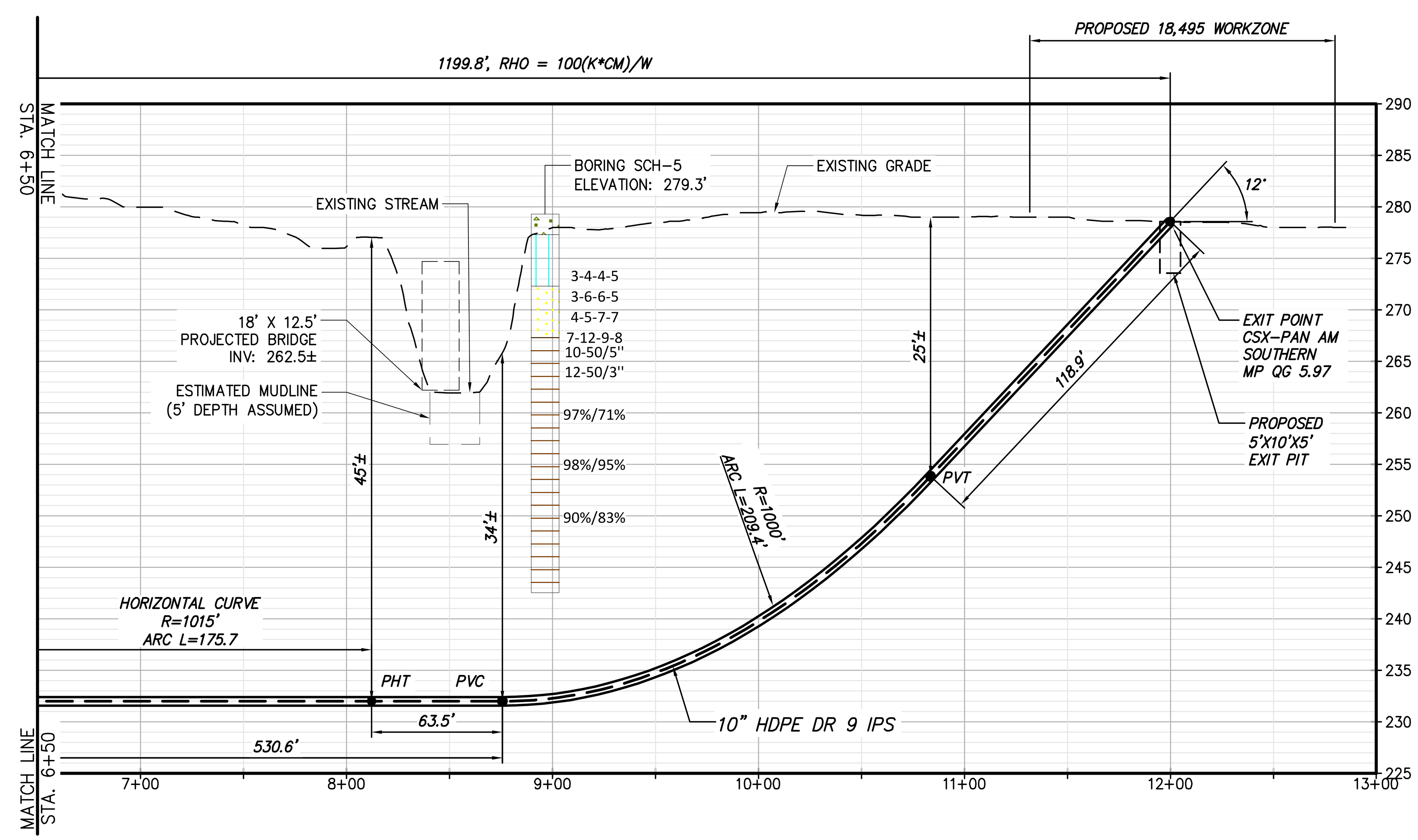
DRAWN BY: CJL DESIGNED BY: CJL APPROVED BY: JEO SCALE AS NOTED DATE: 07/28/2023



0 50 100
Scale in feet

PROPOSED HDD 64A PLAN VIEW

CONDUIT 2



PROPOSED HDD 64A PROFILE

CONDUIT 2

0 50 100
Scale in feet

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▼	Water Table	Water Table during drilling
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CHPE Champlain Hudson Power Express

PROJECT NO.: 21162

Kiewit

PROJECT NO.: 066076

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Albany, NY 12205-0269
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AFFIXED ON: 06/12/2024

STATE OF NEW YORK
JEFFREY E. O'DONNELL
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CHAMPLAIN HUDSON POWER EXPRESS

SEGMENT 7 (PACKAGE 4B) - CSX - PAN AM SOUTHERN

PLAN AND PROFILE - HDD 64A, CONDUIT 2

DRAWN BY: CJL DESIGNED BY: CJL APPROVED BY: JEO

SCALE AS NOTED

DATE: 07/28/2023

PERMIT DRAWING NO. C-305A.1

DRAWING NO. C-305A.1