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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 3 HDD 126 DWG C-326.2

Input Summary

Start Coordinate	(0.00, 0.00, 100.31) ft
End Coordinate	(1630.00, 0.00, 103.46) ft
Project Length	1630.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	3.500 in
Pipe DR	9.0
Pipe Thickness	0.39 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

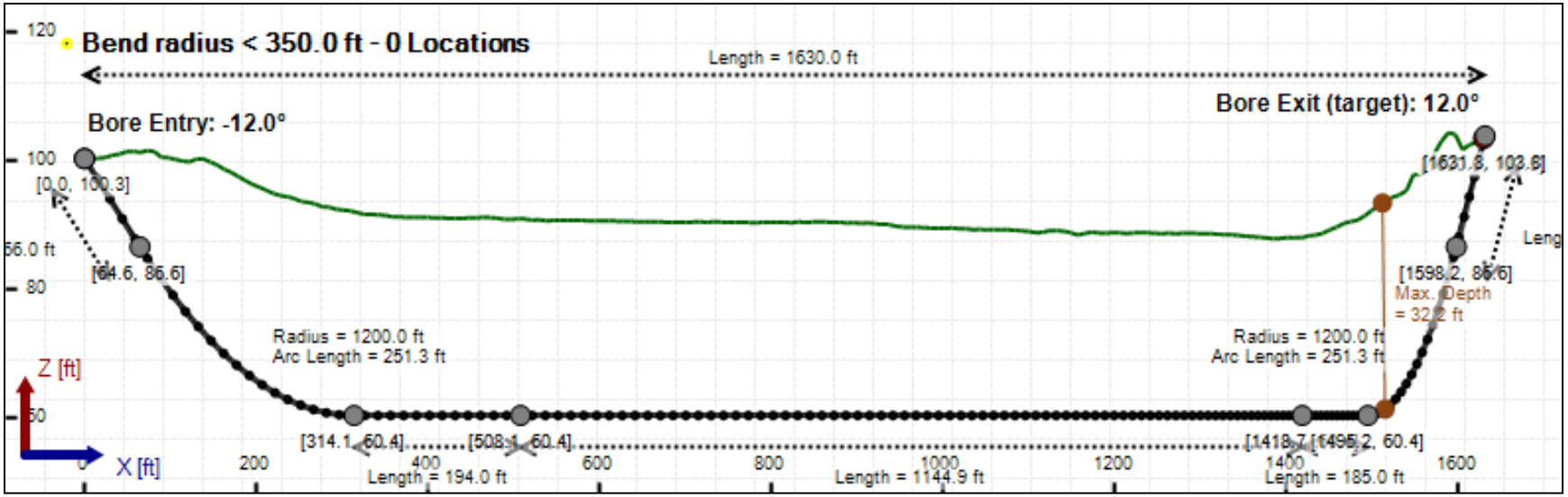
Soil Layer #1 USCS, Sand (S), SM
Depth: 7.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 16.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

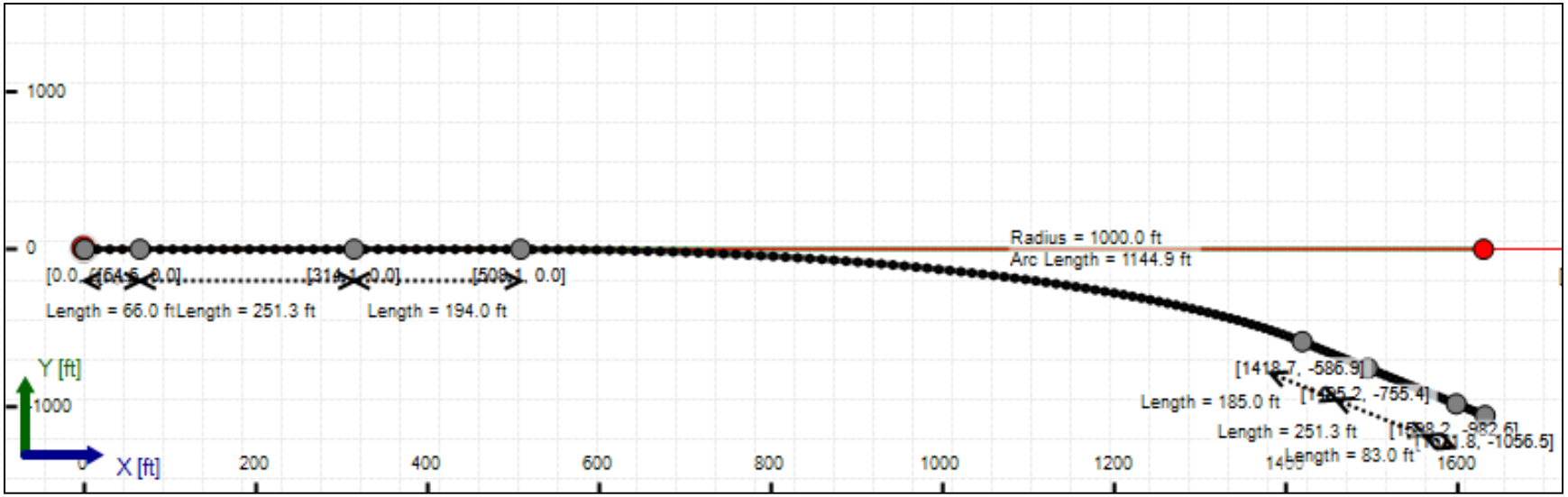
Soil Layer #3 USCS, Sand (S), SM
Depth: 22.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #4 USCS, Silt (M), ML
Depth: 2.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable

Pipe Type: HDPE

Classification: IPS

Pipe OD: 3" (3.5")

Pipe DR: 9

Pipe Length: 2189.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 0.625 ft

Silo Width: 0.625 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: 7.92790 lb/US (liquid) gallon

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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.8	26.3
Water Pressure	0.0	0.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	2.8	26.3
Deflection		
Earth Load Deflection	0.775	7.162
Buoyant Deflection	0.043	0.043
Reissner Effect	0	0
Net Deflection	0.818	7.205
Compressive Stress [psi]		
Compressive Wall Stress	12.8	118.3

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	3011.5	3011.5
Pullback Stress [psi]	792.3	792.3
Pullback Strain	1.378E-2	1.378E-2
Bending Stress [psi]	0.0	8.4
Bending Strain	0	1.458E-4
Tensile Stress [psi]	792.3	798.3
Tensile Strain	1.378E-2	1.403E-2

Net External Pressure = 20.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 172.8 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.818	7.5	9.2	OK
Unconstrained Collapse [psi]	30.2	128.3	4.2	OK
Compressive Wall Stress [psi]	12.8	1150.0	89.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.021	7.5	355.7	OK
Unconstrained Collapse [psi]	20.1	202.6	10.1	OK
Tensile Stress [psi]	798.3	1200.0	1.5	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	96.344 psi	96.344 psi
1	8.00 in	7.50 in	96.352 psi	96.352 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

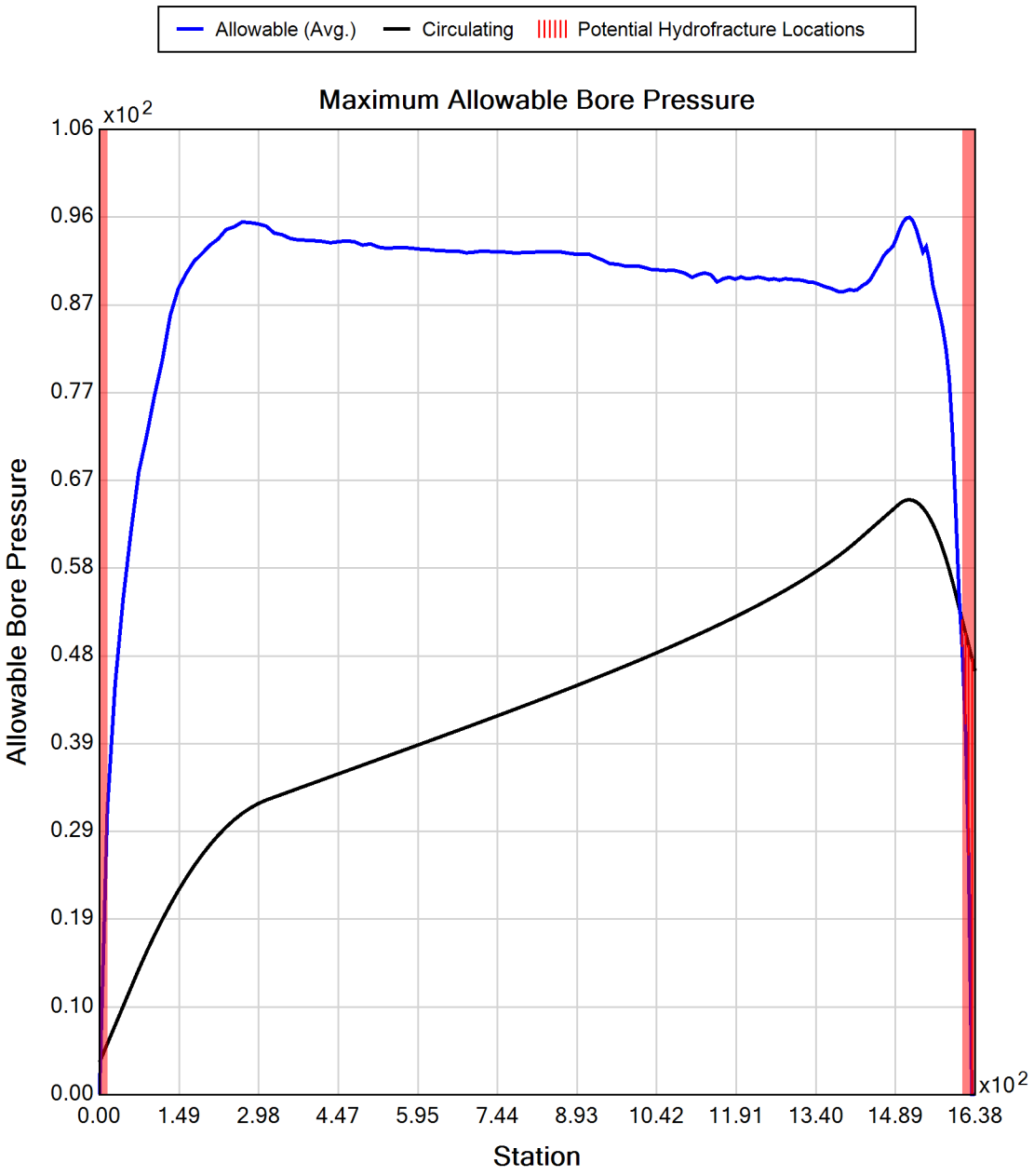
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 417.7



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 & 3 Equivalent Pipe Bundle HDD 126 DWG C-326.2

Input Summary

Start Coordinate	(0.00, 0.00, 100.31) ft
End Coordinate	(1630.00, 0.00, 103.46) ft
Project Length	1630.00 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	12.750 in
Pipe DR	26.0
Pipe Thickness	0.49 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: PVC

Classification: IPS

Pipe OD: 12" (12.75")

Pipe DR: 26

Pipe Length: 2189.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.59400002161662 ft

Silo Width: 1.59400002161662 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	7.1	26.3
Water Pressure	0.0	0.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	7.1	26.3
Deflection		
Earth Load Deflection	4.140	15.409
Buoyant Deflection	0.266	0.266
Reissner Effect	0	0
Net Deflection	4.407	15.675
Compressive Stress [psi]		
Compressive Wall Stress	91.9	341.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	29571.0	29571.0
Pullback Stress [psi]	1565.7	1565.7
Pullback Strain	3.914E-3	3.914E-3
Bending Stress [psi]	0.0	212.5
Bending Strain	0	5.313E-4
Tensile Stress [psi]	1565.7	1738.4
Tensile Strain	3.914E-3	4.789E-3

Net External Pressure = 14.1 [psi]

Buoyant Deflection = 0.3

Hydrokinetic Force = 798.4 lb

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.266	7.5	28.2	OK
Unconstrained Collapse [psi]	20.1	54.7	2.7	OK
Tensile Stress [psi]	1738.4	7000.0	4.0	OK

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Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 1 HDD 127 DWG C-327

Input Summary

Start Coordinate	(0.00, 0.00, 116.26) ft
End Coordinate	(1440.00, 0.00, 109.77) ft
Project Length	1440.00 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

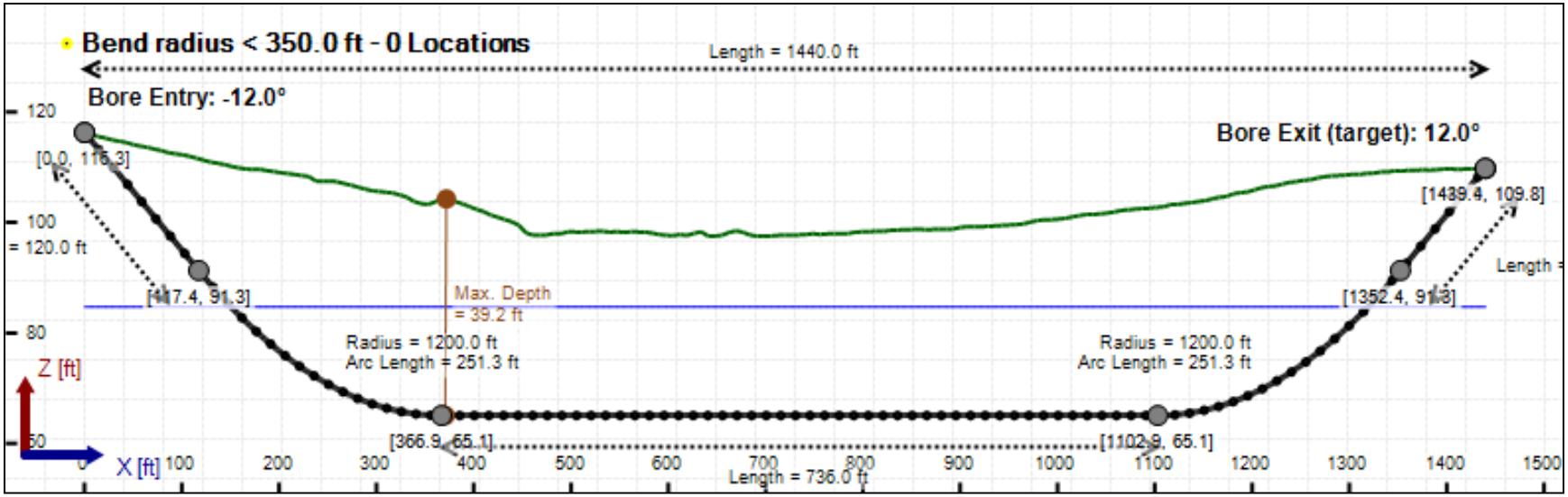
Soil Layer #2 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 USCS, Sand (S), SC
From Assistant
Unit Weight: 15.3153 (dry), 17.6253 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 5.80 [psi]

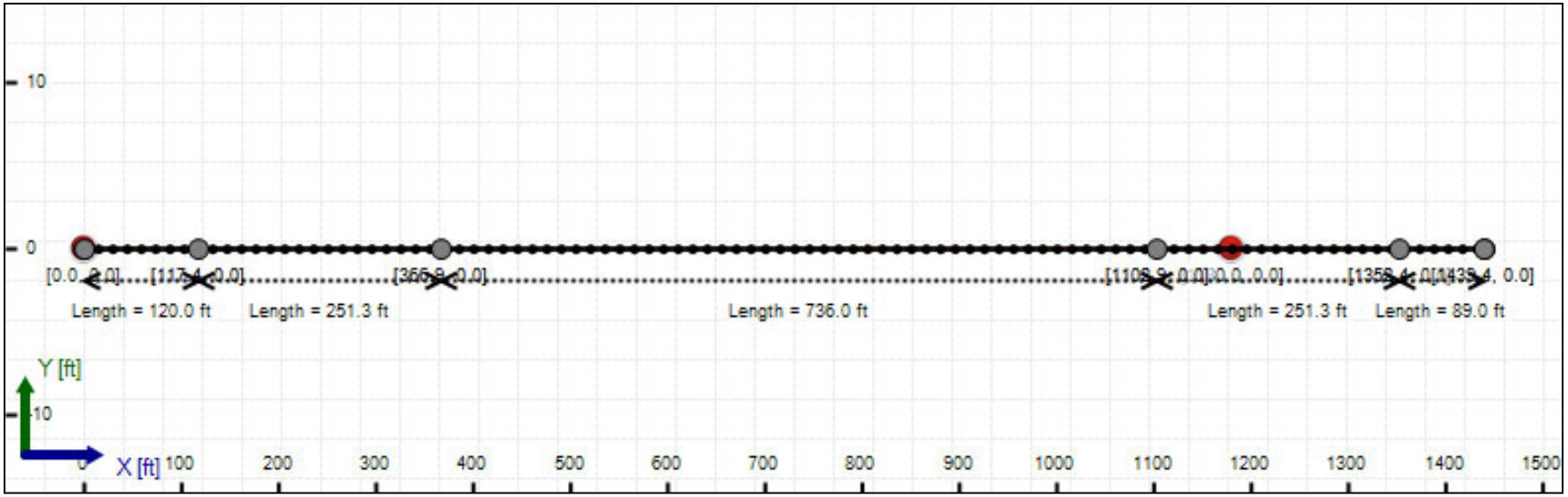
Soil Layer #4 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #5 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable

Pipe Type: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1455.00 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.9	24.8
Water Pressure	8.5	8.5
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.4	33.3
Deflection		
Earth Load Deflection	0.873	4.631
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	0.933	4.691
Compressive Stress [psi]		
Compressive Wall Stress	111.3	299.6

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	16271.4	16271.4
Pullback Stress [psi]	1326.9	1326.9
Pullback Strain	3.317E-3	3.317E-3
Bending Stress [psi]	0.0	119.8
Bending Strain	0	2.995E-4
Tensile Stress [psi]	1326.9	1436.7
Tensile Strain	3.317E-3	3.891E-3

Net External Pressure = 24.2 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.933	7.5	8.0	OK
Unconstrained Collapse [psi]	33.3	177.6	5.3	OK
Compressive Wall Stress [psi]	111.3	3200.0	28.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	43.2	180.5	4.2	OK
Tensile Stress [psi]	1436.7	7000.0	4.9	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	95.112 psi	101.975 psi
1	8.00 in	10.00 in	95.084 psi	101.945 psi
2	10.00 in	12.94 in	95.032 psi	101.888 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): 70.00 US (liquid) gallon/min

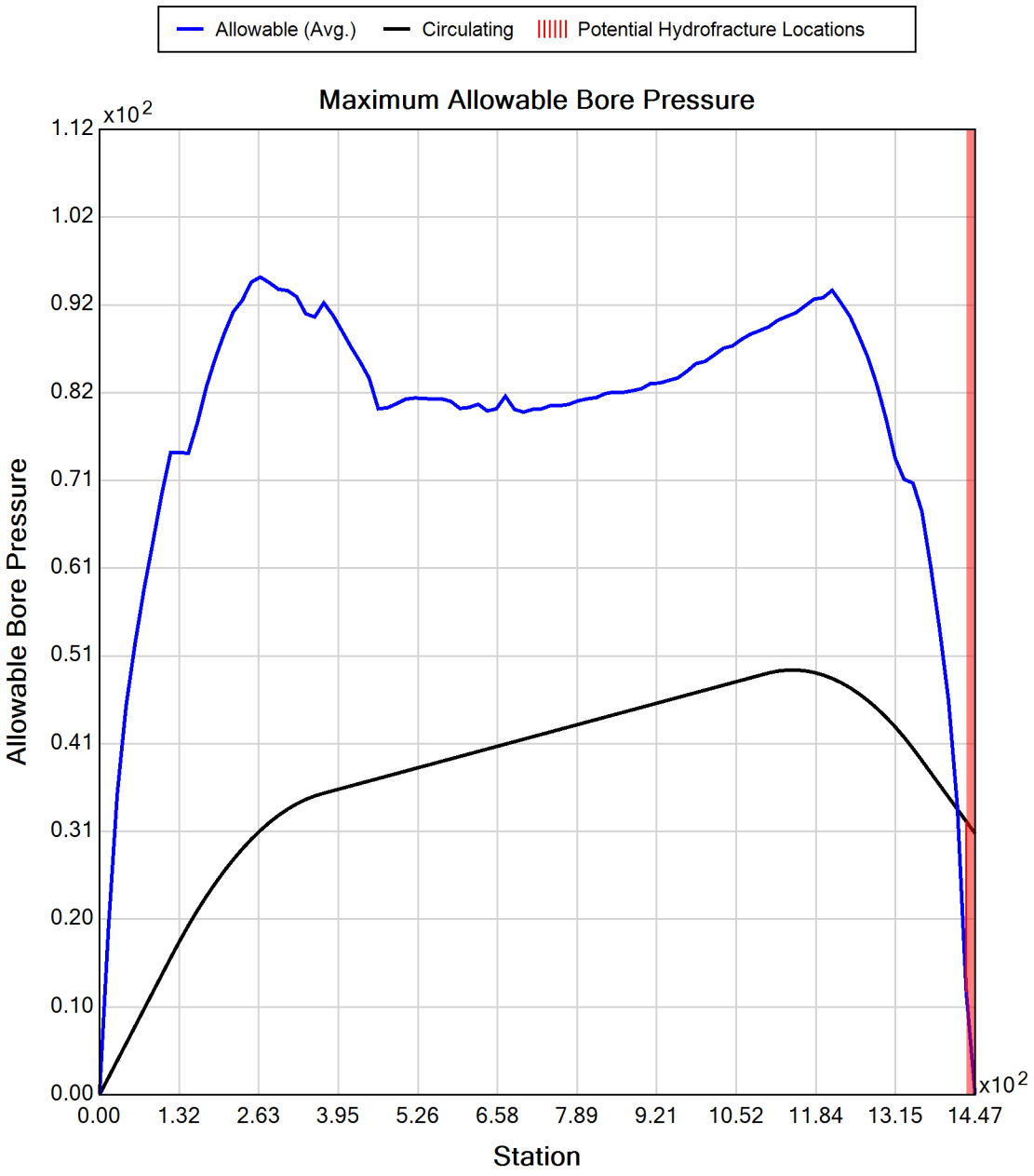
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 697.8



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Description:	Segment 12 (Package 7B) Conduit 2 HDD 127 DWG C-327.2

Input Summary

Start Coordinate	(0.00, 0.00, 114.79) ft
End Coordinate	(1440.00, 0.00, 109.66) ft
Project Length	1440.00 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

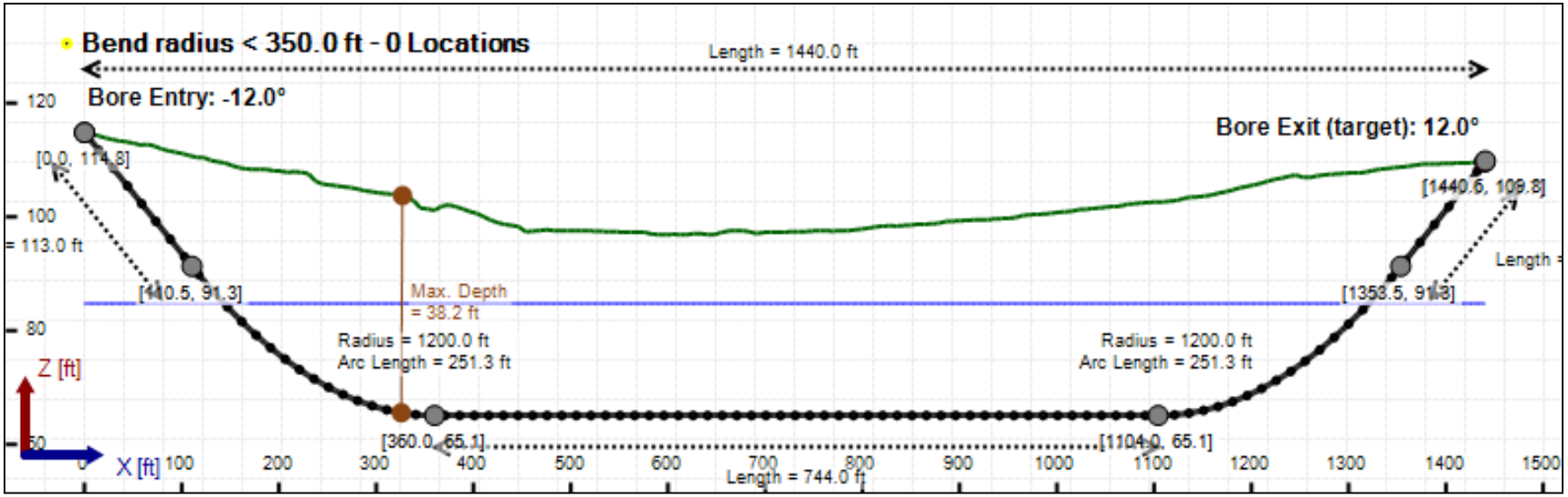
Soil Layer #2 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 USCS, Sand (S), SC
From Assistant
Unit Weight: 15.3153 (dry), 17.6253 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 5.80 [psi]

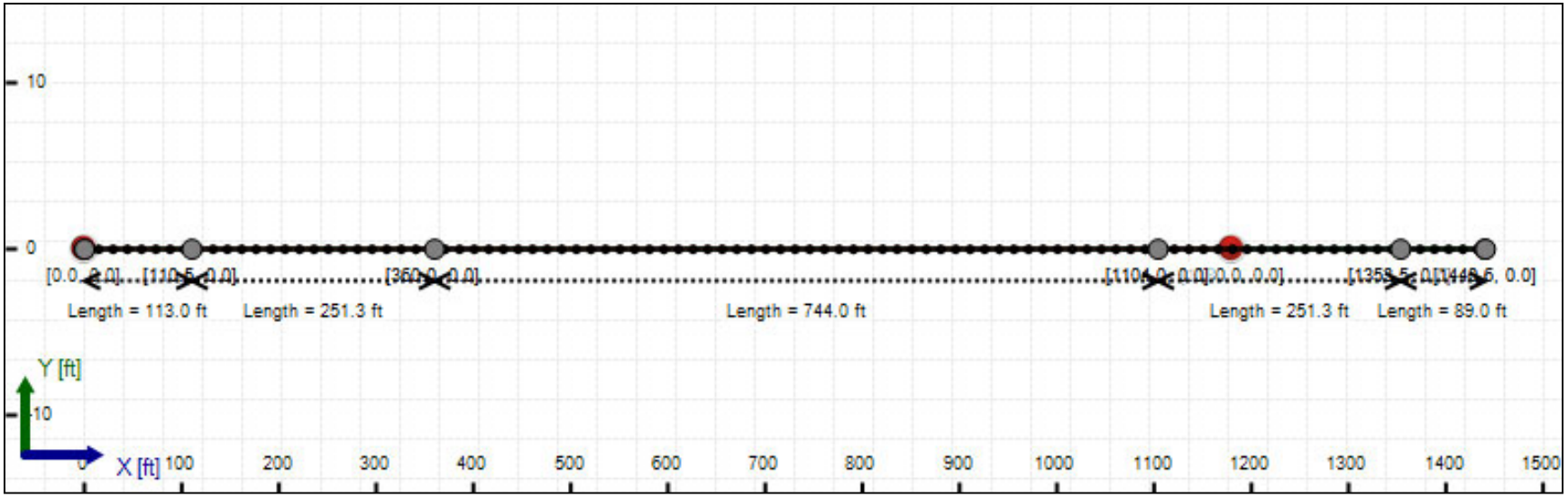
Soil Layer #4 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #5 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable

Pipe Type: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1455.00 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.8	24.1
Water Pressure	8.5	8.3
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.3	32.4
Deflection		
Earth Load Deflection	0.867	4.445
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	0.926	4.505
Compressive Stress [psi]		
Compressive Wall Stress	111.1	291.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	16301.8	16301.8
Pullback Stress [psi]	1329.4	1329.4
Pullback Strain	3.324E-3	3.324E-3
Bending Stress [psi]	0.0	119.8
Bending Strain	0	2.995E-4
Tensile Stress [psi]	1329.4	1443.2
Tensile Strain	3.324E-3	3.908E-3

Net External Pressure = 24.2 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.926	7.5	8.1	OK
Unconstrained Collapse [psi]	32.3	177.7	5.5	OK
Compressive Wall Stress [psi]	111.1	3200.0	28.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	42.3	180.5	4.3	OK
Tensile Stress [psi]	1443.2	7000.0	4.9	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	92.911 psi	99.825 psi
1	8.00 in	10.00 in	92.880 psi	99.791 psi
2	10.00 in	12.94 in	92.823 psi	99.729 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): 70.00 US (liquid) gallon/min

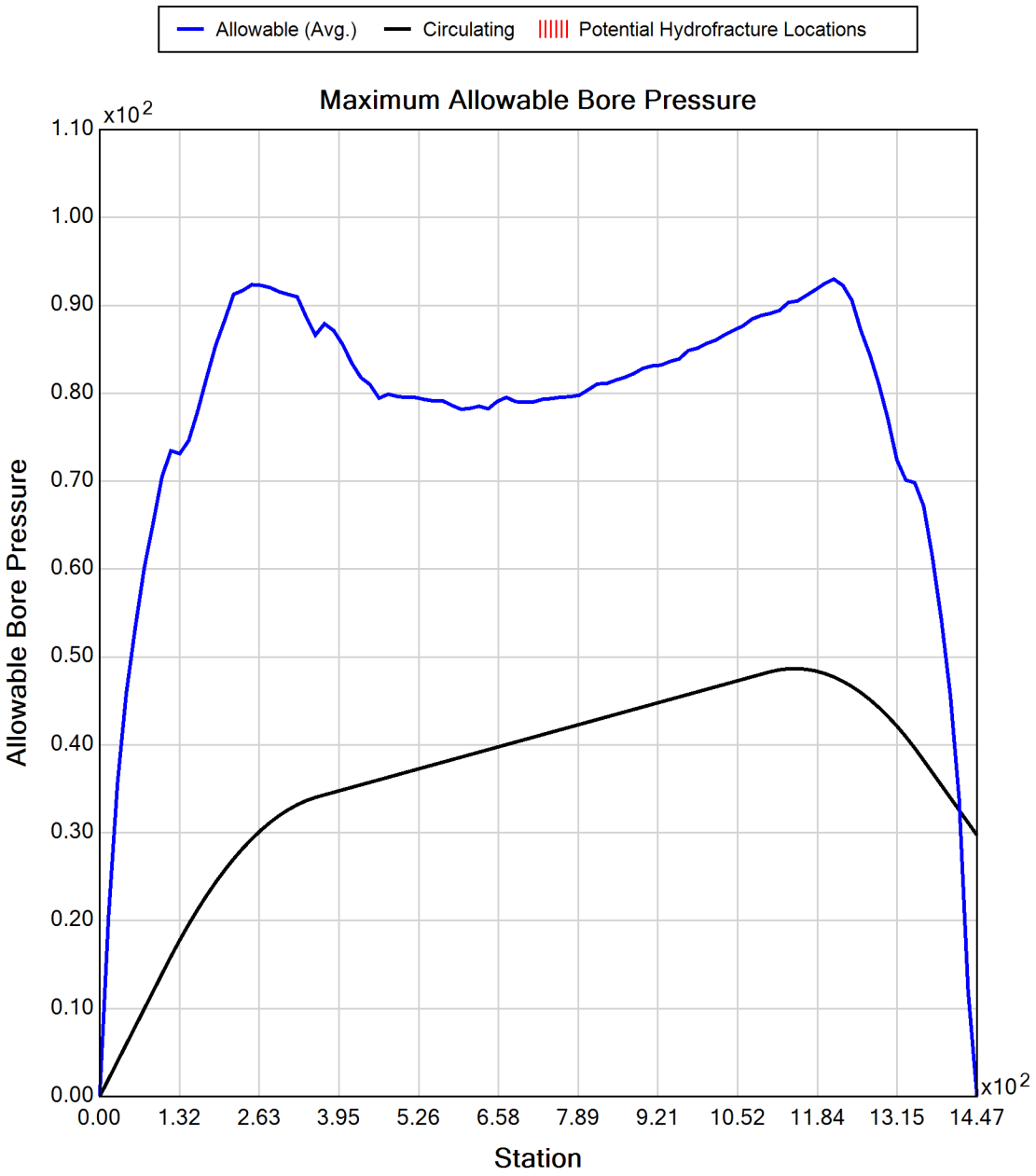
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 697.8



Generated Output

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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 3 HDD 127 DWG C-327.2

Input Summary

Start Coordinate	(0.00, 0.00, 114.79) ft
End Coordinate	(1440.00, 0.00, 109.66) ft
Project Length	1440.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	3.500 in
Pipe DR	9.0
Pipe Thickness	0.39 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), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

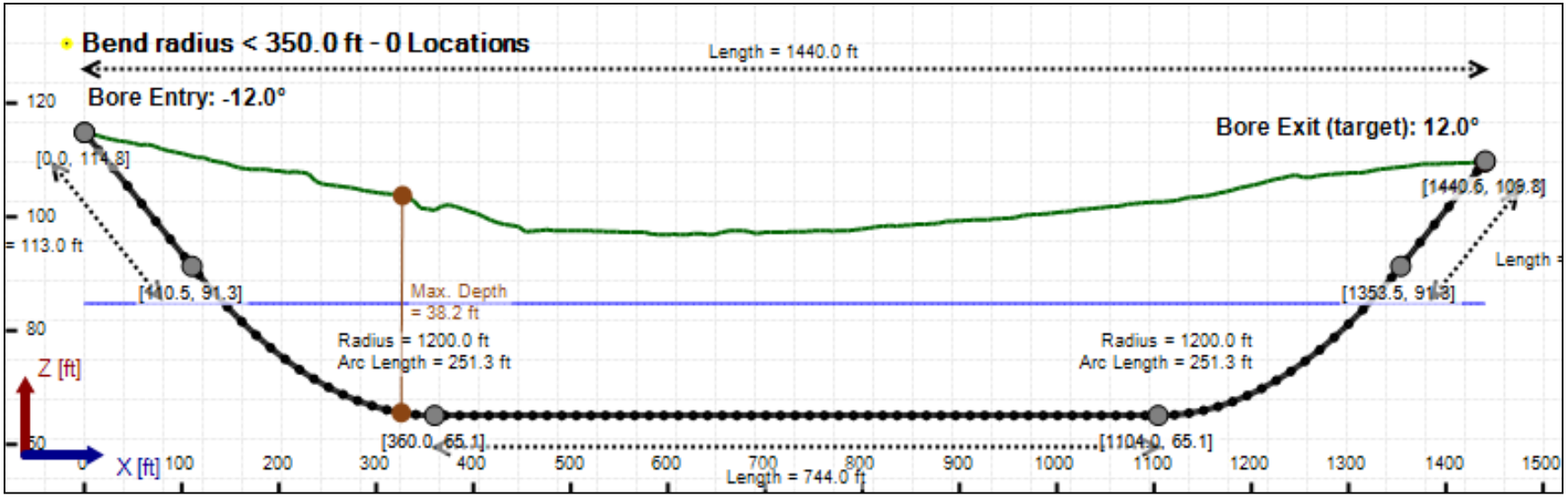
Soil Layer #2 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 USCS, Sand (S), SC
From Assistant
Unit Weight: 15.3153 (dry), 17.6253 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 5.80 [psi]

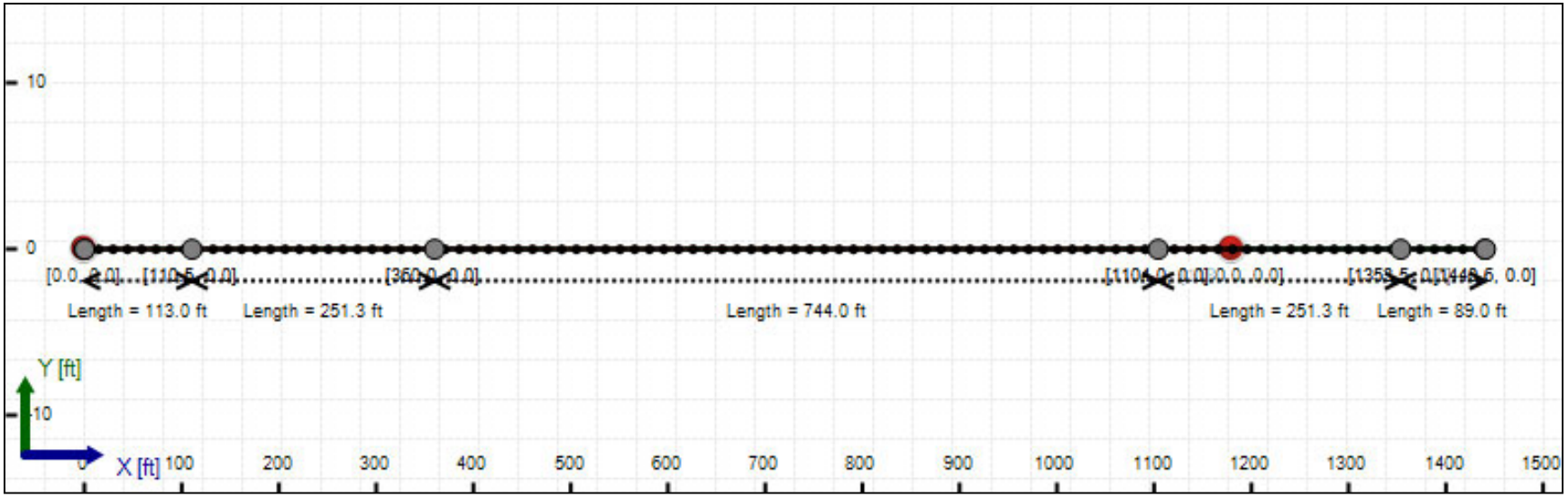
Soil Layer #4 USCS, Silt (M), ML
From Assistant
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #5 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable

Pipe Type: HDPE

Classification: IPS

Pipe OD: 3" (3.5")

Pipe DR: 9

Pipe Length: 1455.00 ft

Internal Pressure: 0 psi

Borehole Diameter: 0.625 ft

Silo Width: 0.625 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: 7.92790 lb/US (liquid) gallon

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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.2	24.1
Water Pressure	8.5	8.3
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	10.7	32.4
Deflection		
Earth Load Deflection	0.771	6.571
Buoyant Deflection	0.043	0.043
Reissner Effect	0	0
Net Deflection	0.814	6.614
Compressive Stress [psi]		
Compressive Wall Stress	48.3	145.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	2673.8	2673.8
Pullback Stress [psi]	703.5	703.5
Pullback Strain	1.223E-2	1.223E-2
Bending Stress [psi]	0.0	7.0
Bending Strain	0	1.215E-4
Tensile Stress [psi]	703.5	708.4
Tensile Strain	1.223E-2	1.244E-2

Net External Pressure = 24.2 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 172.8 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.814	7.5	9.2	OK
Unconstrained Collapse [psi]	32.3	130.3	4.0	OK
Compressive Wall Stress [psi]	48.3	1150.0	23.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.021	7.5	355.7	OK
Unconstrained Collapse [psi]	42.3	215.2	5.1	OK
Tensile Stress [psi]	708.4	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	92.911 psi	99.825 psi
1	8.00 in	7.50 in	92.917 psi	99.832 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): 70.00 US (liquid) gallon/min

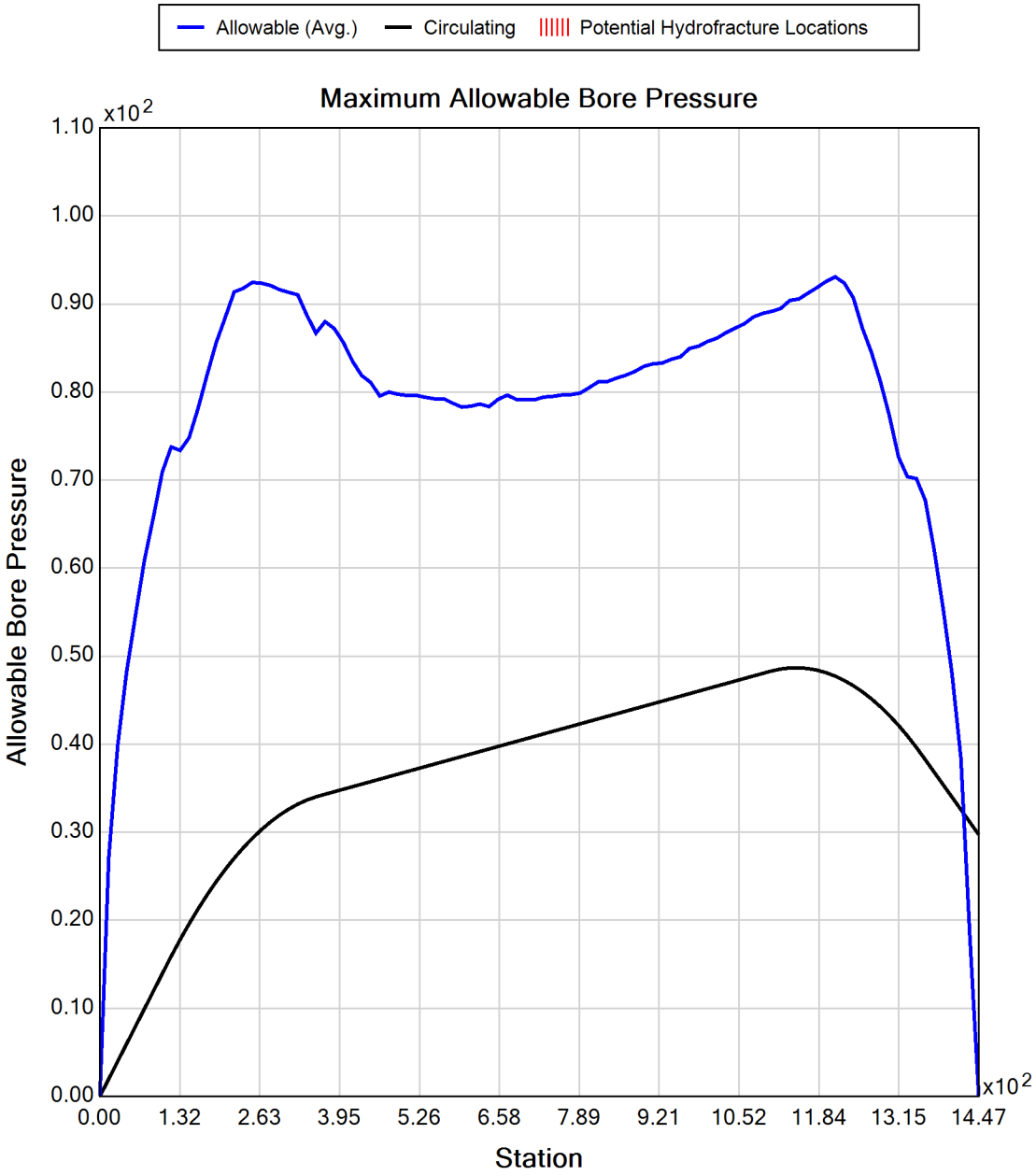
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 697.8



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 & 3 Equivalent Pipe Bundle HDD 127 DWG C-327.2

Input Summary

Start Coordinate	(0.00, 0.00, 114.79) ft
End Coordinate	(1440.00, 0.00, 109.66) ft
Project Length	1440.00 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	12.750 in
Pipe DR	26.0
Pipe Thickness	0.49 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: PVC
Classification: IPS
Pipe OD: 12" (12.75")
Pipe DR: 26
Pipe Length: 1455.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.59400002161662 ft
Silo Width: 1.59400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 400000 psi
Long Term Modulus: 400000 psi
Short Term Poisson Ratio: 0.38
Long Term Poisson Ratio: 0.38
Pipe Unit Weight: 11.68400 lb/US (liquid) gallon
Allowable Tensile Stress (Short Term): 2800 psi
Allowable Tensile Stress (Long Term): 2800 psi
Allowable Compressive Stress (Short Term): 3200 psi
Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	5.6	24.1
Water Pressure	8.5	8.3
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.1	32.4
Deflection		
Earth Load Deflection	3.890	14.137
Buoyant Deflection	0.266	0.266
Reissner Effect	0	0
Net Deflection	4.157	14.404
Compressive Stress [psi]		
Compressive Wall Stress	183.2	421.6

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	14230.5	14230.5
Pullback Stress [psi]	753.5	753.5
Pullback Strain	1.884E-3	1.884E-3
Bending Stress [psi]	0.0	177.1
Bending Strain	0	4.427E-4
Tensile Stress [psi]	753.5	929.9
Tensile Strain	1.884E-3	2.767E-3

Net External Pressure = 14.7 [psi]

Buoyant Deflection = 0.3

Hydrokinetic Force = 798.4 lb

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.266	7.5	28.2	OK
Unconstrained Collapse [psi]	20.8	53.4	2.6	OK
Tensile Stress [psi]	929.9	2800.0	3.0	OK

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Project Summary

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Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 1 HDD 129 DWG C-329

Input Summary

Start Coordinate	(0.00, 0.00, 98.25) ft
End Coordinate	(1839.70, 0.00, 110.66) ft
Project Length	1839.70 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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

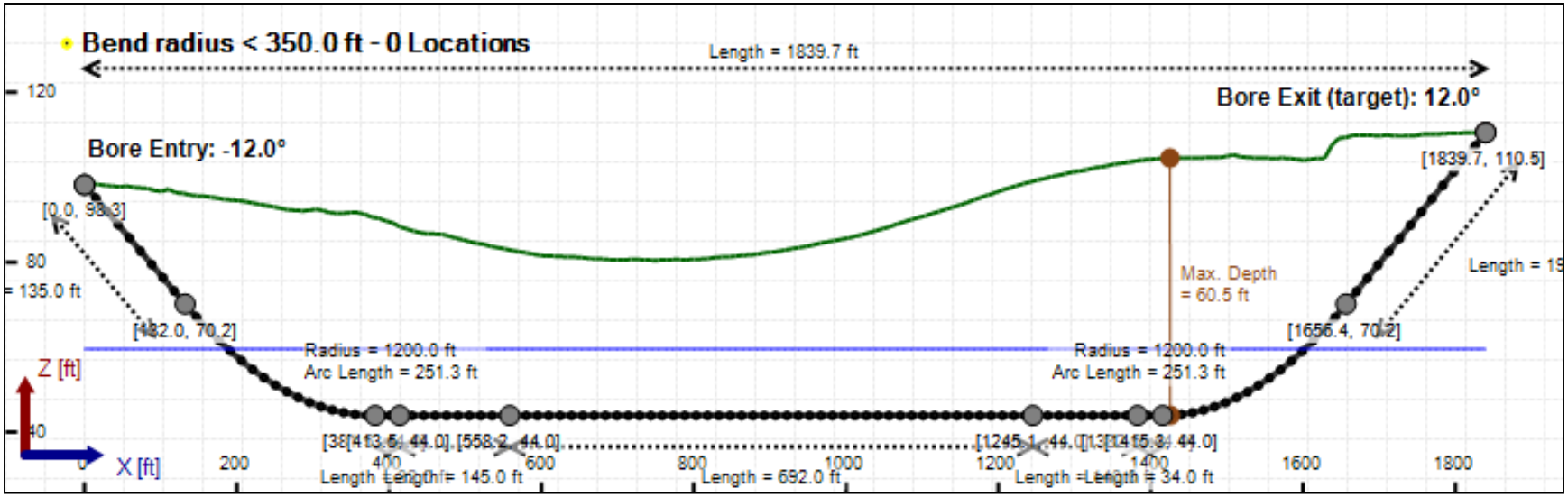
Soil Layer #1 USCS, Gravel (G), GM
Depth: 10.00 ft
Unit Weight: 16.9785 (dry), 18.6879 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 34.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

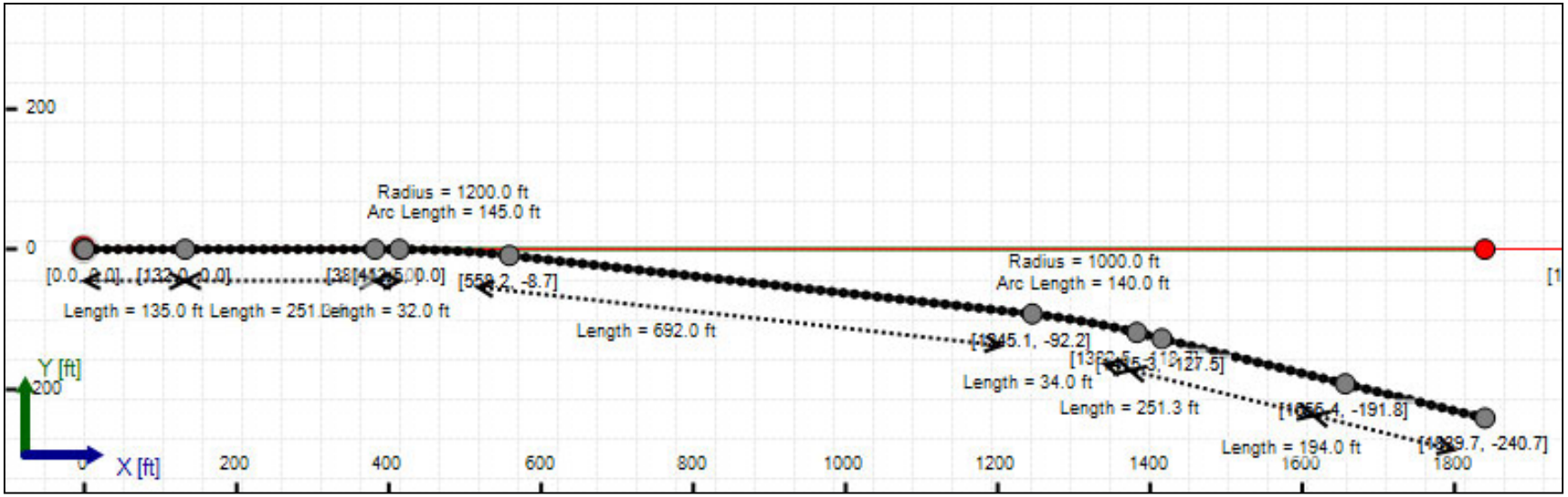
Soil Layer #3 USCS, Clay (C), CL
Depth: 17.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 7.30 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
Depth: 20.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1874.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.4	44.9
Water Pressure	6.8	6.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.2	51.6
Deflection		
Earth Load Deflection	0.980	8.266
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	1.039	8.325
Compressive Stress [psi]		
Compressive Wall Stress	100.8	464.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	23031.5	23031.5
Pullback Stress [psi]	1878.2	1878.2
Pullback Strain	4.696E-3	4.696E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	1878.2	1982.8
Tensile Strain	4.696E-3	5.256E-3

Net External Pressure = 34.3 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.039	7.5	7.2	OK
Unconstrained Collapse [psi]	43.3	175.9	4.1	OK
Compressive Wall Stress [psi]	100.8	3200.0	31.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	53.3	176.5	3.3	OK
Tensile Stress [psi]	1982.8	7000.0	3.5	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	131.397 psi	125.001 psi
1	8.00 in	10.00 in	131.387 psi	124.986 psi
2	10.00 in	12.94 in	131.369 psi	124.958 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

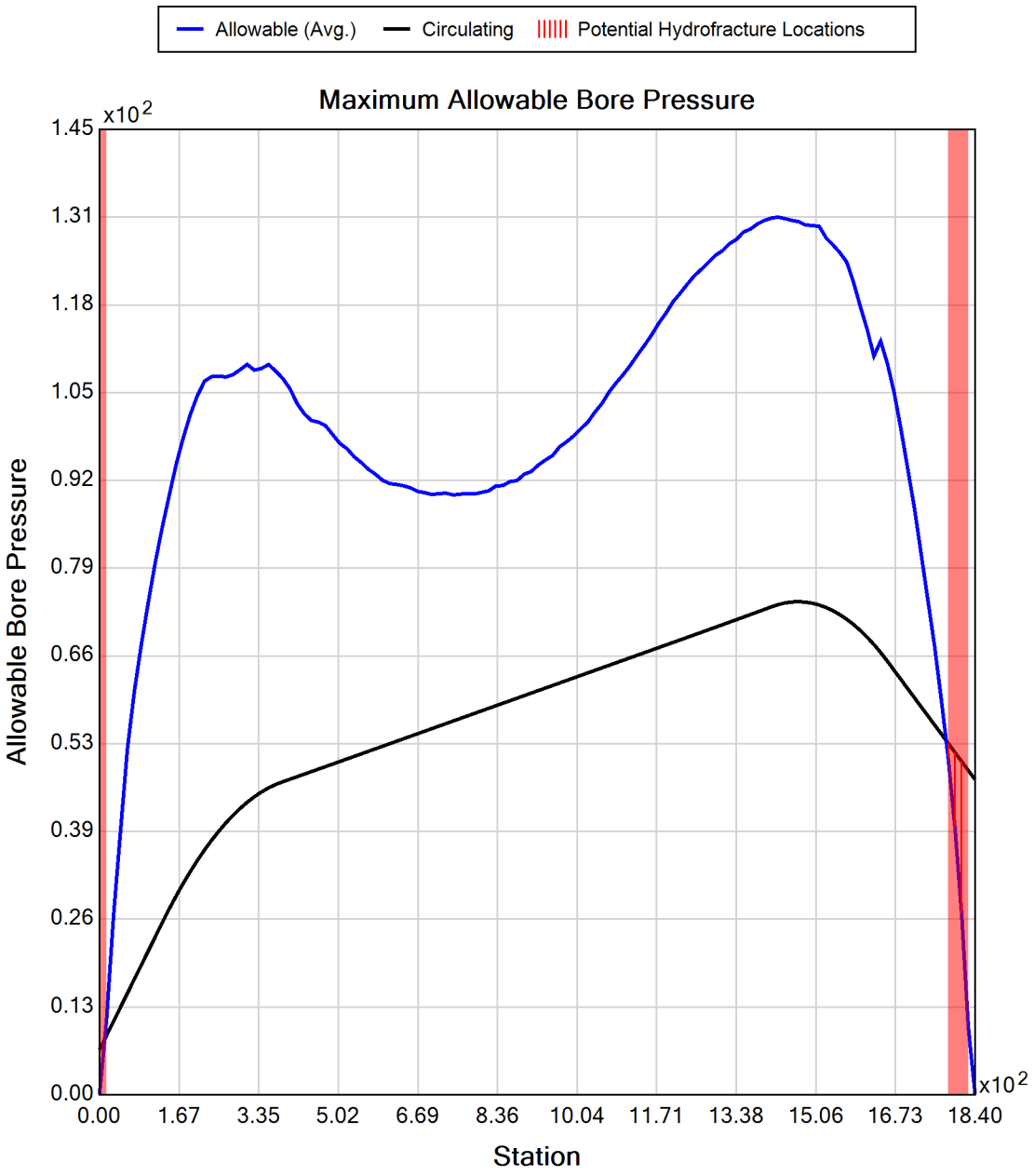
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 417.7



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 HDD 129 DWG C-329.2

Input Summary

Start Coordinate	(0.00, 0.00, 98.77) ft
End Coordinate	(1852.30, 0.00, 109.89) ft
Project Length	1852.30 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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

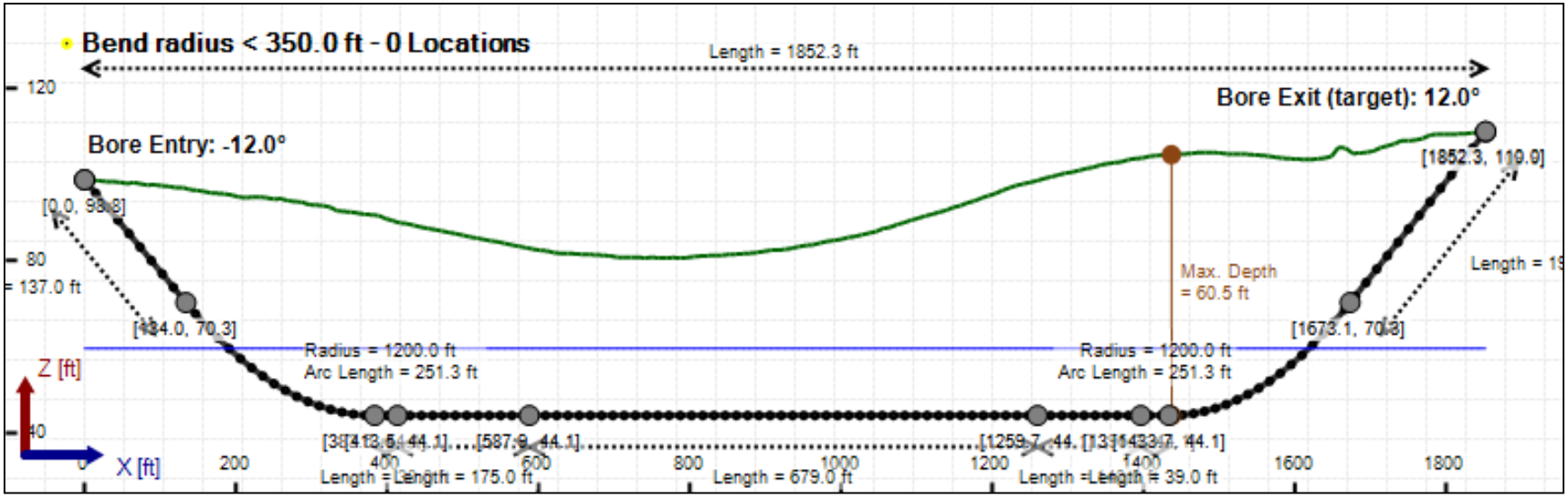
Soil Layer #1 USCS, Gravel (G), GM
Depth: 10.00 ft
Unit Weight: 16.9785 (dry), 18.6879 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 34.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

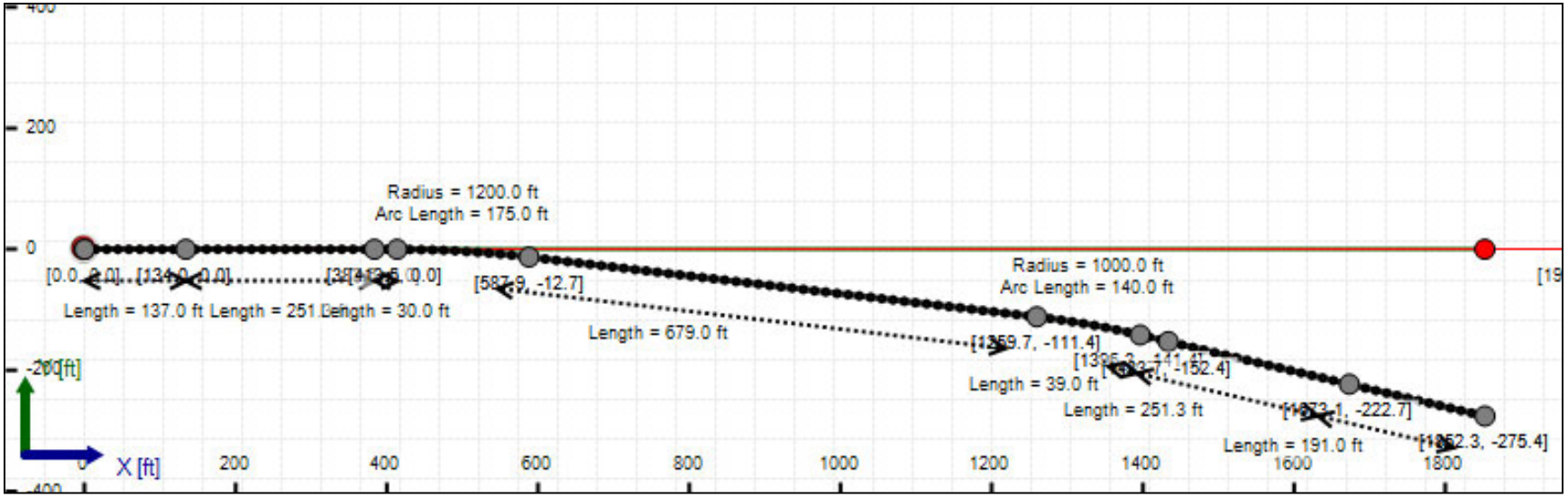
Soil Layer #3 USCS, Clay (C), CL
Depth: 17.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 7.30 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
Depth: 20.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1904.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.4	44.8
Water Pressure	6.7	6.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.1	51.6
Deflection		
Earth Load Deflection	0.968	8.275
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	1.028	8.335
Compressive Stress [psi]		
Compressive Wall Stress	100.3	464.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	23634.4	23634.4
Pullback Stress [psi]	1927.4	1927.4
Pullback Strain	4.819E-3	4.819E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	1927.4	2033.4
Tensile Strain	4.819E-3	5.383E-3

Net External Pressure = 35.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.028	7.5	7.3	OK
Unconstrained Collapse [psi]	44.4	175.9	4.0	OK
Compressive Wall Stress [psi]	100.3	3200.0	31.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	54.4	176.1	3.2	OK
Tensile Stress [psi]	2033.4	7000.0	3.4	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	131.292 psi	122.002 psi
1	8.00 in	10.00 in	131.282 psi	121.986 psi
2	10.00 in	12.94 in	131.264 psi	121.955 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

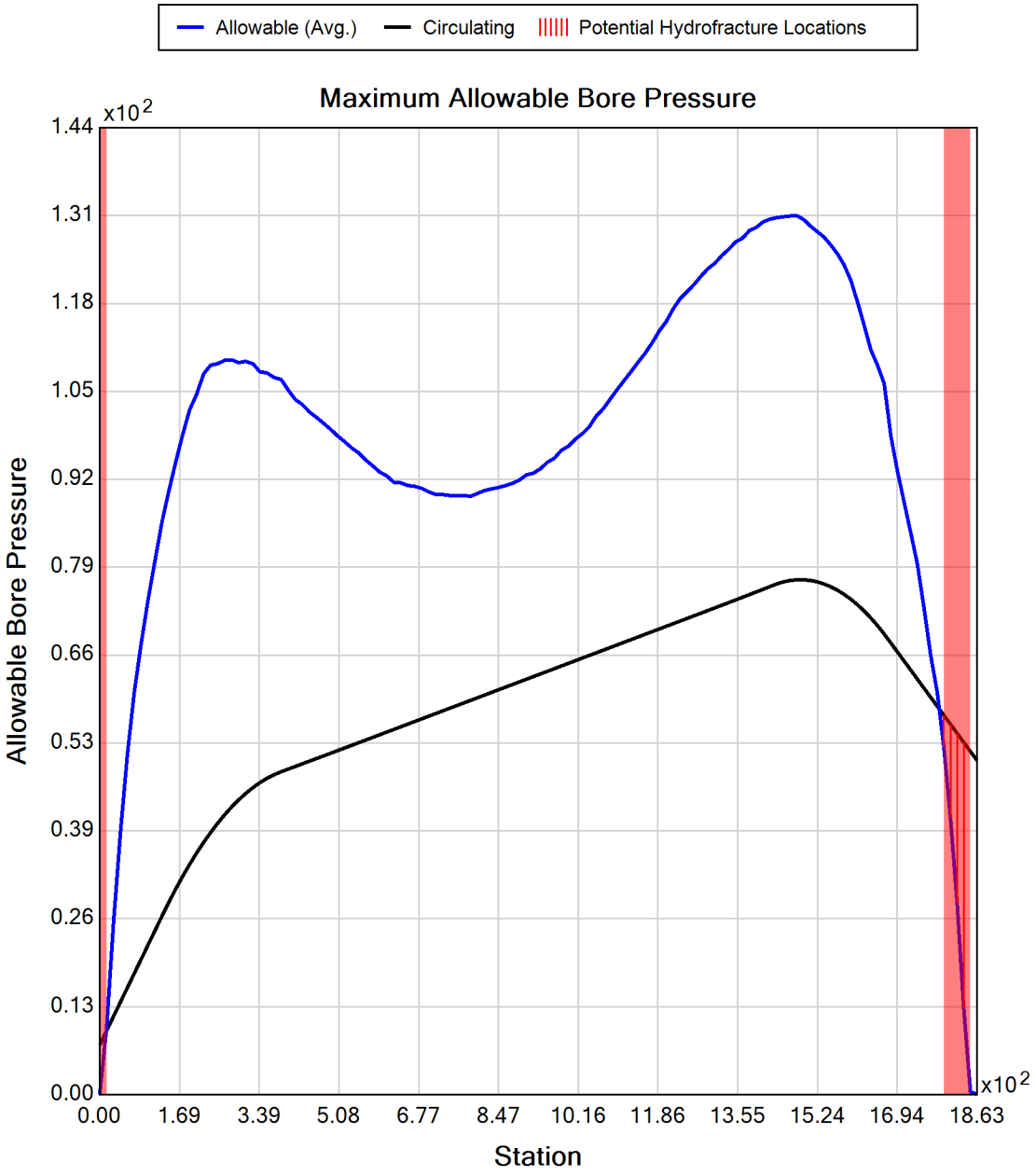
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 417.7



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 3 HDD 129 DWG C-329.2

Input Summary

Start Coordinate	(0.00, 0.00, 98.77) ft
End Coordinate	(1852.30, 0.00, 109.89) ft
Project Length	1852.30 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	3.500 in
Pipe DR	9.0
Pipe Thickness	0.39 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

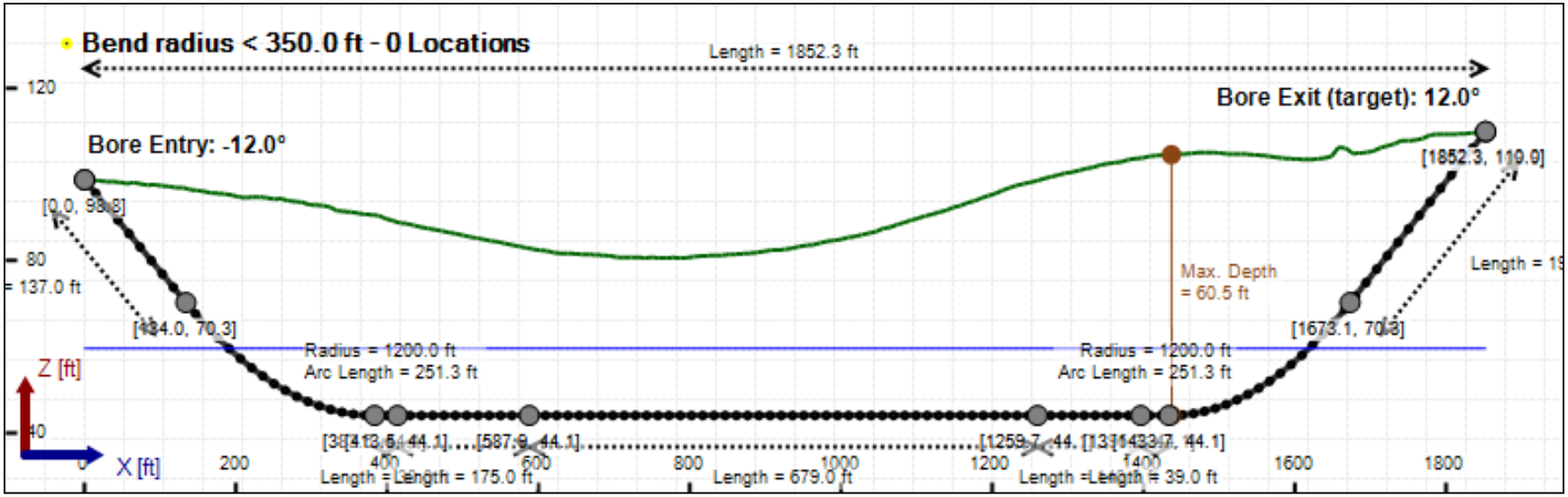
Soil Layer #1 USCS, Gravel (G), GM
Depth: 10.00 ft
Unit Weight: 16.9785 (dry), 18.6879 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 34.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

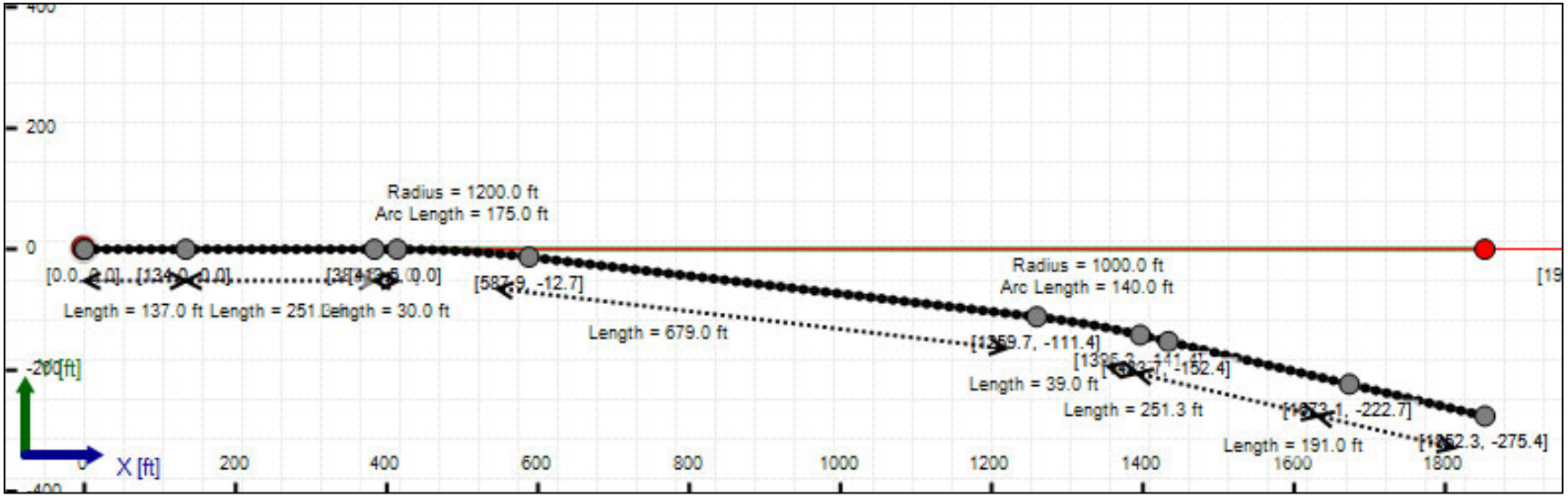
Soil Layer #3 USCS, Clay (C), CL
Depth: 17.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 7.30 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
Depth: 20.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: 3" (3.5")

Pipe DR: 9

Pipe Length: 1904.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 0.625 ft

Silo Width: 0.625 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: 7.92790 lb/US (liquid) gallon

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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.6	44.8
Water Pressure	6.7	6.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	9.3	51.6
Deflection		
Earth Load Deflection	0.862	12.232
Buoyant Deflection	0.043	0.043
Reissner Effect	0	0
Net Deflection	0.905	12.275
Compressive Stress [psi]		
Compressive Wall Stress	41.8	232.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	3828.2	3828.2
Pullback Stress [psi]	1007.2	1007.2
Pullback Strain	1.752E-2	1.752E-2
Bending Stress [psi]	0.0	8.4
Bending Strain	0	1.458E-4
Tensile Stress [psi]	1007.2	1009.3
Tensile Strain	1.752E-2	1.768E-2

Net External Pressure = 35.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 172.8 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.905	7.5	8.3	OK
Unconstrained Collapse [psi]	44.4	129.2	2.9	OK
Compressive Wall Stress [psi]	41.8	1150.0	27.5	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.021	7.5	355.7	OK
Unconstrained Collapse [psi]	54.2	192.4	3.6	OK
Tensile Stress [psi]	1009.3	1200.0	1.2	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	8.00 in	131.292 psi	122.002 psi
1	8.00 in	7.50 in	131.294 psi	122.006 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

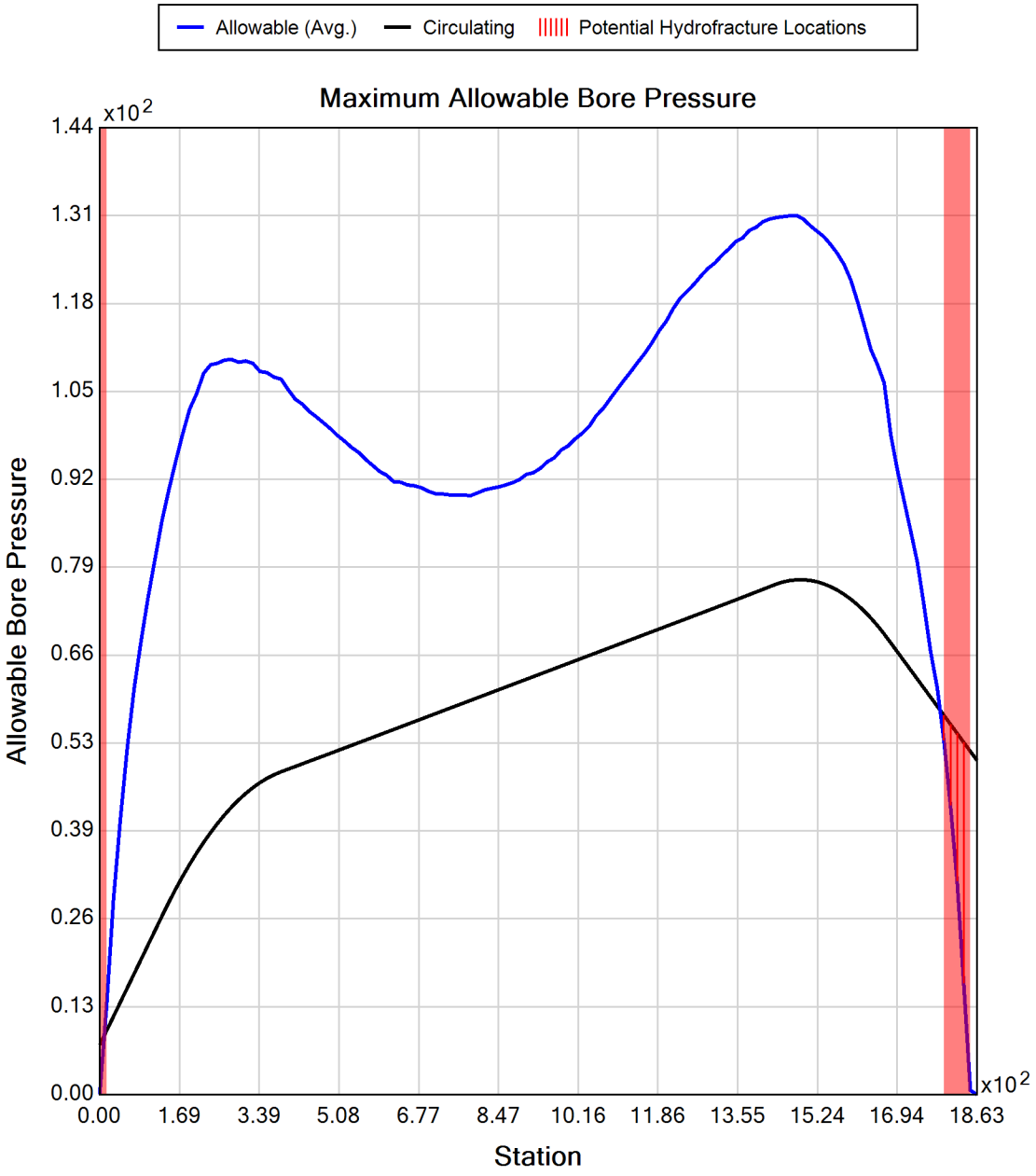
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 417.7



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 & 3 Equivalent Pipe Bundle HDD 129 DWG C-329.2

Input Summary

Start Coordinate	(0.00, 0.00, 98.77) ft
End Coordinate	(1852.30, 0.00, 109.89) ft
Project Length	1852.30 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	12.750 in
Pipe DR	26.0
Pipe Thickness	0.49 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: PVC

Classification: IPS

Pipe OD: 12" (12.75")

Pipe DR: 26

Pipe Length: 1904.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.59400002161662 ft

Silo Width: 1.59400002161662 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	6.5	44.8
Water Pressure	6.7	6.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	13.3	51.6
Deflection		
Earth Load Deflection	4.407	26.317
Buoyant Deflection	0.266	0.266
Reissner Effect	0	0
Net Deflection	4.673	26.584
Compressive Stress [psi]		
Compressive Wall Stress	172.4	670.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	20498.9	20498.9
Pullback Stress [psi]	1085.3	1085.3
Pullback Strain	2.713E-3	2.713E-3
Bending Stress [psi]	0.0	212.5
Bending Strain	0	5.313E-4
Tensile Stress [psi]	1085.3	1259.0
Tensile Strain	2.713E-3	3.590E-3

Net External Pressure = 19.0 [psi]

Buoyant Deflection = 0.3

Hydrokinetic Force = 798.4 lb

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.266	7.5	28.2	OK
Unconstrained Collapse [psi]	24.8	55.9	2.3	OK
Tensile Stress [psi]	1259.0	7000.0	5.6	OK

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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 1 HDD 131 DWG C-331

Input Summary

Start Coordinate	(0.00, 0.00, 110.73) ft
End Coordinate	(1860.85, 0.00, 130.92) ft
Project Length	1860.85 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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

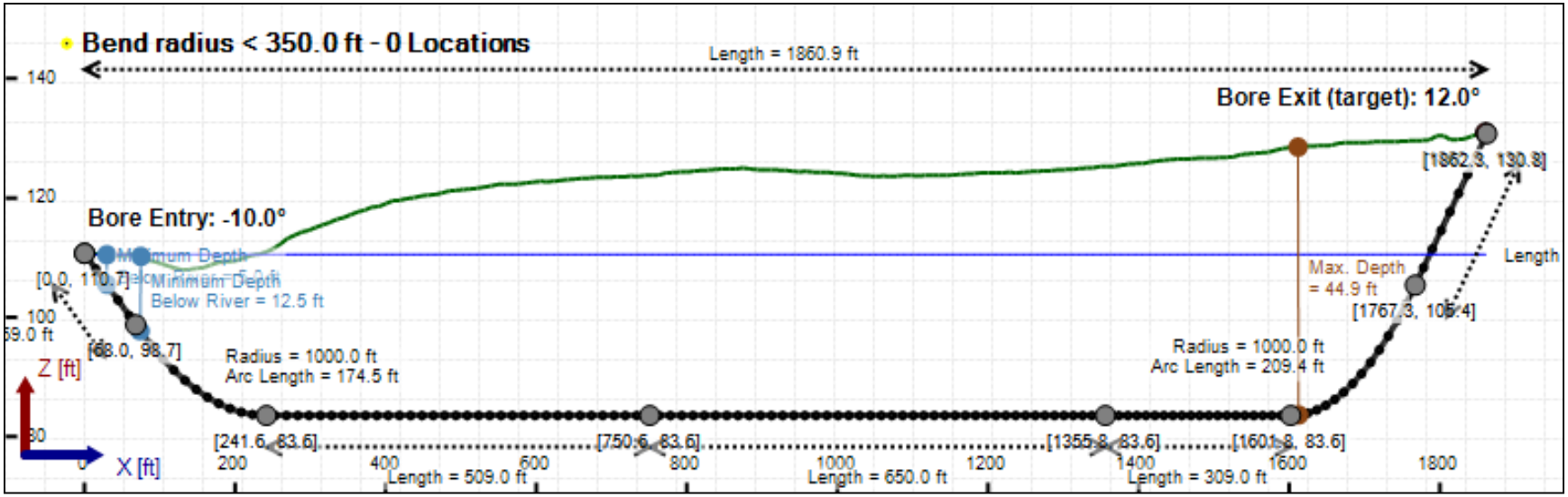
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #2 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

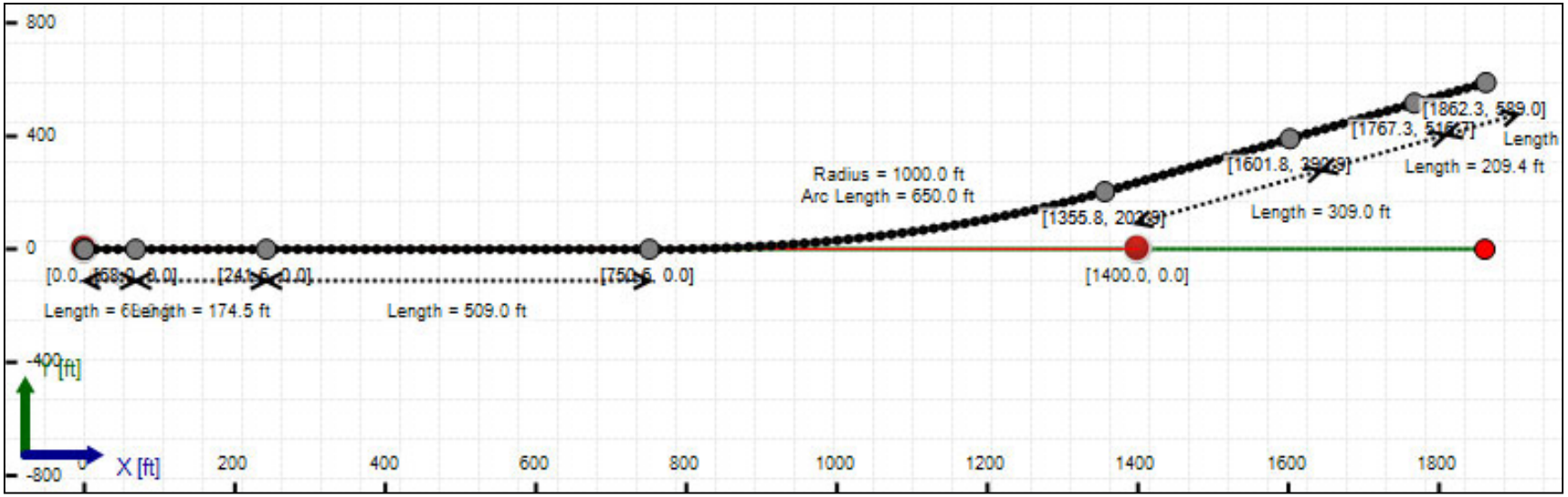
Soil Layer #3 USCS, Gravel (G), GP
From Assistant
Unit Weight: 15.9852 (dry), 17.9718 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 2054.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.0	29.7
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	15.7	41.4
Deflection		
Earth Load Deflection	0.863	5.482
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	0.922	5.541
Compressive Stress [psi]		
Compressive Wall Stress	141.4	372.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	27043.5	27043.5
Pullback Stress [psi]	2205.4	2205.4
Pullback Strain	5.514E-3	5.514E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	2205.4	2335.3
Tensile Strain	5.514E-3	6.198E-3

Net External Pressure = 31.4 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.922	7.5	8.1	OK
Unconstrained Collapse [psi]	32.3	177.1	5.5	OK
Compressive Wall Stress [psi]	141.4	3200.0	22.6	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	42.3	173.6	4.1	OK
Tensile Stress [psi]	2335.3	7000.0	3.0	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	455.293 psi	1338.989 psi
1	8.00 in	10.00 in	455.217 psi	1338.905 psi
2	10.00 in	12.94 in	455.075 psi	1338.747 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): 200.00 US (liquid) gallon/min

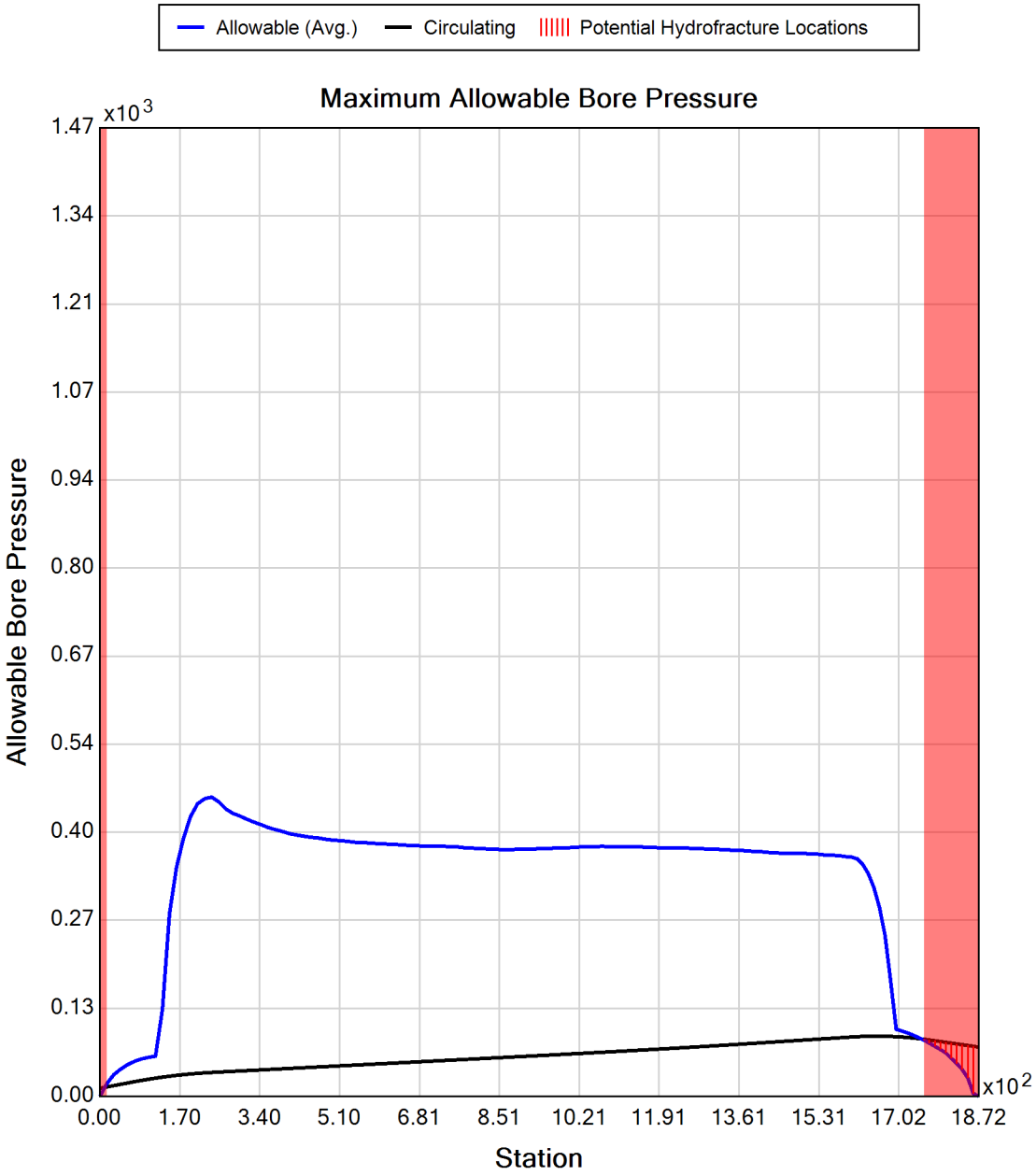
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

General:

Kiewit - CHPE

Ref: New York

204-3701

Start Date: 04-29-2022

End Date: 04-14-2023

Designer:

Aaron Coady

TetraTech Rooney

115 Inverness Drive East, Suite 300

Englewood, Colorado

United States 80112

aaron.coady@tetratech.com

Description:

Segment 12 (Package 7B)
Conduit 2
HDD 131
DWG C-331.2

Input Summary

Start Coordinate	(0.00, 0.00, 110.34) ft
End Coordinate	(1876.50, 0.00, 130.54) ft
Project Length	1876.50 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 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

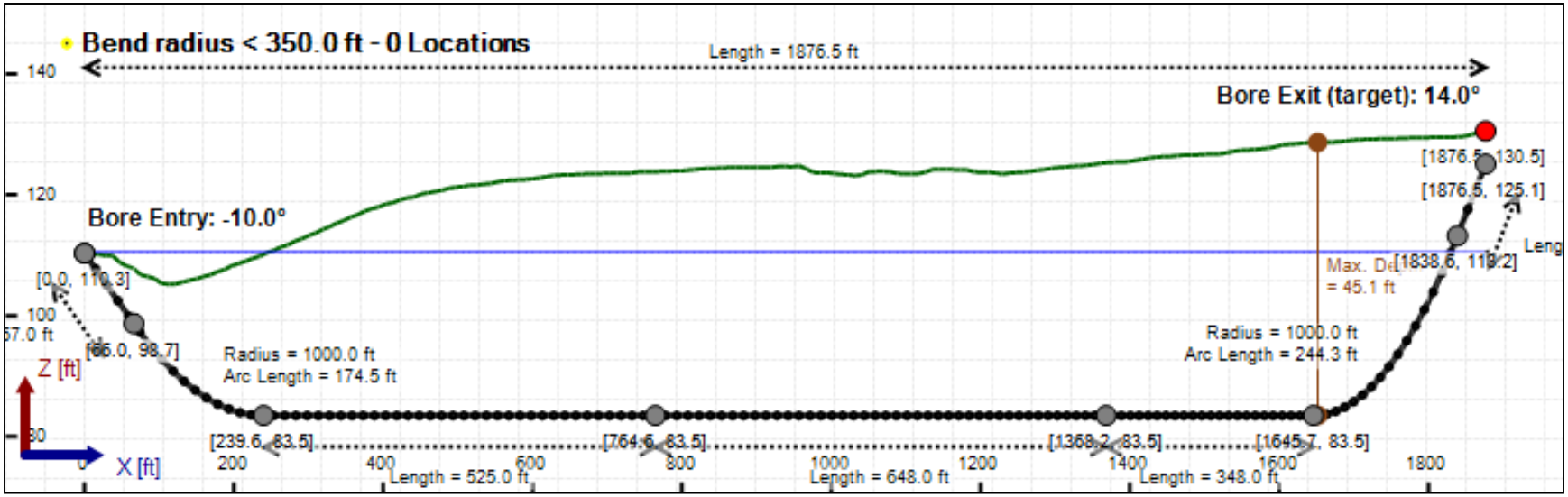
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #2 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

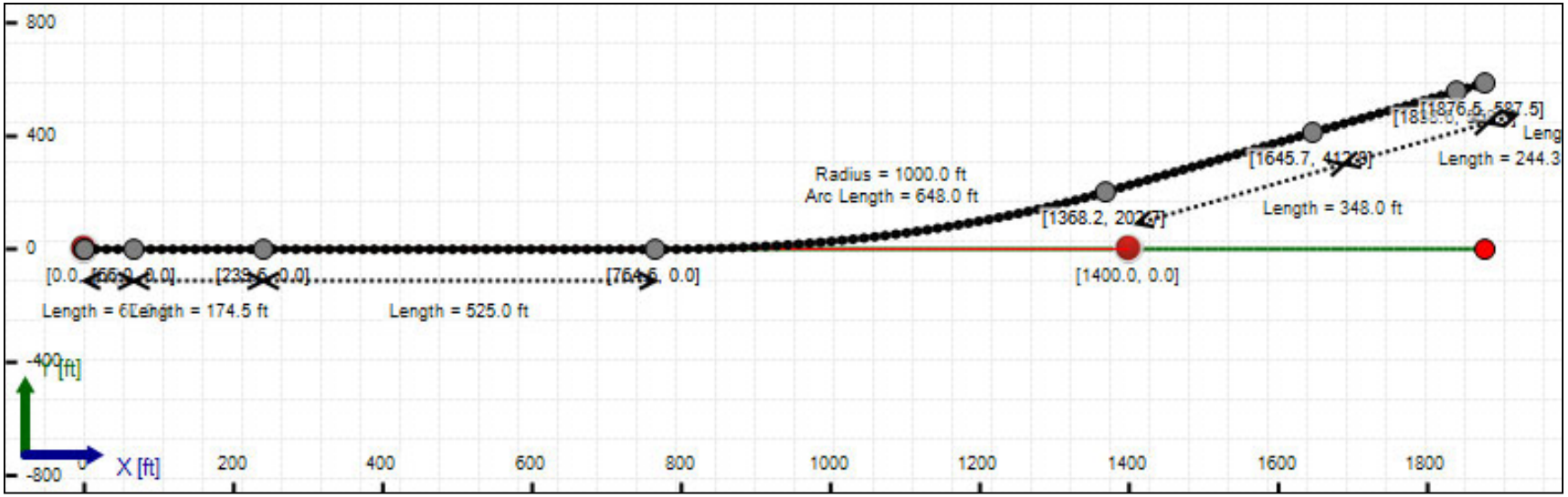
Soil Layer #3 USCS, Gravel (G), GP
From Assistant
Unit Weight: 15.9852 (dry), 17.9718 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 2069.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.0	29.9
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	15.7	41.6
Deflection		
Earth Load Deflection	0.864	5.515
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	0.924	5.575
Compressive Stress [psi]		
Compressive Wall Stress	141.6	374.7

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	27164.3	27164.3
Pullback Stress [psi]	2215.3	2215.3
Pullback Strain	5.538E-3	5.538E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	2215.3	2343.5
Tensile Strain	5.538E-3	6.218E-3

Net External Pressure = 26.9 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.924	7.5	8.1	OK
Unconstrained Collapse [psi]	29.2	177.1	6.1	OK
Compressive Wall Stress [psi]	141.6	3200.0	22.6	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	39.2	173.5	4.4	OK
Tensile Stress [psi]	2343.5	7000.0	3.0	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	465.941 psi	1339.163 psi
1	8.00 in	10.00 in	465.853 psi	1339.080 psi
2	10.00 in	12.94 in	465.689 psi	1338.923 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): 200.00 US (liquid) gallon/min

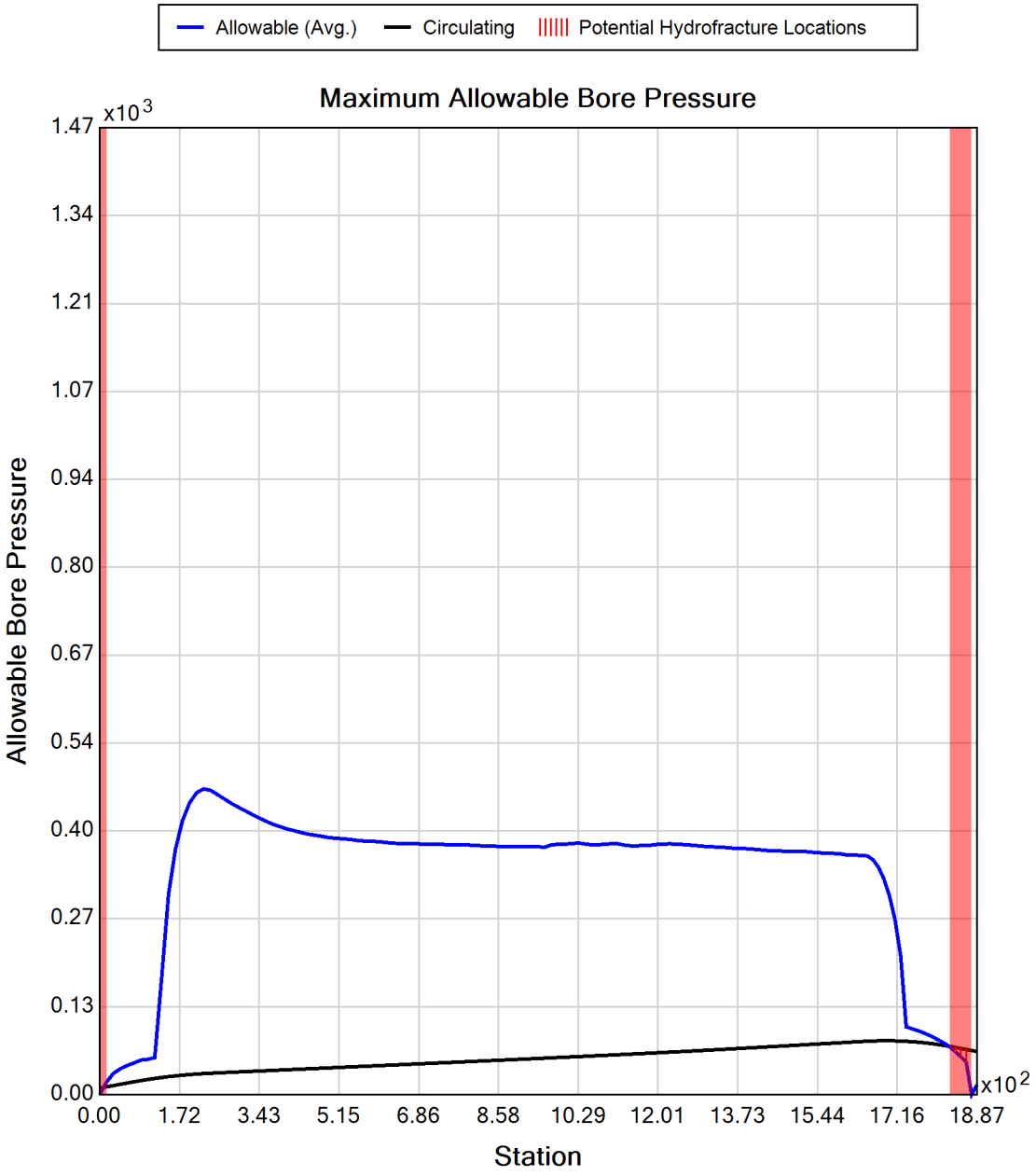
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady TetraTech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 3 HDD 131 DWG C-331.2

Input Summary

Start Coordinate	(0.00, 0.00, 110.34) ft
End Coordinate	(1876.50, 0.00, 130.54) ft
Project Length	1876.50 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	3.500 in
Pipe DR	9.0
Pipe Thickness	0.39 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

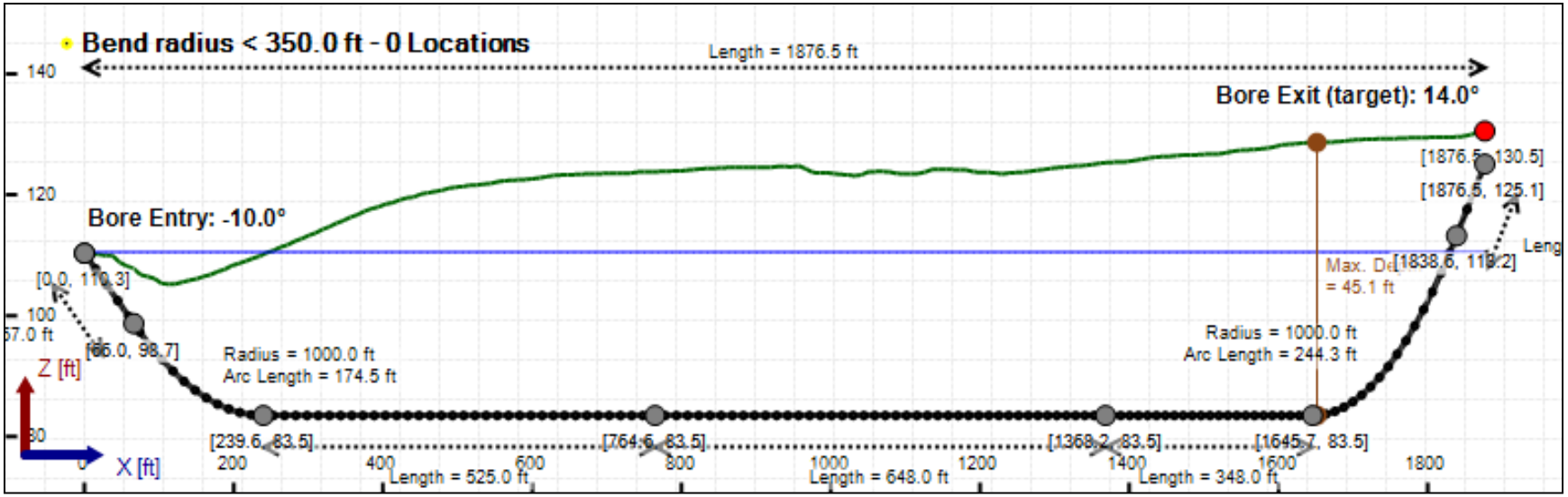
Soil Layer #1 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #2 USCS, Sand (S), SM
From Assistant
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

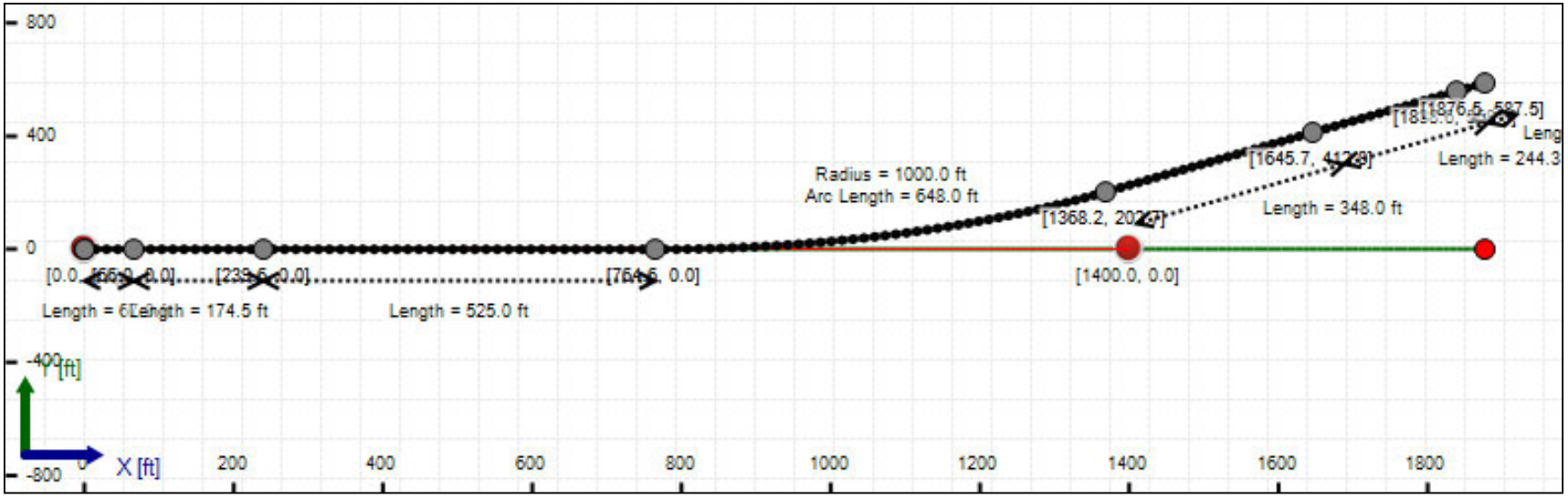
Soil Layer #3 USCS, Gravel (G), GP
From Assistant
Unit Weight: 15.9852 (dry), 17.9718 (sat) [lb/US (liquid) gallon]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #4 Rock, Geological Classification, Sedimentary Rocks
From Assistant
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: 3" (3.5")

Pipe DR: 9

Pipe Length: 2069.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 0.625 ft

Silo Width: 0.625 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: 7.92790 lb/US (liquid) gallon

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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	2.3	29.9
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.0	41.6
Deflection		
Earth Load Deflection	0.770	8.152
Buoyant Deflection	0.043	0.043
Reissner Effect	0	0
Net Deflection	0.813	8.195
Compressive Stress [psi]		
Compressive Wall Stress	63.2	187.3

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	4404.6	4404.6
Pullback Stress [psi]	1158.8	1158.8
Pullback Strain	2.015E-2	2.015E-2
Bending Stress [psi]	0.0	8.4
Bending Strain	0	1.458E-4
Tensile Stress [psi]	1158.8	1160.7
Tensile Strain	2.015E-2	2.033E-2

Net External Pressure = 28.6 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 172.8 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.813	7.5	9.2	OK
Unconstrained Collapse [psi]	29.2	129.9	4.4	OK
Compressive Wall Stress [psi]	63.2	1150.0	18.2	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.021	7.5	355.7	OK
Unconstrained Collapse [psi]	39.2	179.1	4.6	OK
Tensile Stress [psi]	1160.7	1200.0	1.0	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	465.941 psi	1339.163 psi
1	8.00 in	7.50 in	465.959 psi	1339.181 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): 200.00 US (liquid) gallon/min

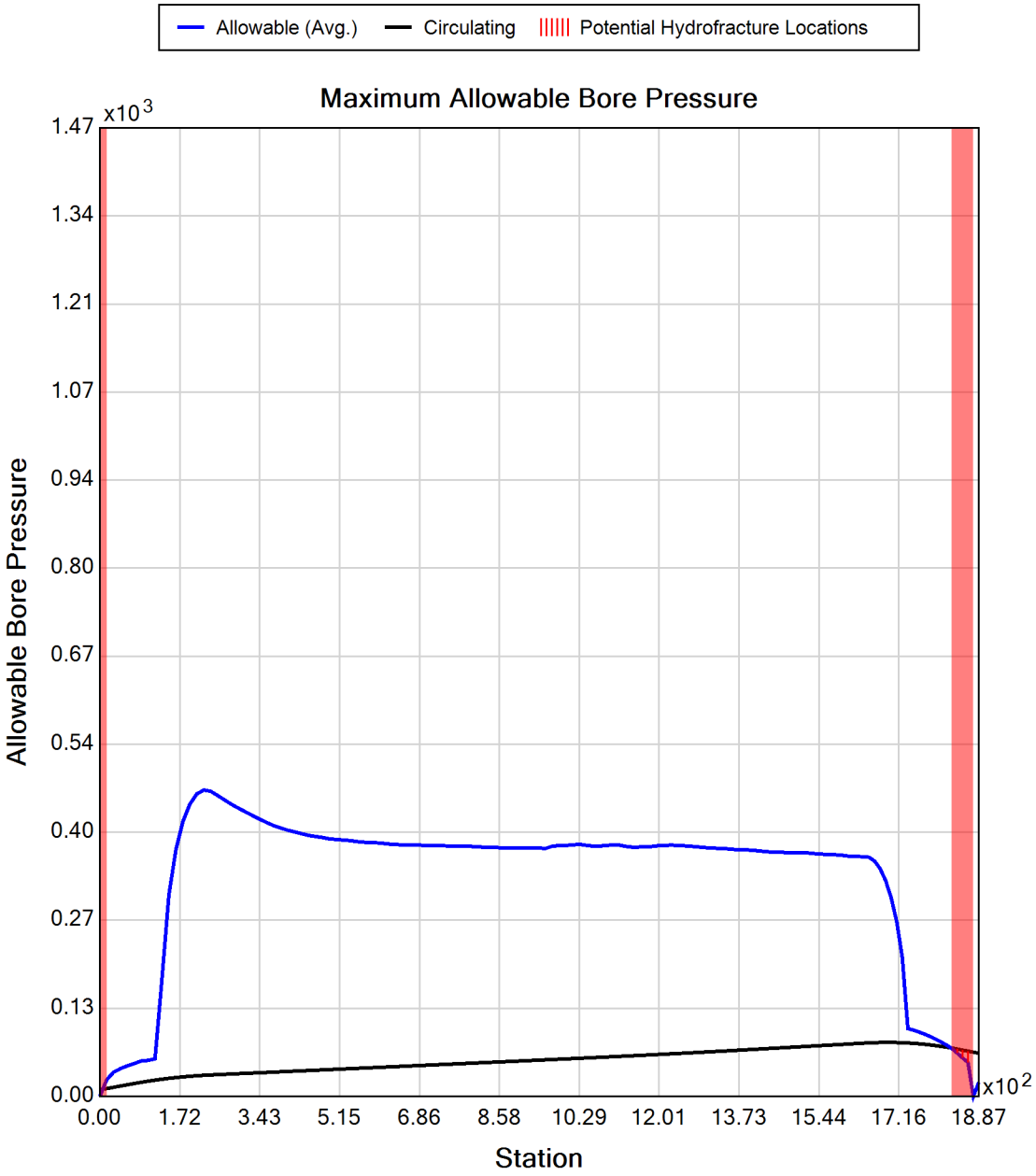
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady TetraTech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 & 3 Equivalent Pipe Bundle HDD 131 DWG C-331.2

Input Summary

Start Coordinate	(0.00, 0.00, 110.34) ft
End Coordinate	(1876.50, 0.00, 130.54) ft
Project Length	1876.50 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	12.750 in
Pipe DR	26.0
Pipe Thickness	0.49 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: PVC

Classification: IPS

Pipe OD: 12" (12.75")

Pipe DR: 26

Pipe Length: 2069.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.59400002161662 ft

Silo Width: 1.59400002161662 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	5.9	29.9
Water Pressure	11.7	11.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	17.6	41.6
Deflection		
Earth Load Deflection	3.745	17.540
Buoyant Deflection	0.266	0.266
Reissner Effect	0	0
Net Deflection	4.011	17.806
Compressive Stress [psi]		
Compressive Wall Stress	229.1	541.2

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	23773.5	23773.5
Pullback Stress [psi]	1258.7	1258.7
Pullback Strain	3.147E-3	3.147E-3
Bending Stress [psi]	0.0	212.5
Bending Strain	0	5.313E-4
Tensile Stress [psi]	1258.7	1466.0
Tensile Strain	3.147E-3	4.196E-3

Net External Pressure = 16.2 [psi]

Buoyant Deflection = 0.3

Hydrokinetic Force = 798.4 lb

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.266	7.5	28.2	OK
Unconstrained Collapse [psi]	19.7	55.4	2.8	OK
Tensile Stress [psi]	1466.0	7000.0	4.8	OK

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Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 1 HDD 132 DWG C-332

Input Summary

Start Coordinate	(0.00, 0.00, 116.31) ft
End Coordinate	(1751.10, 0.00, 131.07) ft
Project Length	1751.10 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

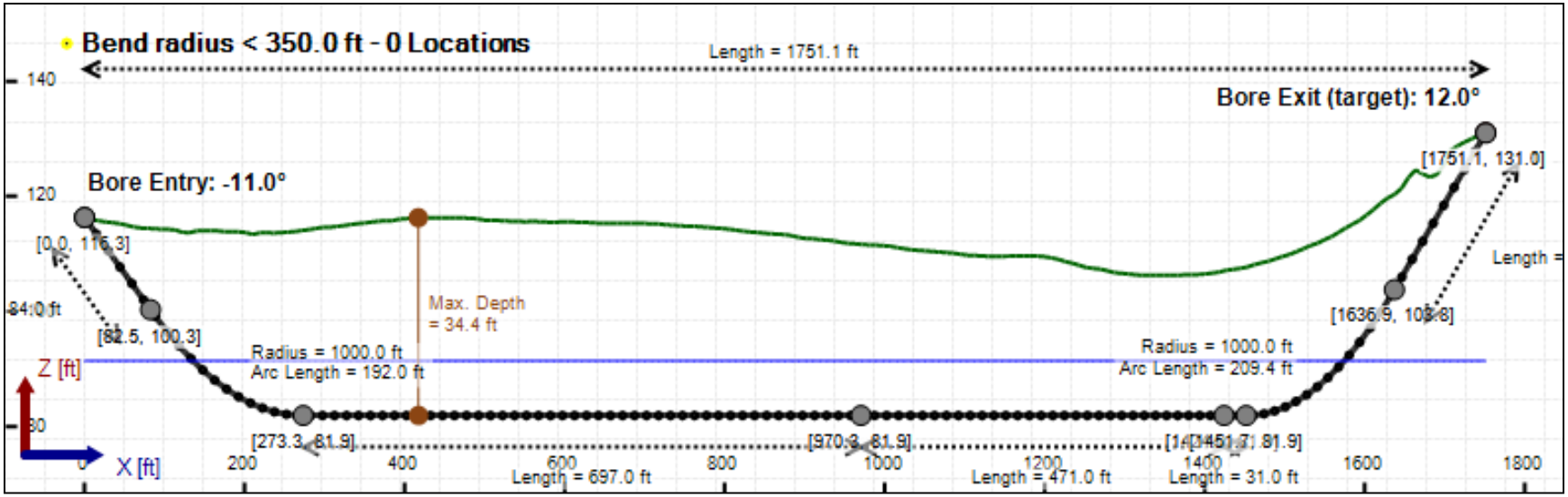
Number of Layers: 3

Soil Layer #1 USCS, Silt (M), ML
Depth: 8.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

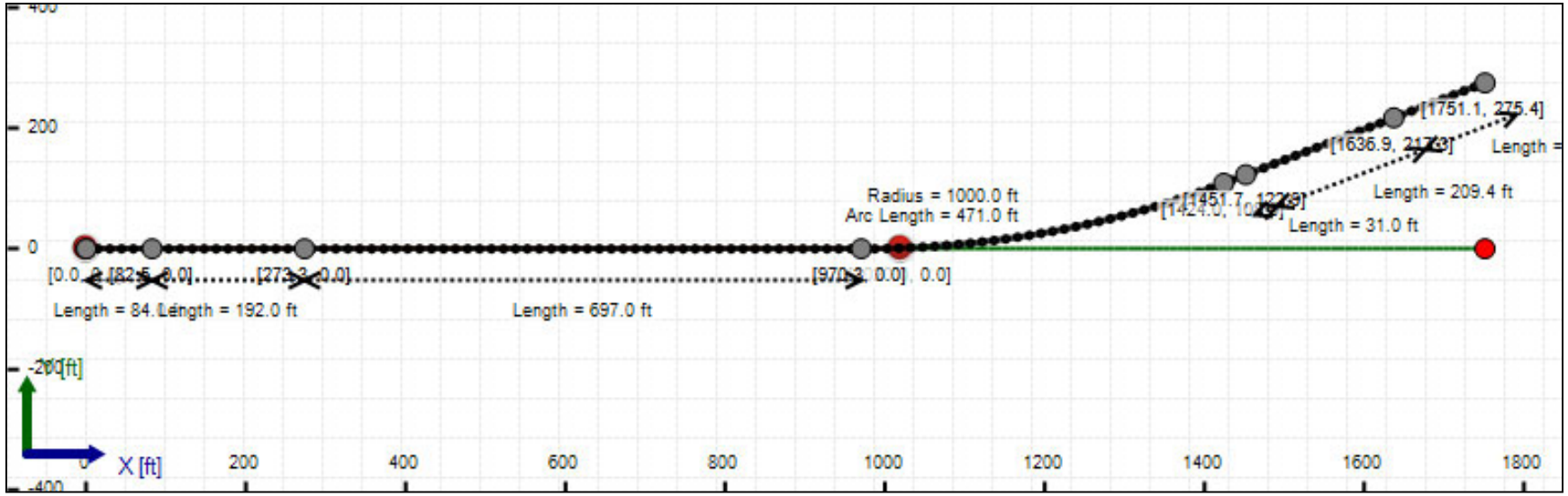
Soil Layer #2 USCS, Sand (S), SM
Depth: 22.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 Rock, Geological Classification, Sedimentary Rocks
Depth: 15.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1829.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	11.4	25.7
Water Pressure	0.0	4.1
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.4	29.8
Deflection		
Earth Load Deflection	2.100	4.737
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	2.160	4.797
Compressive Stress [psi]		
Compressive Wall Stress	102.6	268.3

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	22845.4	22845.4
Pullback Stress [psi]	1863.1	1863.1
Pullback Strain	4.658E-3	4.658E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	1863.1	1995.8
Tensile Strain	4.658E-3	5.349E-3

Net External Pressure = 30.8 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	2.160	7.5	3.5	OK
Unconstrained Collapse [psi]	33.9	175.7	5.2	OK
Compressive Wall Stress [psi]	102.6	3200.0	31.2	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	43.9	176.3	4.0	OK
Tensile Stress [psi]	1995.8	7000.0	3.5	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	398.002 psi	1327.943 psi
1	8.00 in	10.00 in	397.917 psi	1327.799 psi
2	10.00 in	12.94 in	397.759 psi	1327.530 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): 200.00 US (liquid) gallon/min

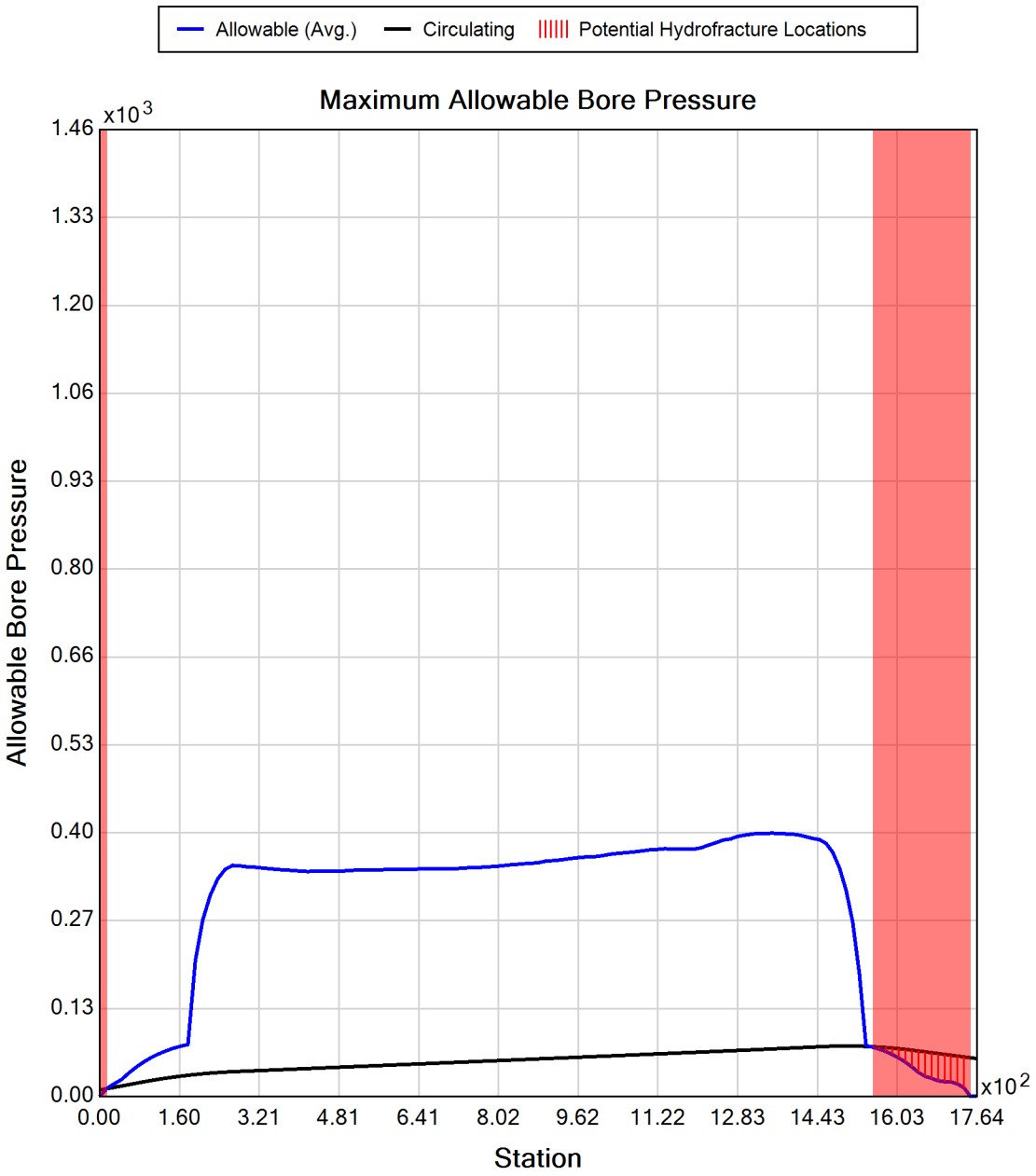
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 HDD 132 DWG C-332.2

Input Summary

Start Coordinate	(0.00, 0.00, 116.65) ft
End Coordinate	(1757.90, 0.00, 126.02) ft
Project Length	1757.90 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	8.625 in
Pipe DR	18.0
Pipe Thickness	0.48 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

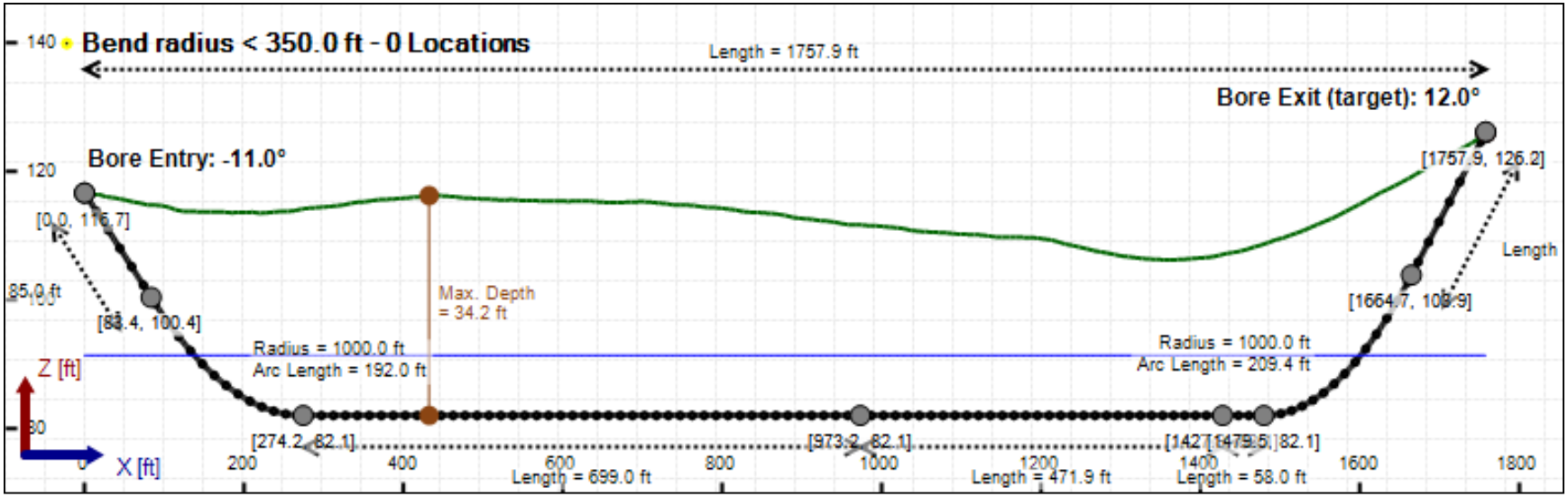
Number of Layers: 3

Soil Layer #1 USCS, Silt (M), ML
Depth: 8.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

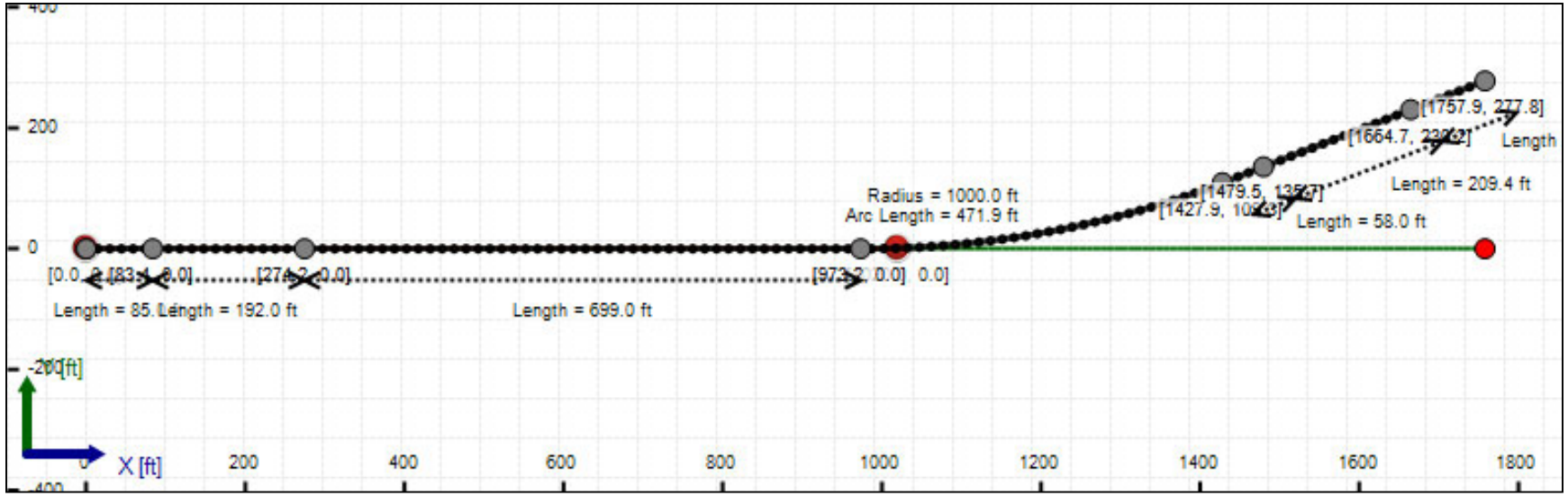
Soil Layer #2 USCS, Sand (S), SM
Depth: 22.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 Rock, Geological Classification, Sedimentary Rocks
Depth: 15.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: PVC

Classification: IPS

Pipe OD: 8" (8.625")

Pipe DR: 18

Pipe Length: 1829.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.07799990971883 ft

Silo Width: 1.07799990971883 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	8.7	25.7
Water Pressure	0.0	4.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	8.7	29.7
Deflection		
Earth Load Deflection	1.601	4.733
Buoyant Deflection	0.060	0.060
Reissner Effect	0	0
Net Deflection	1.660	4.793
Compressive Stress [psi]		
Compressive Wall Stress	78.2	267.6

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	22505.3	22505.3
Pullback Stress [psi]	1835.3	1835.3
Pullback Strain	4.588E-3	4.588E-3
Bending Stress [psi]	0.0	143.8
Bending Strain	0	3.594E-4
Tensile Stress [psi]	1835.3	1969.0
Tensile Strain	4.588E-3	5.282E-3

Net External Pressure = 26.5 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 365.0 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.660	7.5	4.5	OK
Unconstrained Collapse [psi]	29.7	175.7	5.9	OK
Compressive Wall Stress [psi]	78.2	3200.0	40.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.060	7.5	125.5	OK
Unconstrained Collapse [psi]	39.7	176.5	4.4	OK
Tensile Stress [psi]	1969.0	7000.0	3.6	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	8.00 in	408.218 psi	1327.858 psi
1	8.00 in	10.00 in	408.130 psi	1327.713 psi
2	10.00 in	12.94 in	407.966 psi	1327.441 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): 200.00 US (liquid) gallon/min

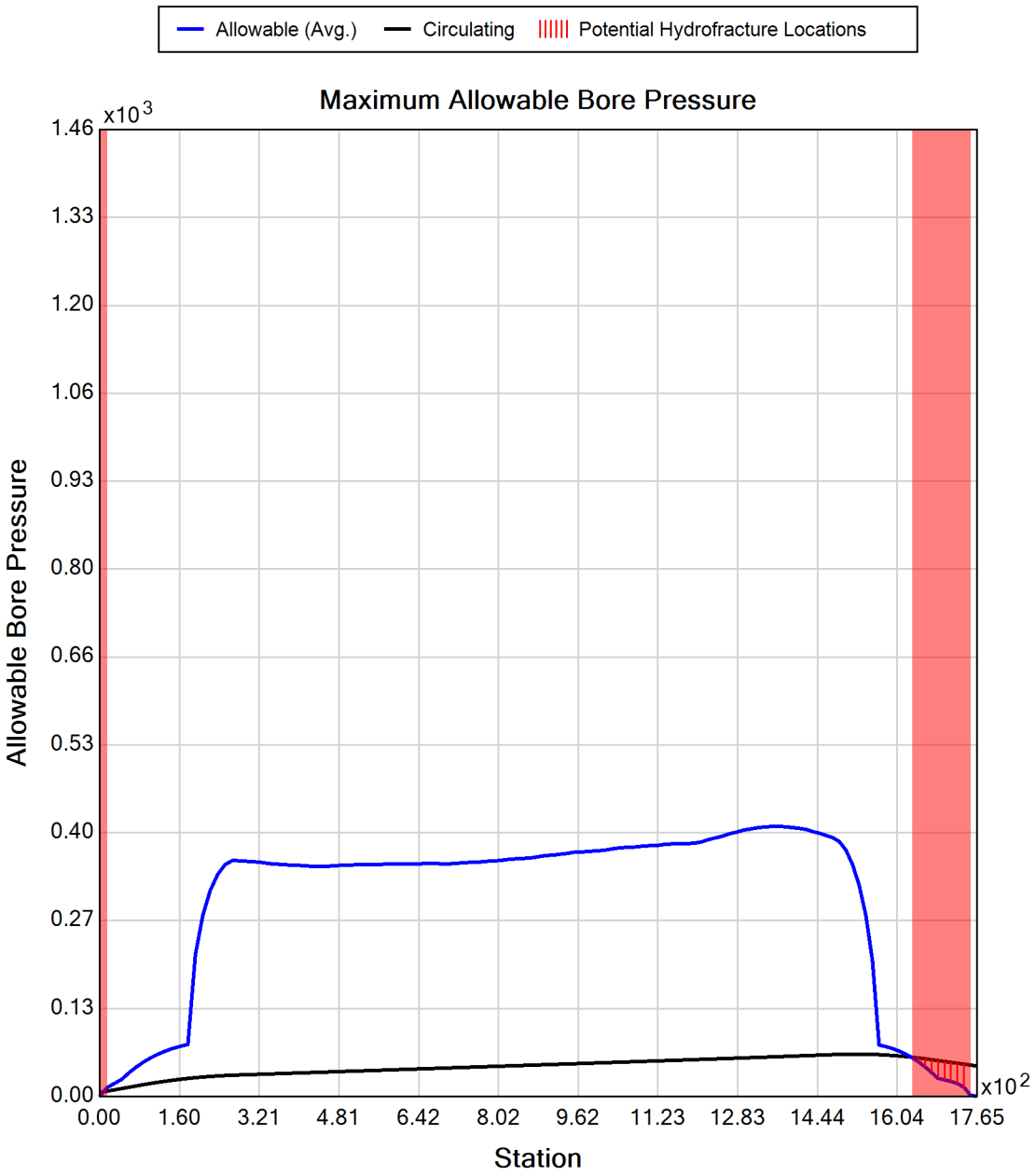
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

General:	Kiewit - CHPE Ref: New York 204-3701 Start Date: 04-29-2022 End Date: 04-14-2023
Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 3 HDD 132 DWG C-332.2

Input Summary

Start Coordinate	(0.00, 0.00, 116.65) ft
End Coordinate	(1757.90, 0.00, 126.02) ft
Project Length	1757.90 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	3.500 in
Pipe DR	9.0
Pipe Thickness	0.39 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

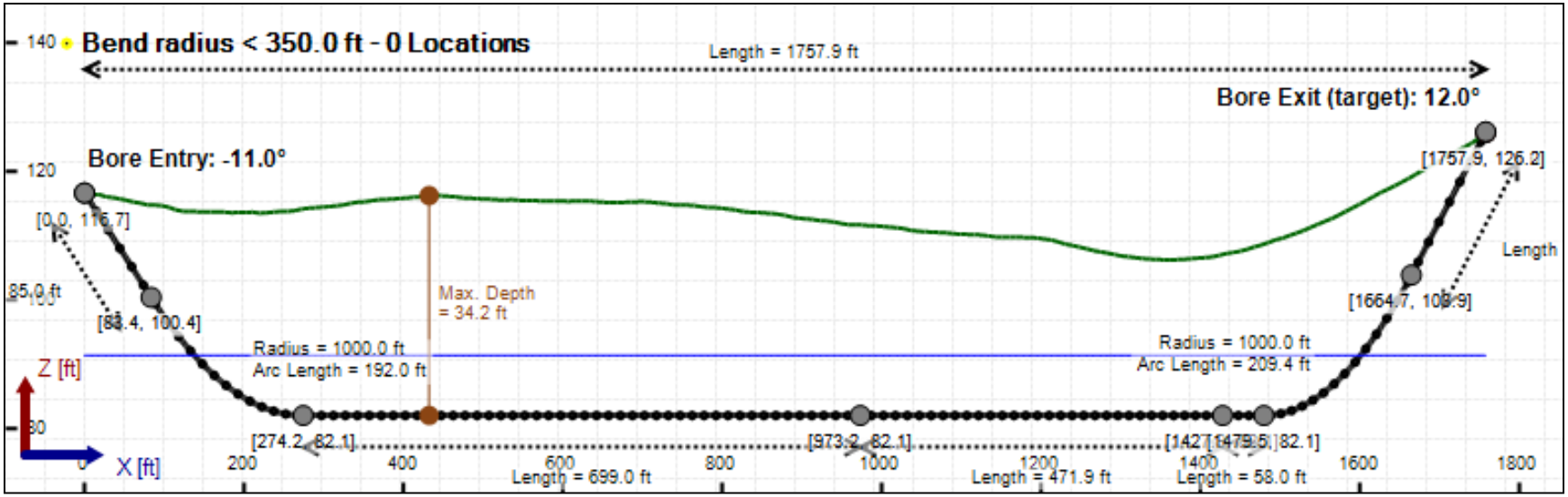
Number of Layers: 3

Soil Layer #1 USCS, Silt (M), ML
Depth: 8.00 ft
Unit Weight: 14.3220 (dry), 16.8861 (sat) [lb/US (liquid) gallon]
Phi: 0.00, S.M.: 145.00, Coh: 4.40 [psi]

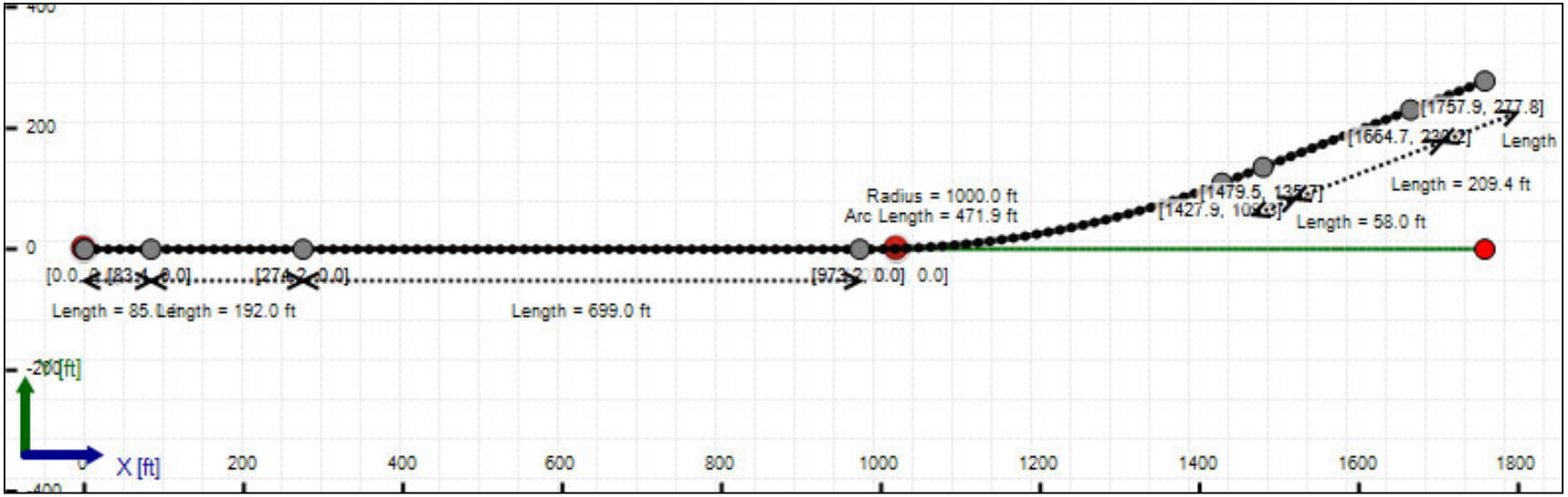
Soil Layer #2 USCS, Sand (S), SM
Depth: 22.00 ft
Unit Weight: 15.6618 (dry), 17.7639 (sat) [lb/US (liquid) gallon]
Phi: 30.00, S.M.: 145.00, Coh: 4.40 [psi]

Soil Layer #3 Rock, Geological Classification, Sedimentary Rocks
Depth: 15.00 ft
Unit Weight: 14.4144 (dry), 23.7468 (sat) [lb/US (liquid) gallon]
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: 3" (3.5")

Pipe DR: 9

Pipe Length: 1829.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 0.625 ft

Silo Width: 0.625 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: 7.92790 lb/US (liquid) gallon

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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	8.7	25.7
Water Pressure	0.0	4.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	8.7	29.7
Deflection		
Earth Load Deflection	2.366	6.997
Buoyant Deflection	0.043	0.043
Reissner Effect	0	0
Net Deflection	2.409	7.040
Compressive Stress [psi]		
Compressive Wall Stress	39.1	133.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	3659.1	3659.1
Pullback Stress [psi]	962.7	962.7
Pullback Strain	1.674E-2	1.674E-2
Bending Stress [psi]	0.0	8.4
Bending Strain	0	1.458E-4
Tensile Stress [psi]	962.7	967.1
Tensile Strain	1.674E-2	1.696E-2

Net External Pressure = 26.5 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 172.8 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	2.409	7.5	3.1	OK
Unconstrained Collapse [psi]	29.7	129.0	4.3	OK
Compressive Wall Stress [psi]	39.1	1150.0	29.4	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.021	7.5	355.7	OK
Unconstrained Collapse [psi]	39.7	195.9	4.9	OK
Tensile Stress [psi]	967.1	1200.0	1.2	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	8.00 in	408.218 psi	1327.858 psi
1	8.00 in	7.50 in	408.236 psi	1327.890 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): 200.00 US (liquid) gallon/min

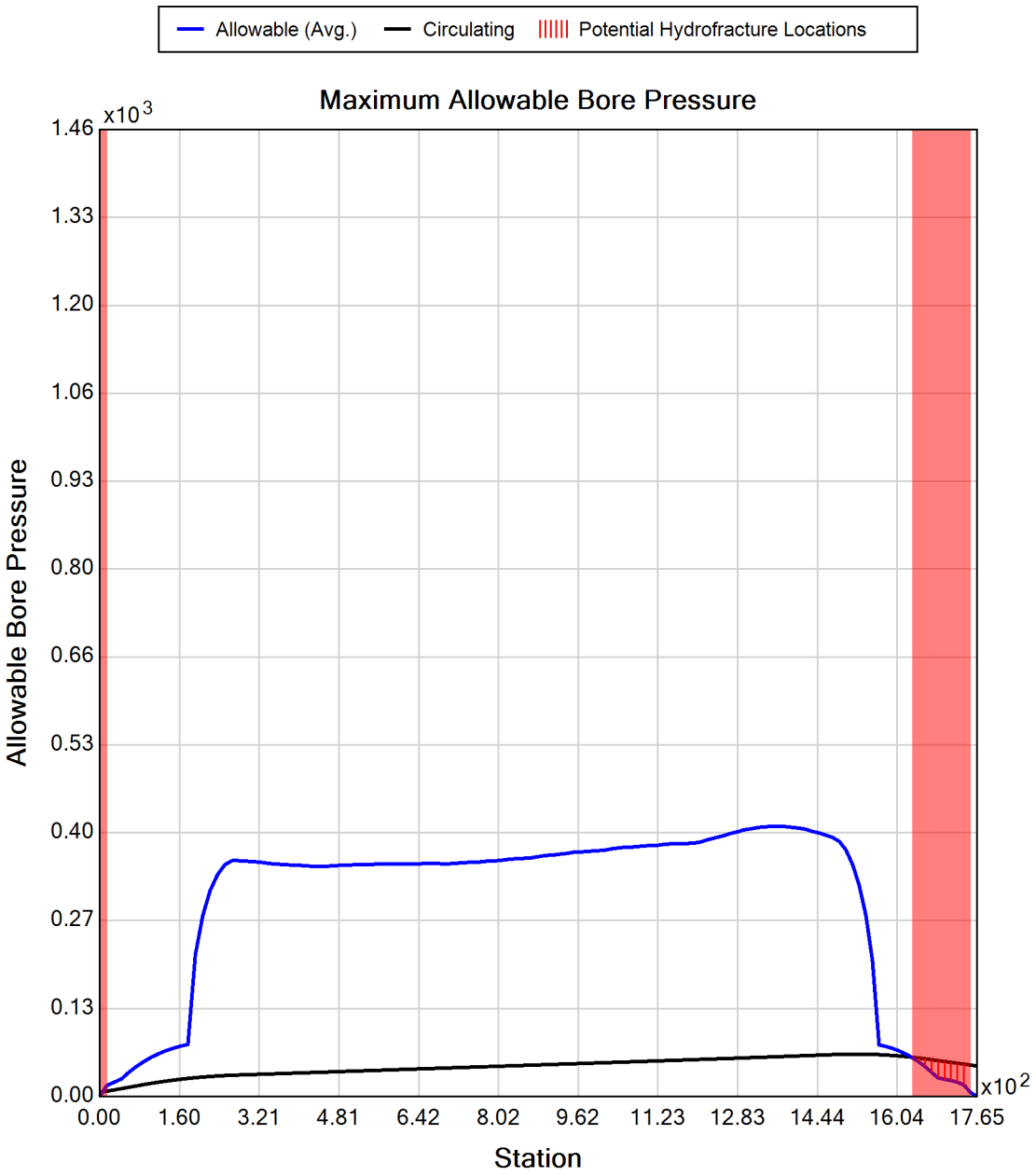
Drill Fluid Density: 10.500 lb/US (liquid) gallon

Rheological model: Bingham-Plastic

Plastic Viscosity (PV): 25.53

Yield Point (YP): 16.49

Effective Viscosity (cP): 260.8



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Project Summary

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Designer:	Aaron Coady Tetra Tech Rooney 115 Inverness Drive East, Suite 300 Englewood, Colorado United States 80112 aaron.coady@tetratech.com
Description:	Segment 12 (Package 7B) Conduit 2 & 3 Equivalent Pipe Bundle HDD 132 DWG C-332.2

Input Summary

Start Coordinate	(0.00, 0.00, 116.65) ft
End Coordinate	(1757.90, 0.00, 126.02) ft
Project Length	1757.90 ft
Pipe Type	PVC
OD Classification	IPS
Pipe OD	12.750 in
Pipe DR	26.0
Pipe Thickness	0.49 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: PVC

Classification: IPS

Pipe OD: 12" (12.75")

Pipe DR: 26

Pipe Length: 1829.99 ft

Internal Pressure: 0 psi

Borehole Diameter: 1.59400002161662 ft

Silo Width: 1.59400002161662 ft

Surface Surcharge: 0 psi

Short Term Modulus: 400000 psi

Long Term Modulus: 400000 psi

Short Term Poisson Ratio: 0.38

Long Term Poisson Ratio: 0.38

Pipe Unit Weight: 11.68400 lb/US (liquid) gallon

Allowable Tensile Stress (Short Term): 7000 psi

Allowable Tensile Stress (Long Term): 7000 psi

Allowable Compressive Stress (Short Term): 3200 psi

Allowable Compressive Stress (Long Term): 3200 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: 12.51801 lb/US (liquid) gallon

Hydrokinetic Pressure: 10 psi

Ballast Unit Weight: 8.34534 lb/US (liquid) gallon

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	6.5	25.7
Water Pressure	4.0	4.0
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	10.6	29.7
Deflection		
Earth Load Deflection	5.090	15.054
Buoyant Deflection	0.266	0.266
Reissner Effect	0	0
Net Deflection	5.357	15.320
Compressive Stress [psi]		
Compressive Wall Stress	137.5	386.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	19645.8	19645.8
Pullback Stress [psi]	1040.2	1040.2
Pullback Strain	2.600E-3	2.600E-3
Bending Stress [psi]	0.0	212.5
Bending Strain	0	5.313E-4
Tensile Stress [psi]	1040.2	1250.1
Tensile Strain	2.600E-3	3.657E-3

Net External Pressure = 15.5 [psi]

Buoyant Deflection = 0.3

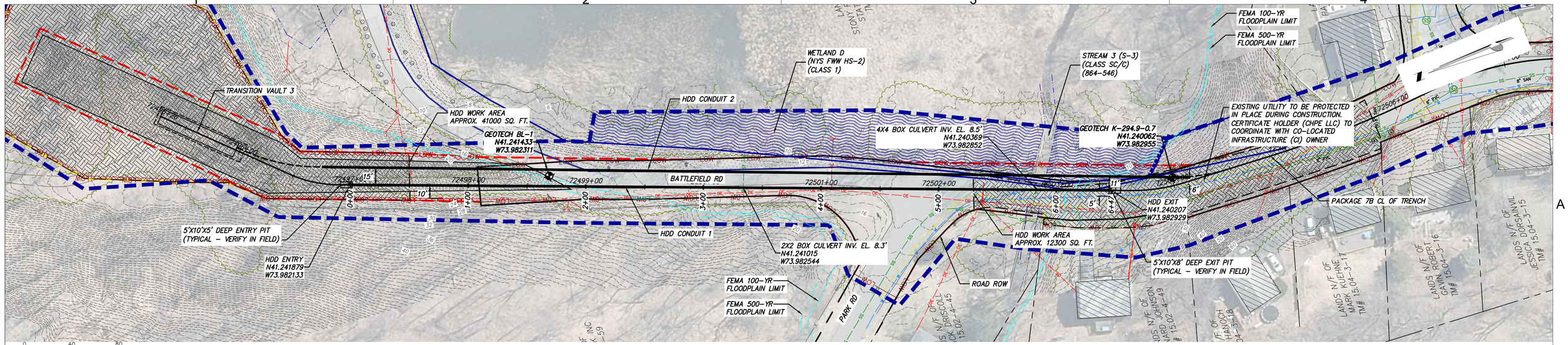
Hydrokinetic Force = 798.4 lb

Installation Analysis

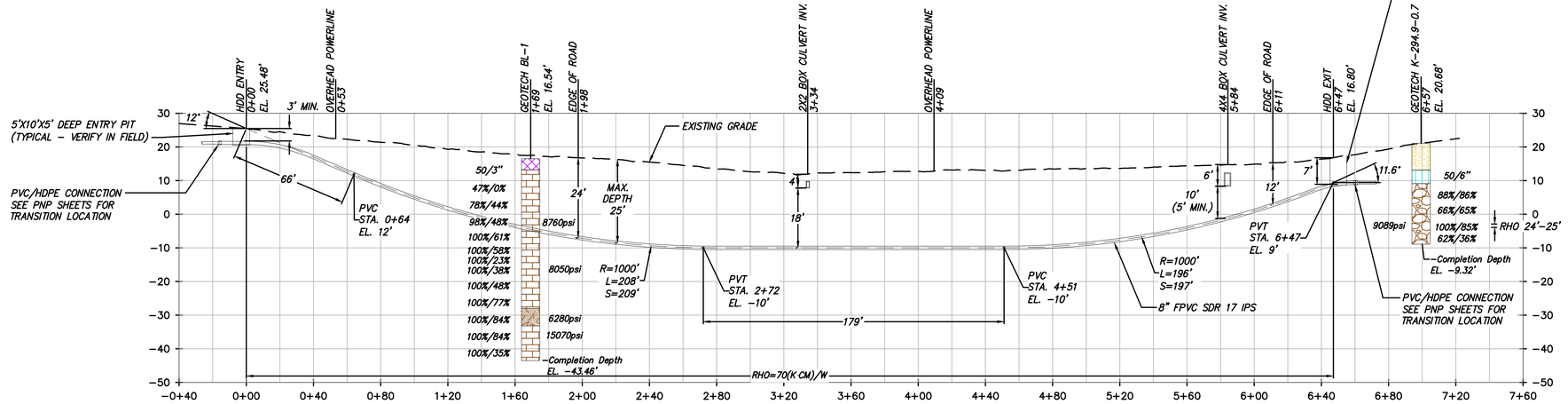
	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.266	7.5	28.2	OK
Unconstrained Collapse [psi]	19.9	55.9	2.8	OK
Tensile Stress [psi]	1250.1	7000.0	5.6	OK

Appendix D

Design Drawings



HDD 124 PLAN VIEW
CONDUIT 1



HDD 124 PROFILE VIEW
CONDUIT 1

0 20 40
0 40 80
Scale in feet when printed on 22x34

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 10.750" HDPE MIN. W.T. 1.194" DR 9 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):647'
   HDD DESIGNED PIPE LENGTH (S): 651'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 3 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

BORING LOG STRIP LEGEND
B101
Blow Counts per 6" + 10-15-15
Recovery %/RQD % + 95%/90%
1100psi +UCS
2D strip logs shown at 1Dx 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

Kiewit

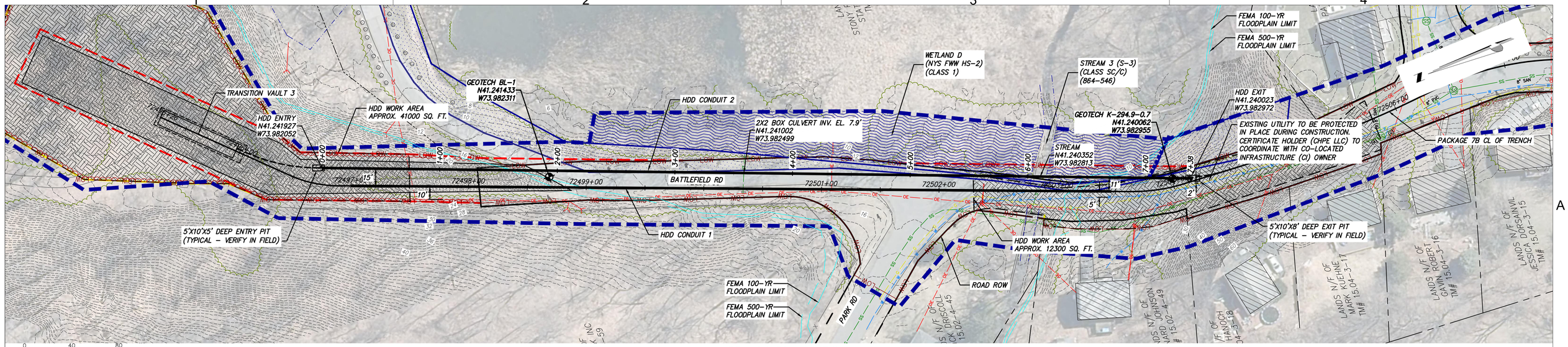
TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

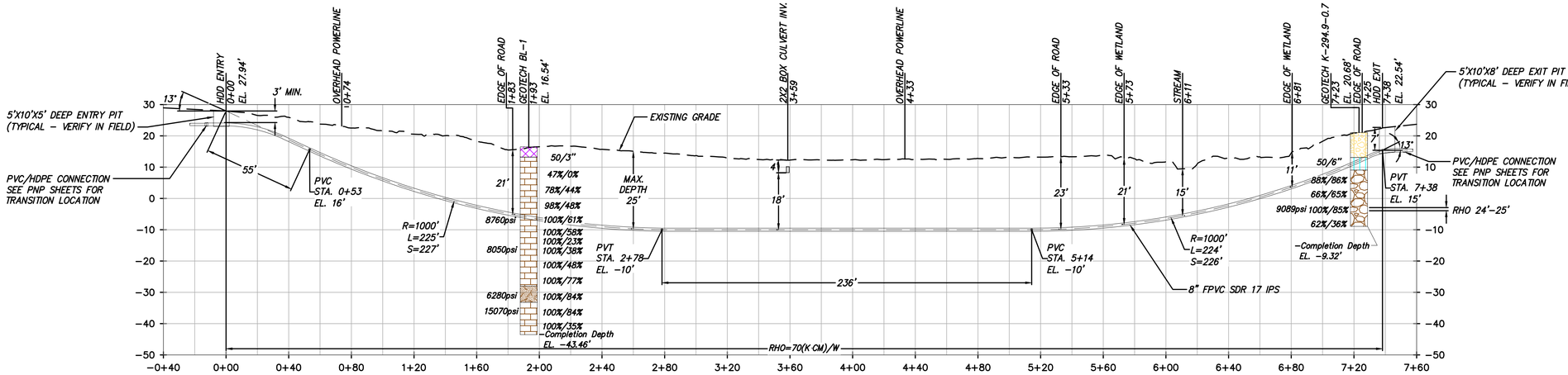
CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 124
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-324

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF



HDD 124 PLAN VIEW
CONDUIT 2



HDD 124 PROFILE VIEW
CONDUIT 2

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 10.750" HDPE MIN. W.T. 1.194" DR 9 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L): 738'
   HDD DESIGNED PIPE LENGTH (S): 743'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 3 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

BORING LOG STRIP LEGEND
B101
Blow Counts per 6" + 10-10-10
Recovery %/RQD % + 95%/50%
f'c=1000psi +UCS
2D strip logs shown at 5Dx 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

0 40 80
Scale in feet when printed on 22x34

CHPE Champlain Hudson Power Express

Kiewit

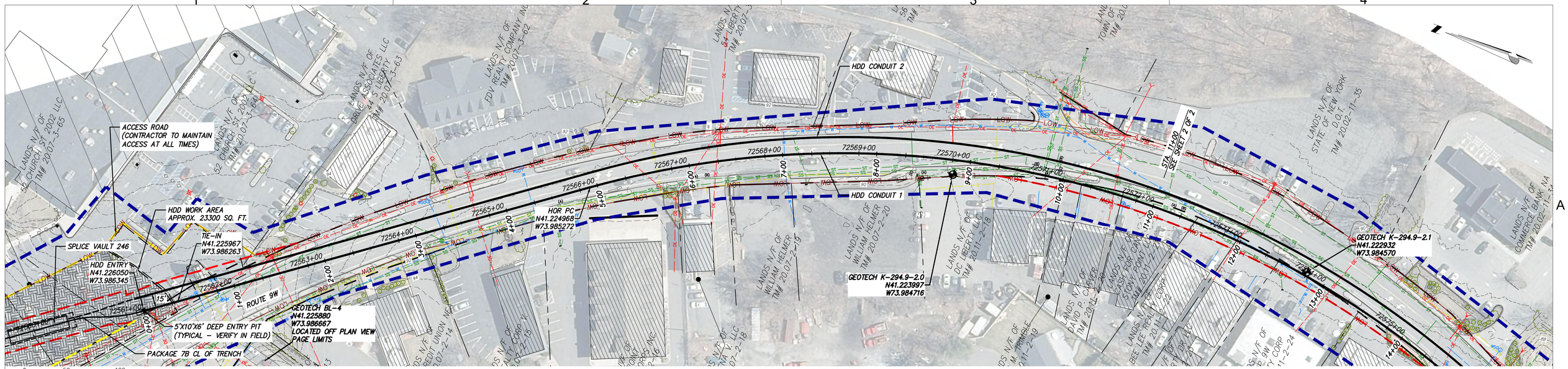
TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 124
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

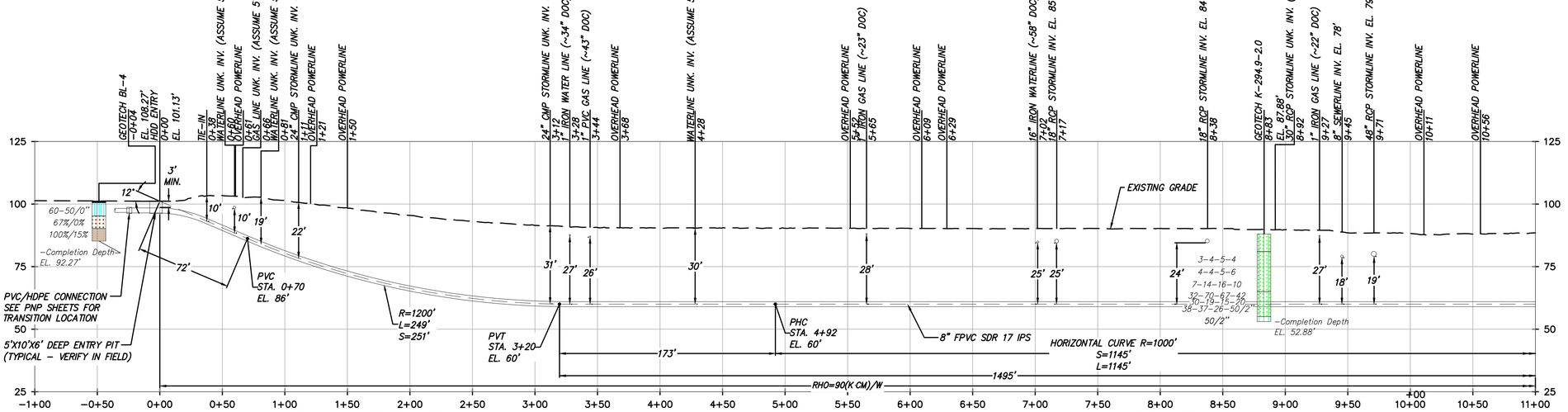
KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-324.2**

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE: AS SHOWN | REV. NO. D | DATE: 04/14/2023 | SH.NO. | OF



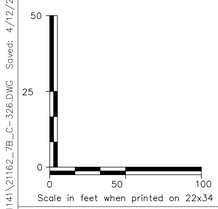
HDD 126 PLAN VIEW

CONDUIT 1



HDD 126 PROFILE VIEW

CONDUIT 1



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2145'
   HDD DESIGNED PIPE LENGTH (S): 2152'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

BORING LOG STRIP LEGEND

Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/80%
Strip
1000psi =UCS
20 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	SILTY, 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

TETRA TECH

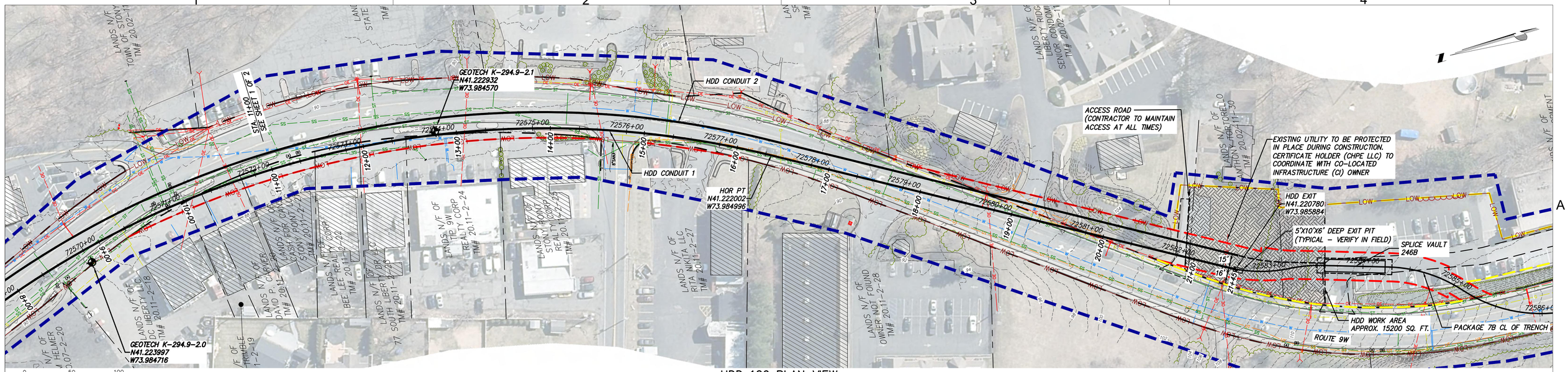
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

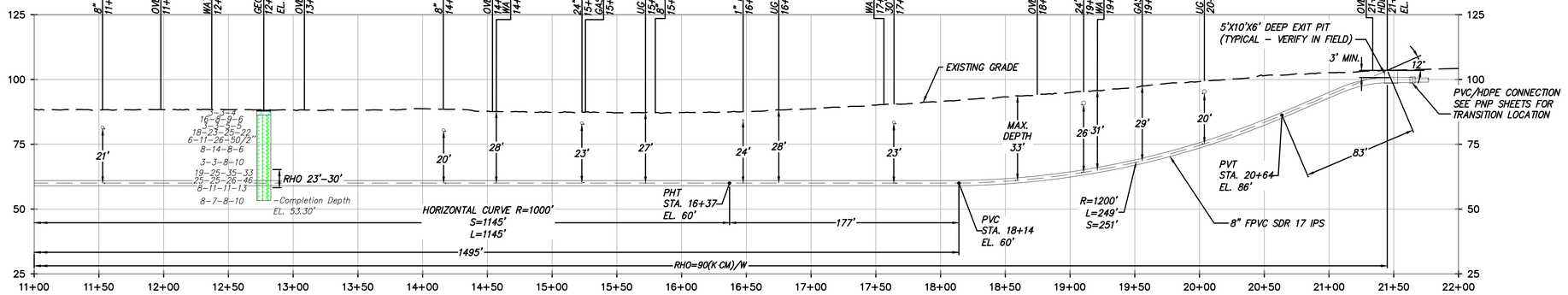
CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 126 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-326

DRAWN BY: MRS | DESIGNED BY:AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF



HDD 126 PLAN VIEW
CONDUIT 1



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L): 2145'
   HDD DESIGNED PIPE LENGTH (S): 2152'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
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3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

HDD 126 PROFILE VIEW
CONDUIT 1

0 25 50
0 50 100
Scale in feet when printed on 22x34

BORING LOG STRIP LEGEND

Blow Counts per 6" = 10-10-10 (RED)
Recovery %/RQD % = 95%/80% (BLUE)
1*10000psi =1UCS
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

Kiewit

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

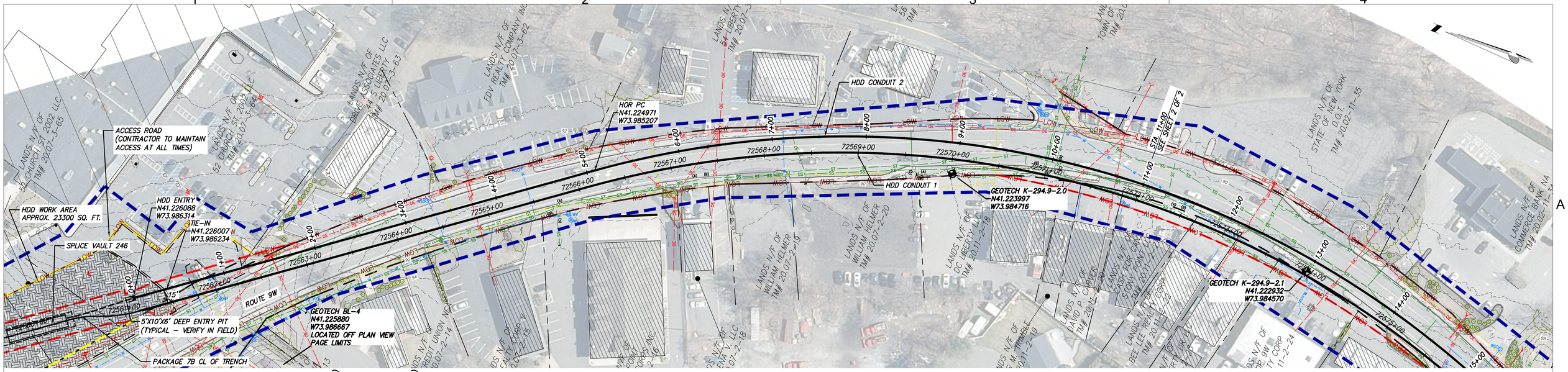
No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 126 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-326

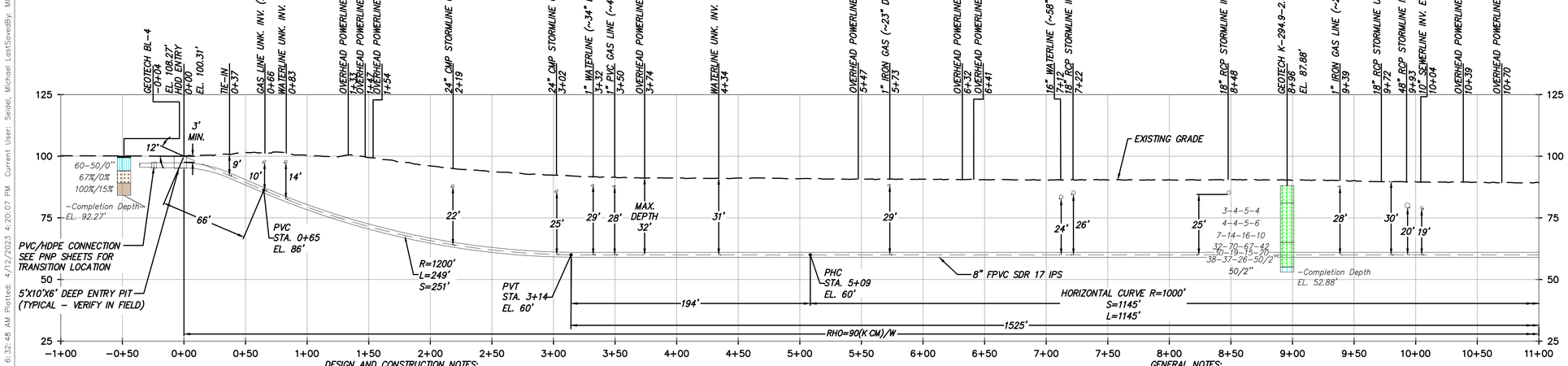
DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. | OF

File: C:\PWWORKING\REN\DMS5114\21162_7B_C-326.DWG Saved: 4/12/2023 6:30:36 AM Plotted: 4/12/2023 4:18:02 PM Current User: Seidel, Michael LastSavedBy: MICHAEL.SEIDEL



0 50 100
Scale in feet when printed on 22x34

HDD 126 PLAN VIEW
CONDUIT 2



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2170'
   HDD DESIGNED PIPE LENGTH (S): 2177'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

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3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

50 25 0
0 50 100
Scale in feet when printed on 22x34

HDD 126 PROFILE VIEW
CONDUIT 2

BORING LOG STRIP LEGEND
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/80%
Rock: 1000psi =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	SILTY, 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

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 126 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-326.2**

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE: AS SHOWN | DATE: 04/14/2023 | REV. NO.: D | SH.NO.: | OF:

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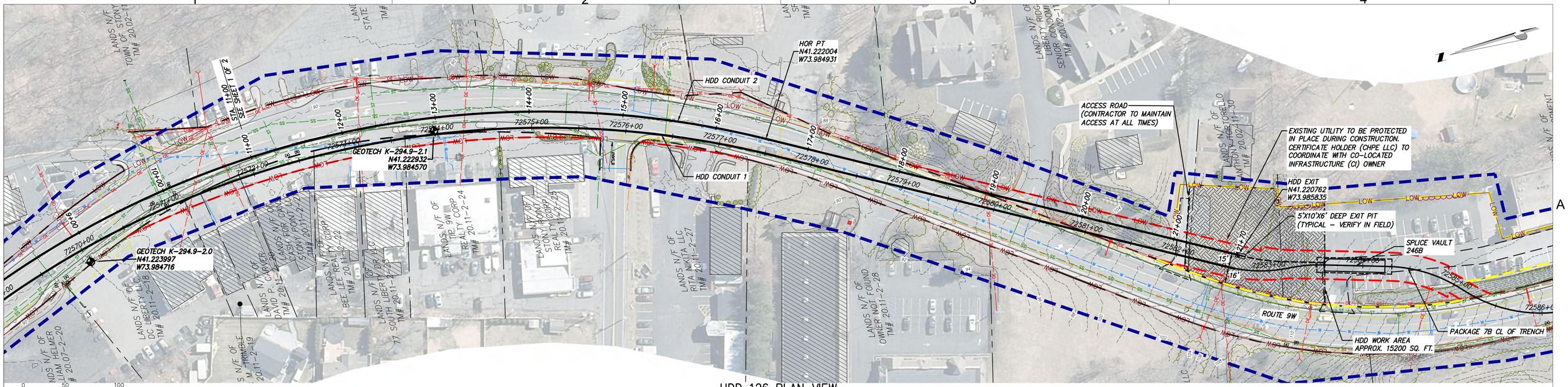
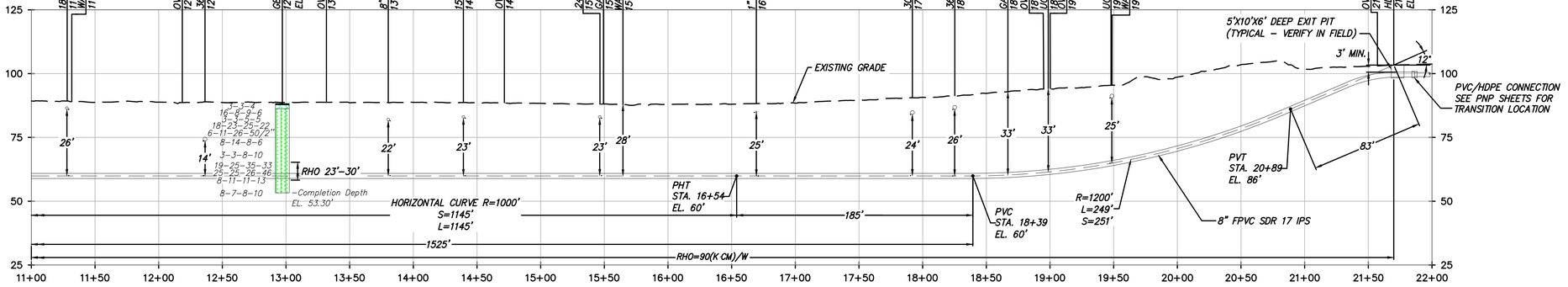
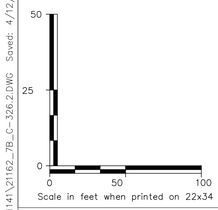


HDD 126 PLAN VIEW
CONDUIT 2



HDD 126 PROFILE VIEW
CONDUIT 2



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2170'
   HDD DESIGNED PIPE LENGTH (S): 2177'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

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3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

BORING LOG STRIP LEGEND

Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/80%
RQD
1000psi +UCS
2D strip logs shown at 5Dx 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
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GW	Well Graded GRAVEL
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OL	ORGANIC Lean CLAY
OL/OH	ORGANIC SOIL
PT	PEAT
Rock	Rock
Sandstone	Sandstone
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SP-SC	Poorly Graded SAND with CLAY
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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

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CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 126 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-326.2

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

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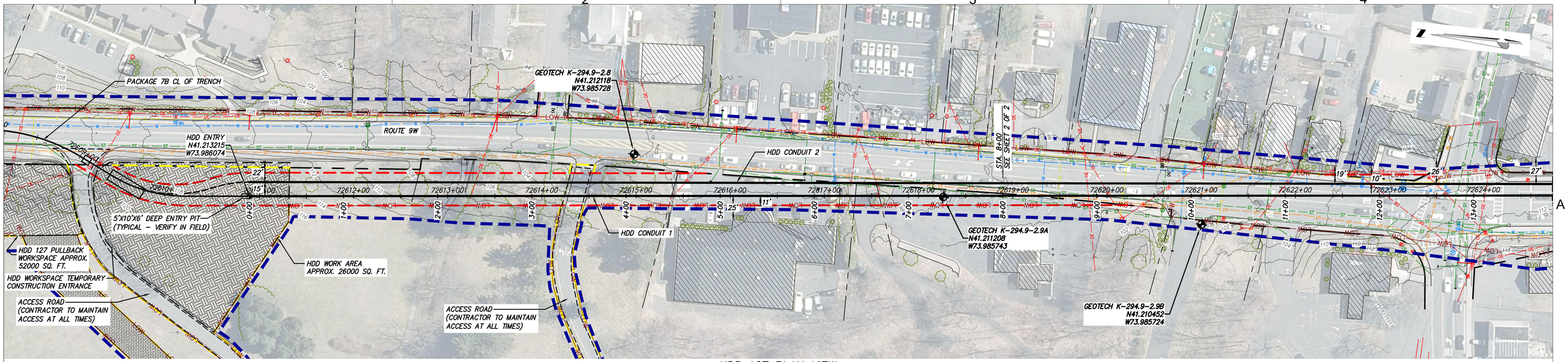
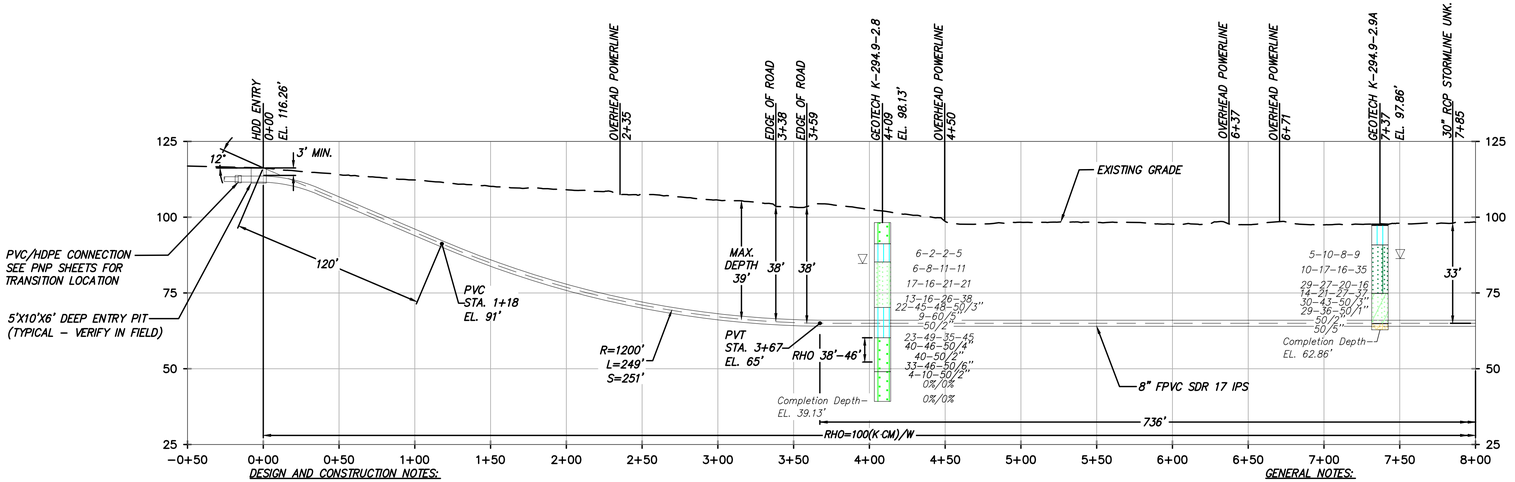


0 50 100

Scale in feet when printed on 22x34

HDD 127 PLAN VIEW

CONDUIT 1



0 25 50

0 50 100

Scale in feet when printed on 22x34

HDD 127 PROFILE VIEW

CONDUIT 1

DESIGN AND CONSTRUCTION NOTES:

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   HDD HORIZONTAL LENGTH (L):1440'
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BORING LOG STRIP LEGEND

B101

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2D strip logs shown at 10x exaggeration
3D strip logs have no exaggeration

Legend	
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Bedrock	Bedrock
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USGS 705	Schist
USGS 705	Schist
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CHPE Champlain Hudson Power Express

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CHAMPLAIN HUDSON POWER EXPRESS

SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND

PLAN AND PROFILE - HDD 127 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-327

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

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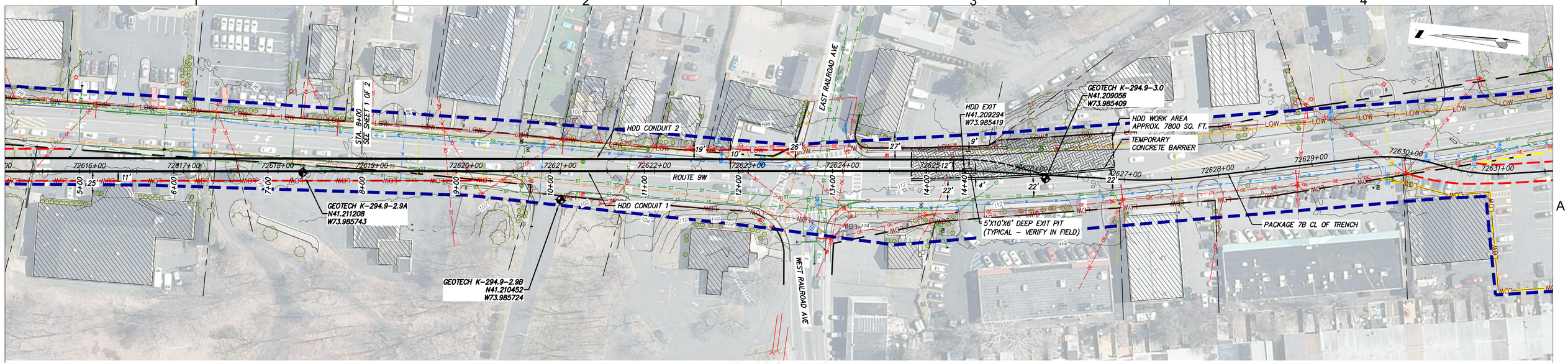

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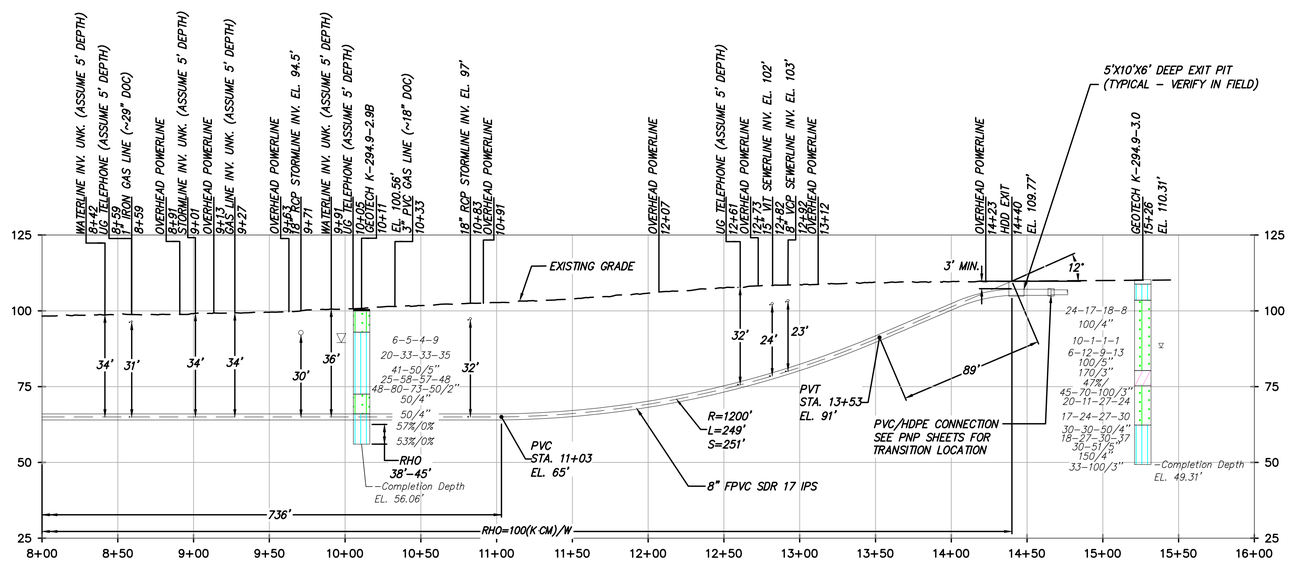
Scale in feet when printed on 22x34

HDD 127 PLAN VIEW
CONDUIT 1



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50 25 0
0 50 100
Scale in feet when printed on 22x34

HDD 127 PROFILE VIEW
CONDUIT 1

BORING LOG STRIP LEGEND
B101
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	OH	ORGANIC Fat CLAY
	OL	ORGANIC Lean CLAY
	OL/OH	ORGANIC SOIL
	PT	PEAT
	Rock	Rock
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	SC	CLAYEY SAND
	SC-SM	SILTY, CLAYEY SAND
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	SW-SM	Well Graded SAND with SILT
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	USGS 702	Quartzite
	USGS 705	Schist
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CHAMPLAIN HUDSON POWER EXPRESS
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PLAN AND PROFILE - HDD 127 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

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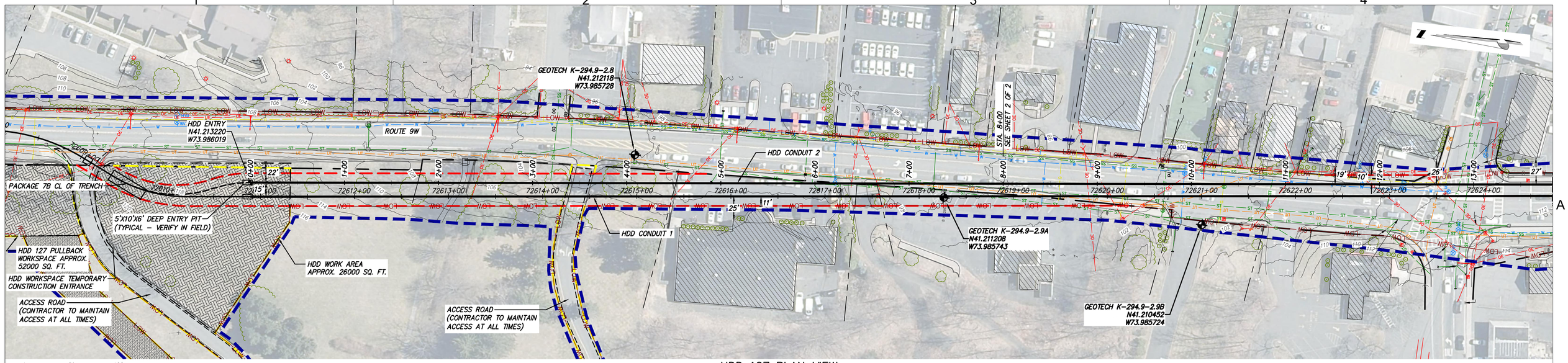

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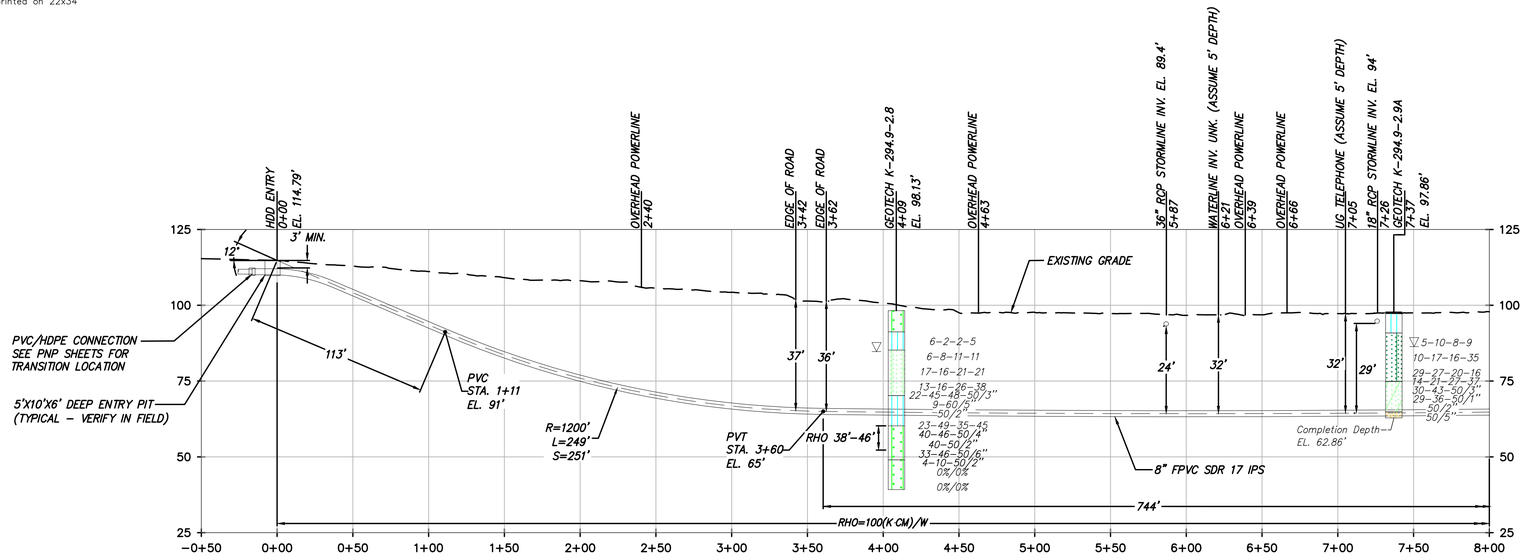
HDD 127 PLAN VIEW
CONDUIT 2



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HDD 127 PROFILE VIEW
CONDUIT 2

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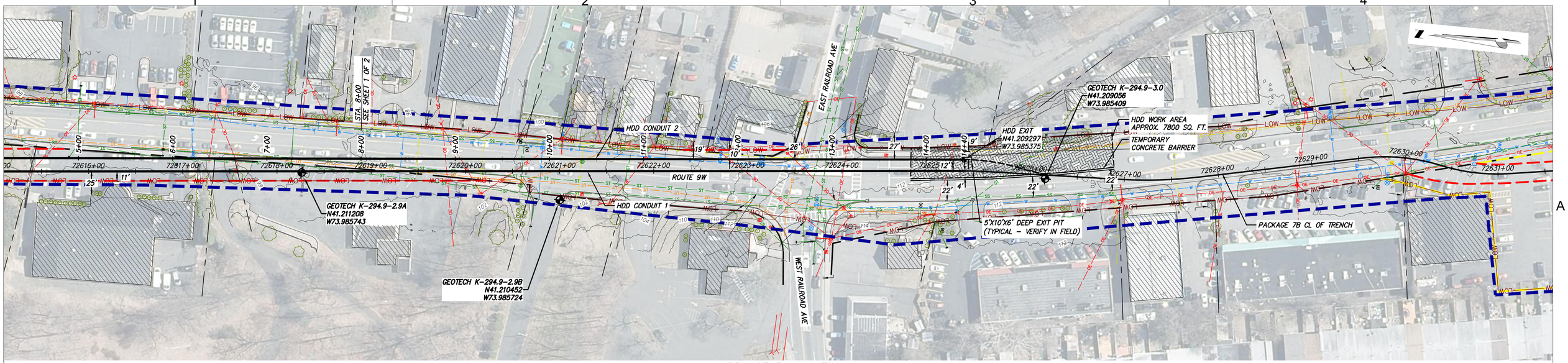
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 127 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-327.2

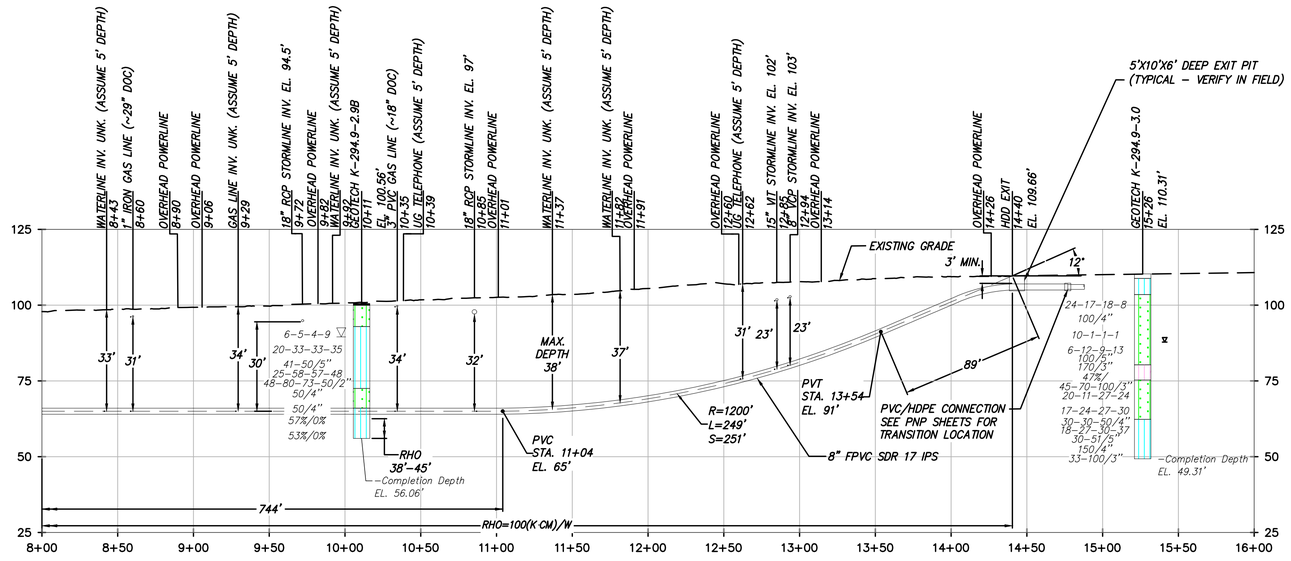
DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

File: C:\PWORKING\PE1\DMS51141\21162_7B_C-327.2.DWG Saved: 4/12/2023 6:36:14 AM Plotted: 4/12/2023 4:25:49 PM Current User: Seidel, Michael LastSavedBy: MICHAEL.SEIDEL



0 50 100
Scale in feet when printed on 22x34

HDD 127 PLAN VIEW
CONDUIT 2



BORING LOG STRIP LEGEND
B101
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/50%
1100psi =UCS
2D strip logs shown at 5Dx 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

HDD 127 PROFILE VIEW
CONDUIT 2

0 25 50
0 50 100
Scale in feet when printed on 22x34

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):1440'
   HDD DESIGNED PIPE LENGTH (S): 1448'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 3 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

CHPE Champlain Hudson Power Express

Kiewit

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

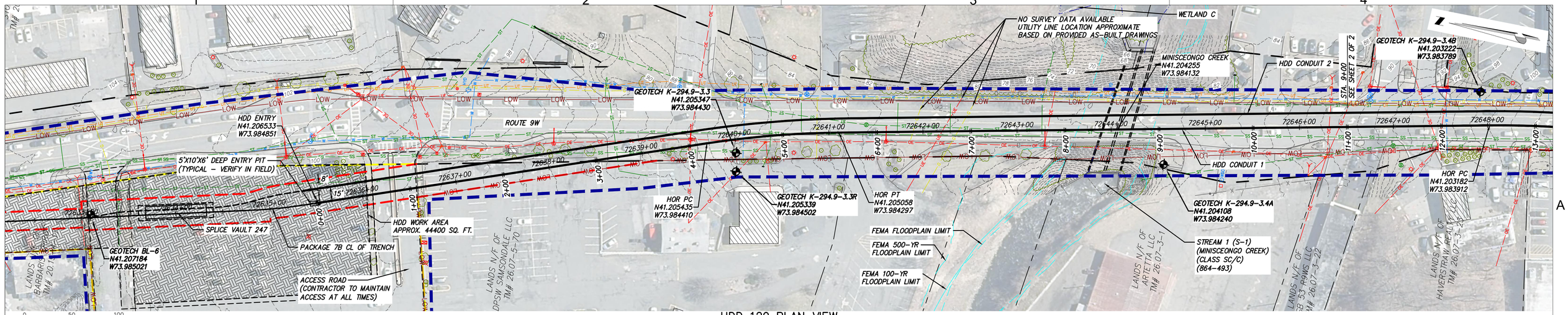
No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 127 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-327.2**

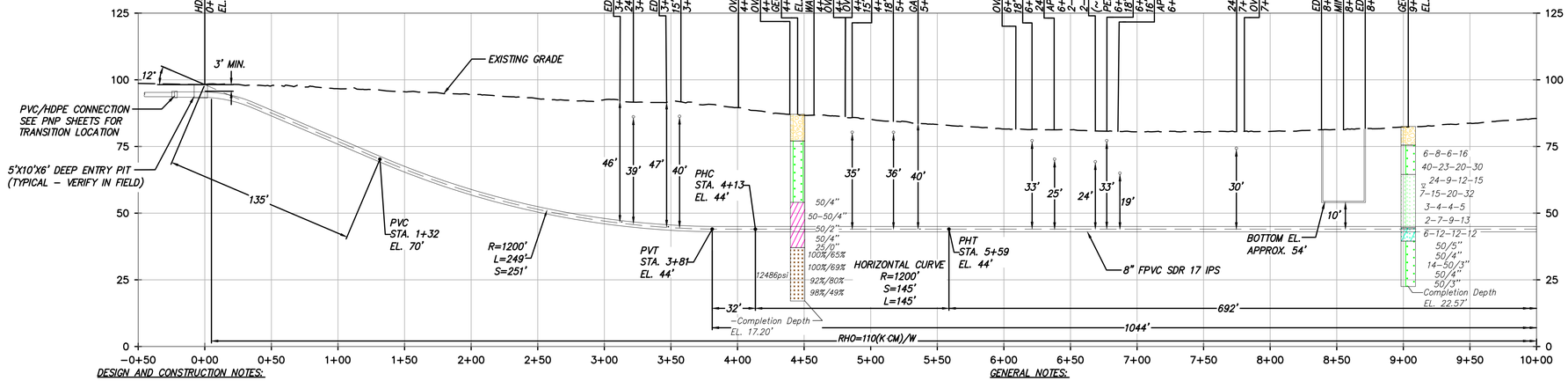
DRAWN BY: MRS | DESIGNED BY:AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

File: C:\PWWORKING\REN\DMS5114\121162_7B_C-327.2.DWG Saved: 4/12/2023 6:36:14 AM Plotted: 4/12/2023 4:24:59 PM Current User: Seidel, Michael LastSavedBy: MICHAEL.SEIDEL



HDD 129 PLAN VIEW

CONDUIT 1



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):1865'
   HDD DESIGNED PIPE LENGTH (S): 1876'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 7 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 4 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. PILOT HOLE VERTICAL ALIGNMENT SHALL REMAIN WITHIN 0 FT ABOVE AND 5 FT BELOW THE DESIGNED HDD PROFILE.
8. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
9. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
10. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

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3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

HDD 129 PROFILE VIEW

CONDUIT 1

50
25
0
0
50
100
Scale in feet when printed on 22x34

BORING LOG STRIP LEGEND

Blow Counts per 6" = 10-10-15
Recovery %/RQD % = 95%/80%
RQD%
f1000psi
f1000psi =UCS

20 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	SILTY, 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

TETRA TECH

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D	04/14/2023	FINAL SUBMISSION	MRS	EJK
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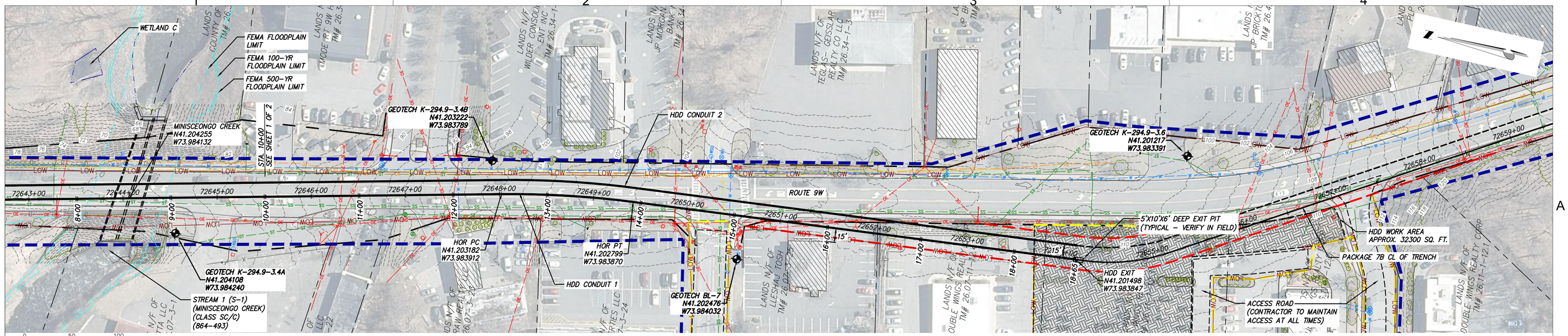
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

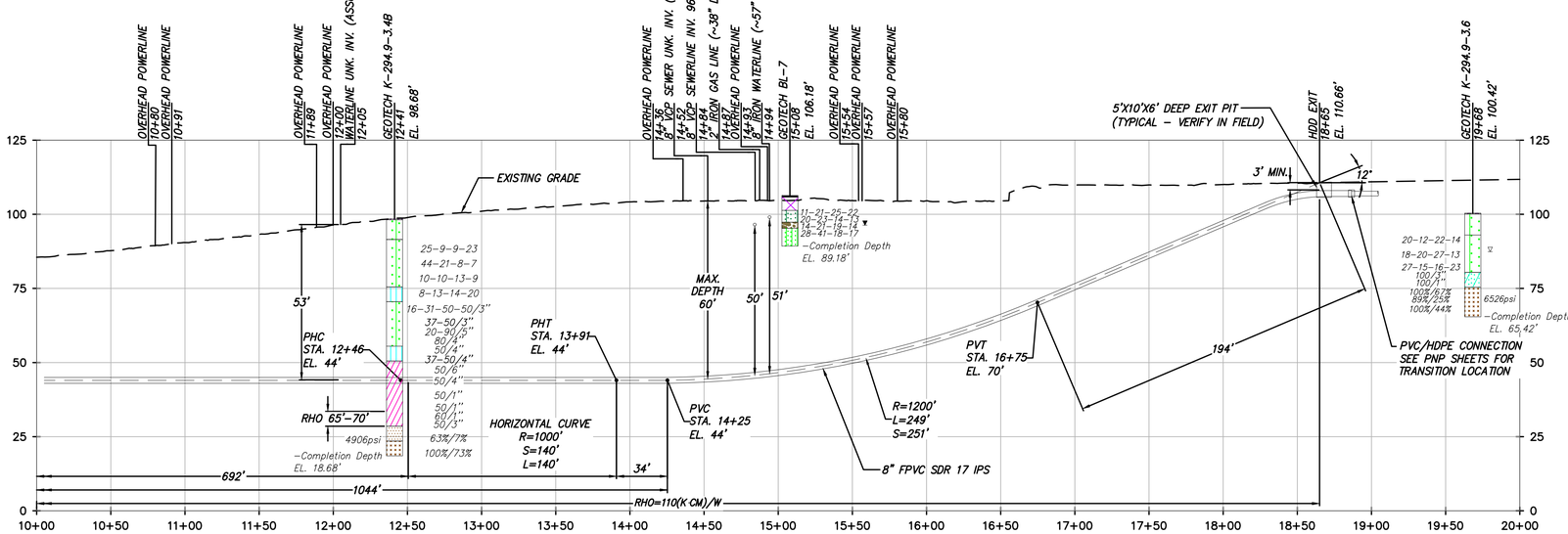
CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 129 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-329**

DRAWN BY: MRS | DESIGNED BY:AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF



HDD 129 PLAN VIEW
CONDUIT 1



HDD 129 PROFILE VIEW
CONDUIT 1

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):1865'
   HDD DESIGNED PIPE LENGTH (S): 1876'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 7 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 4 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. PILOT HOLE VERTICAL ALIGNMENT SHALL REMAIN WITHIN 0 FT ABOVE AND 5 FT BELOW THE DESIGNED HDD PROFILE.
8. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
9. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
10. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

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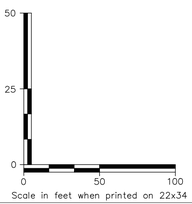
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.



BORING LOG STRIP LEGEND

Blow Counts per 6" = 10-10-10 | Recovery %/RQD % = 95%/80% | 11000psi =UCS

2D strip logs shown at 5Dx exaggeration
3D strip logs have no exaggeration

	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

Kiewit

TETRA TECH

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(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
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B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 129 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-329**

DRAWN BY: MRS | DESIGNED BY:AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

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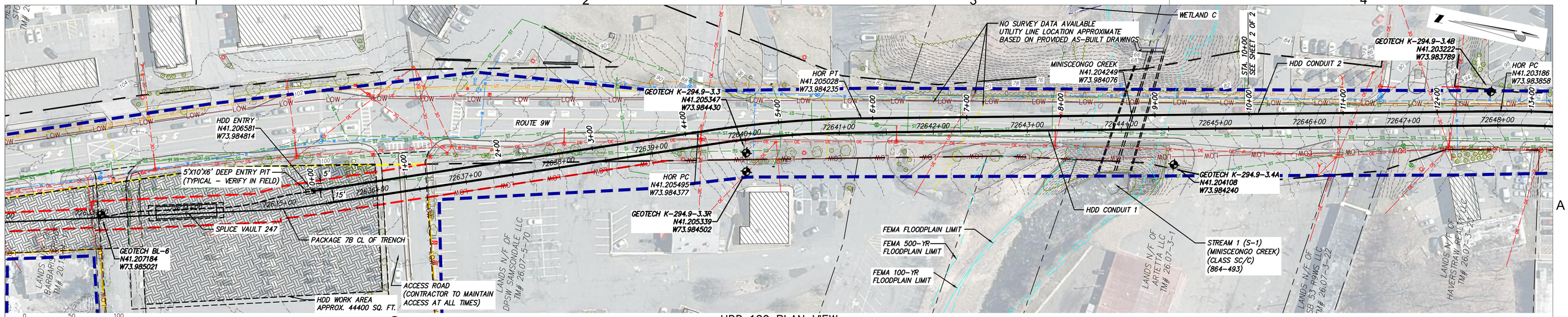
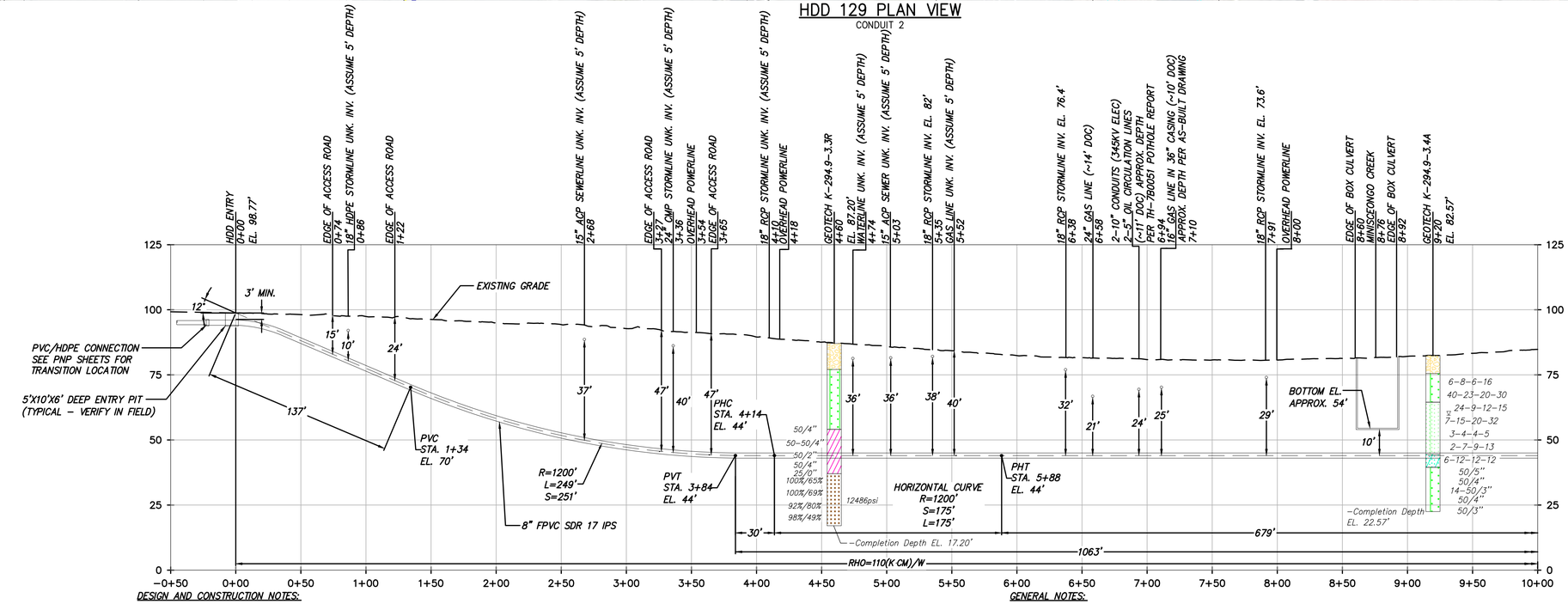


HDD 129 PLAN VIEW

CONDUIT 2



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):1883'
   HDD DESIGNED PIPE LENGTH (S): 1894'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 7 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 4 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. PILOT HOLE VERTICAL ALIGNMENT SHALL REMAIN WITHIN 0 FT ABOVE AND 5 FT BELOW THE DESIGNED HDD PROFILE.
8. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
9. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
10. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

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3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

HDD 129 PROFILE VIEW

CONDUIT 2

0
25
50
0
50
100
Scale in feet when printed on 22x34

BORING LOG STRIP LEGEND

B101

Blow Counts per 6" = 10-10-15
Recovery %/RQD % = 95%/50%
1100psi =UCS

2D strip logs shown at 5Dx 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
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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

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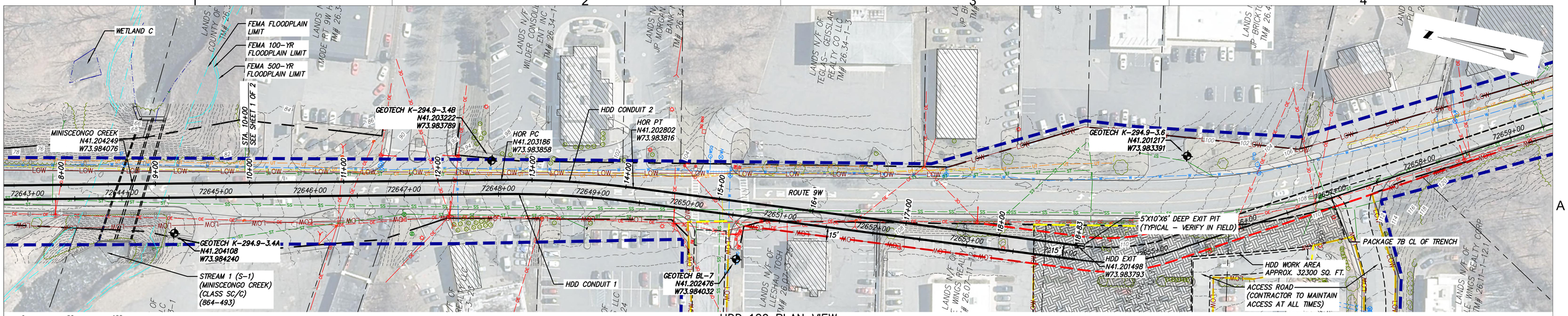
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

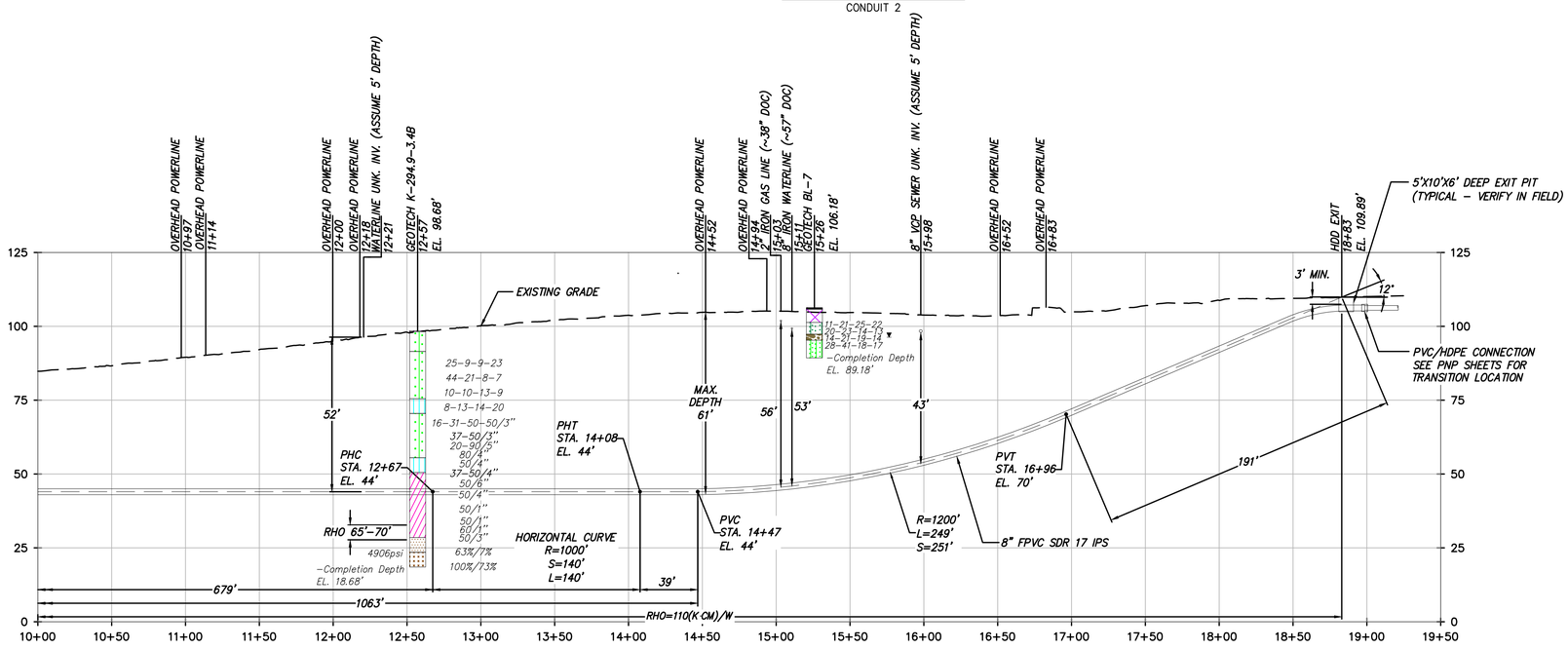
CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 129 PAGE 1 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-329.2**

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF



HDD 129 PLAN VIEW
CONDUIT 2



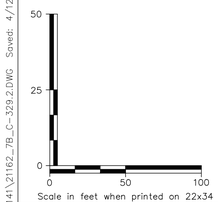
DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):1883'
   HDD DESIGNED PIPE LENGTH (S): 1894'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 7 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 4 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. PILOT HOLE VERTICAL ALIGNMENT SHALL REMAIN WITHIN 0 FT ABOVE AND 5 FT BELOW THE DESIGNED HDD PROFILE.
8. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
9. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
10. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

HDD 129 PROFILE VIEW
CONDUIT 2



BORING LOG STRIP LEGEND
B101
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/50%
1100psi =UCS
2D strip logs shown at 5Dx 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

Kiewit

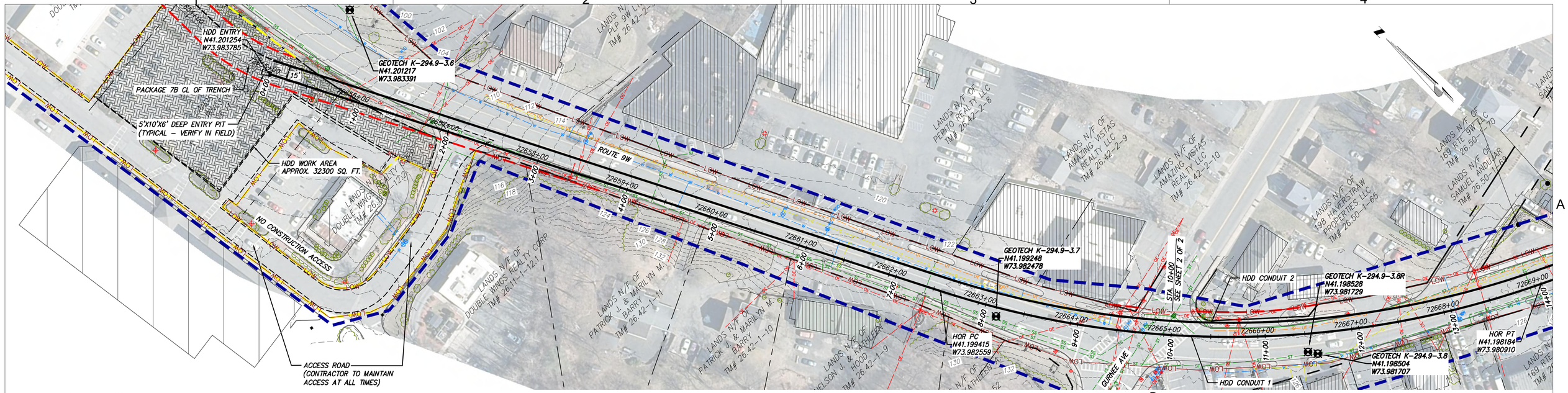
TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 129 PAGE 2 OF 2
UTILITY CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

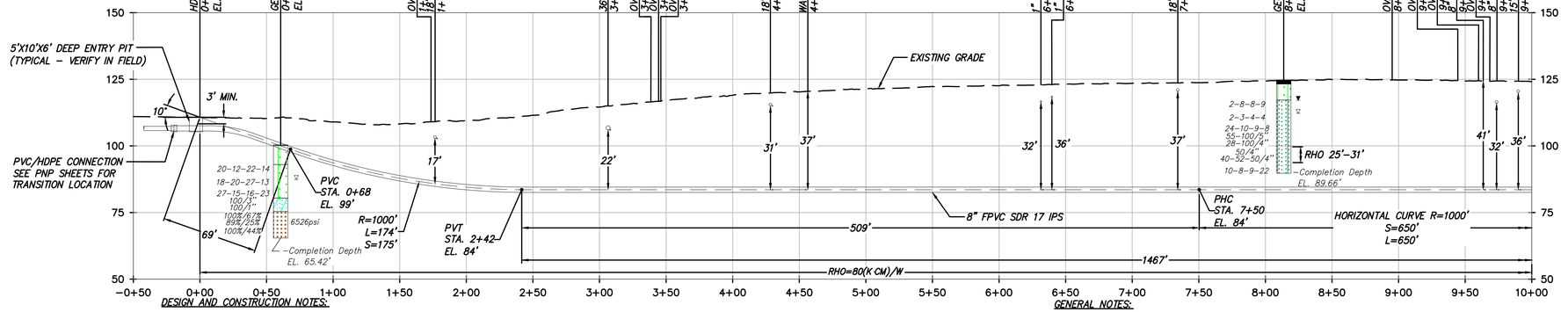
KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-329.2

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF



0 50 100
Scale in feet when printed on 22x34

HDD 131 PLAN VIEW
CONDUIT 1



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2036'
   HDD DESIGNED PIPE LENGTH (S): 2042'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

0 25 50
0 50 100
Scale in feet when printed on 22x34

HDD 131 PROFILE VIEW
CONDUIT 1

BORING LOG STRIP LEGEND
B101
Blow Counts per 6" = 10-15-17
Recovery %/RQD % = 95%/50%
1100psi =UCS
20 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

Kiewit

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 131 PAGE 1 OF 2
ROAD CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

DRAWN BY: MRS	DESIGNED BY:AMC	APPROVED BY: EJK	SCALE	AS SHOWN	DATE 04/14/2023
			REV. NO.	D	SH.NO. OF

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-331**

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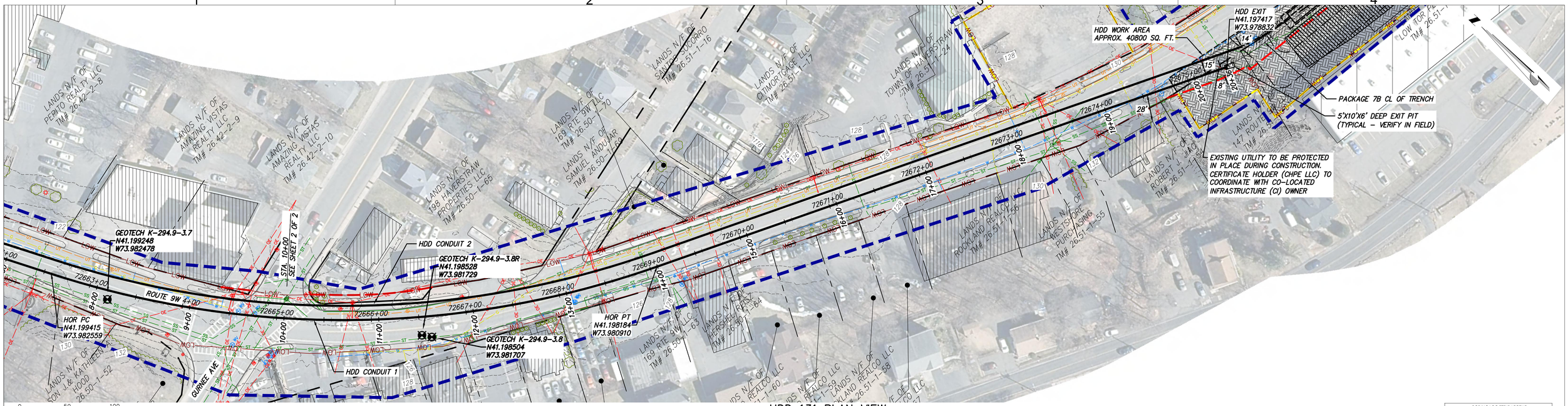
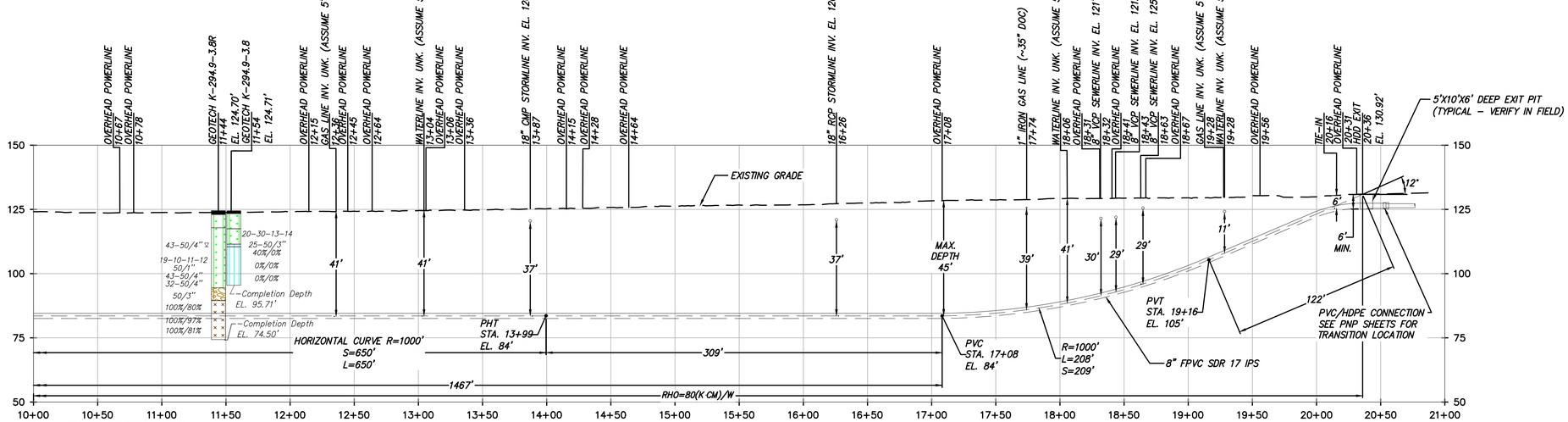


0 50 100
Scale in feet when printed on 22x34

HDD 131 PLAN VIEW
CONDUIT 1

BORING LOG STRIP LEGEND
B101
Blow Counts per 6" + 10-10-10
Recovery %/RQD % + 95%/90%
f'c=5000psi +UCS
2D strip logs shown at 5Dx exaggeration
3D strip logs have no exaggeration



HDD 131 PROFILE VIEW
CONDUIT 1

0 25 50
0 50 100
Scale in feet when printed on 22x34

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2036'
   HDD DESIGNED PIPE LENGTH (S): 2042'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

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

Kiewit

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 131 PAGE 2 0F 2
ROAD CROSSING - CONDUIT 1
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	C-331

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

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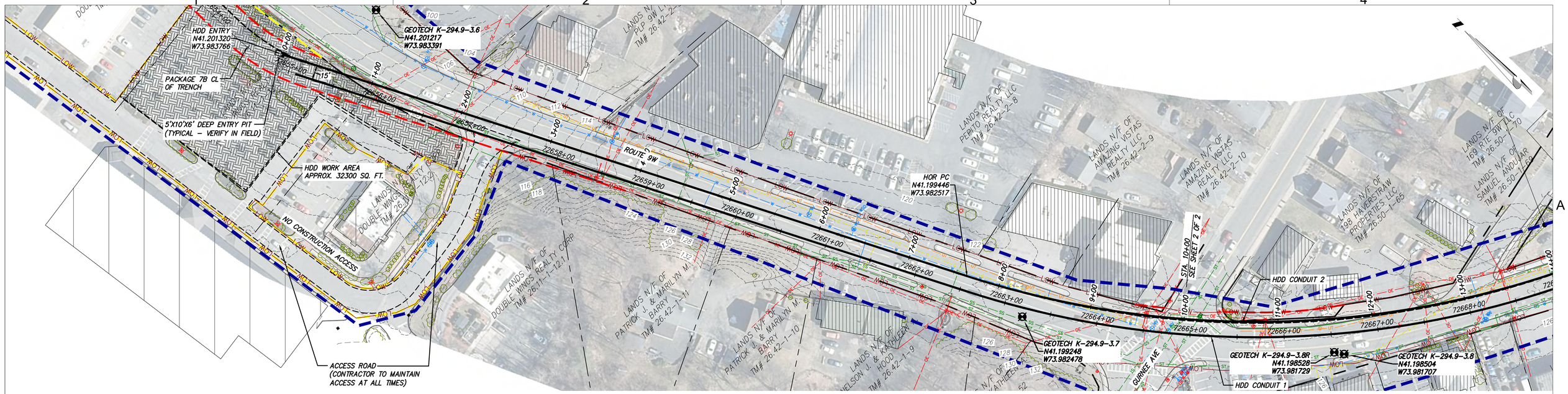
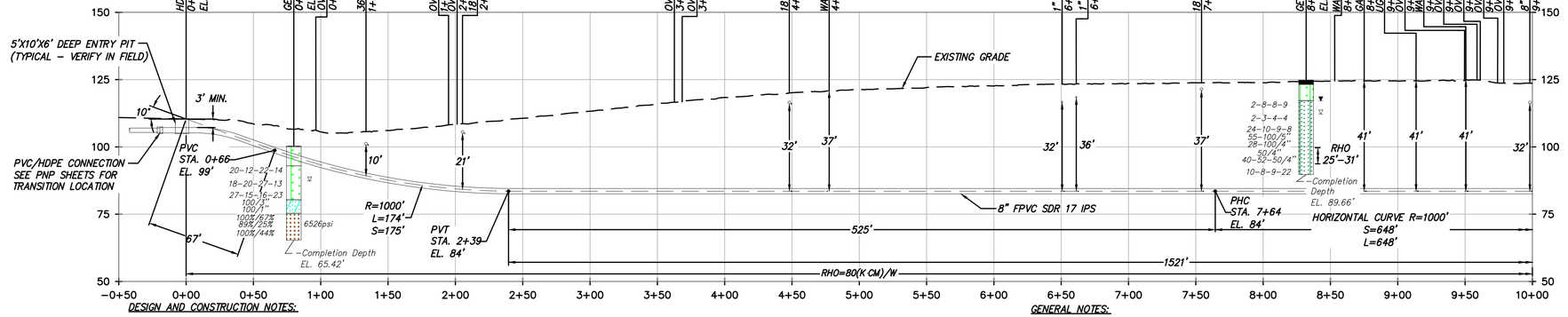


HDD 131 PLAN VIEW
CONDUIT 2



DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L):2050'
   HDD DESIGNED PIPE LENGTH (S): 2056'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

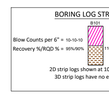
GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

HDD 131 PROFILE VIEW
CONDUIT 2

50
25
0
0
50
100
Scale in feet when printed on 22x34

BORING LOG STRIP LEGEND



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
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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

TETRA TECH

TETRA TECH ENGINEERING AND SURVEYING P.C.
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No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 131 PAGE 1 OF 2
ROAD CROSSING - CONDUIT 2
ROCKLAND COUNTY, NY

KIEWIT PROJECT NO.	21162
TT PROJECT NO.	204-3701
DRAWING NO.	**C-331.2**

DRAWN BY: MRS | DESIGNED BY: AMC | APPROVED BY: EJK | SCALE AS SHOWN | REV. NO. D | DATE 04/14/2023 | SH.NO. OF

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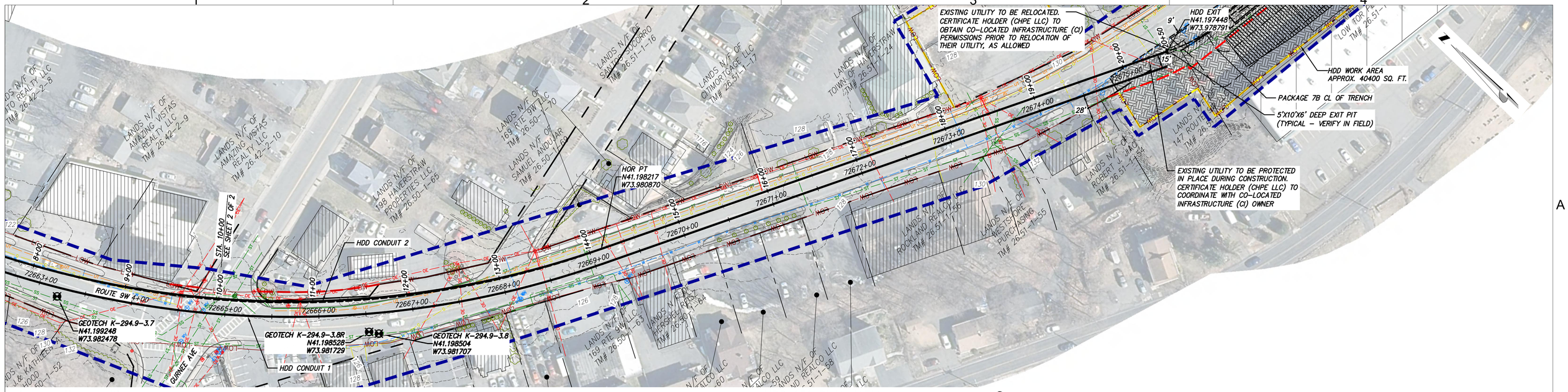
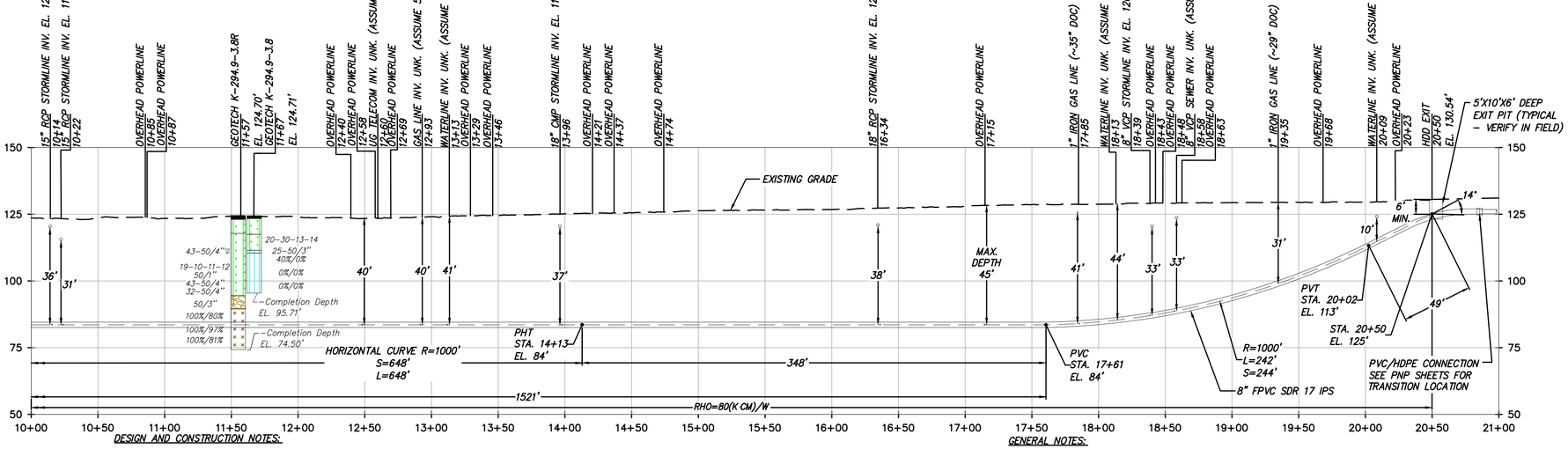


HDD 131 PLAN VIEW
CONDUIT 2



HDD 131 PROFILE VIEW
CONDUIT 2

0 25 50
0 50 100
Scale in feet when printed on 22x34

BORING LOG STRIP LEGEND
Blow Counts per 6" = 10-10-10
Recovery %/RQD % = 95%/80%
RQD%
f'c=1000psi =UCS
20 strip logs shown at 10x exaggeration
3D strip logs have no exaggeration

Legend	
ASPHALT	Asphalt
Bedrock	Bedrock
Boulder	Boulder
OH	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

DESIGN AND CONSTRUCTION NOTES:

1. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL.
2. 8.625" FPVC MIN. W.T. 0.510" SDR 17 IPS PIPE.
   3.500" HDPE MIN. W.T. 0.389" DR 9 IPS PIPE.
   HDD HORIZONTAL LENGTH (L): 2050'
   HDD DESIGNED PIPE LENGTH (S): 2056'
3. THE MINIMUM THREE JOINT (APPROX. 100 FT) COMBINED CURVE (VERTICAL + HORIZONTAL) RADIUS SHALL NOT BE LESS THAN 800 FT.
4. THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FT.
5. AS-BUILT HORIZONTAL SEPARATION BETWEEN CASING 1 AND CASING 2 SHALL BE GREATER THAN 5 FT.
6. PILOT HOLE HORIZONTAL ALIGNMENT SHALL REMAIN WITHIN 5 FT LEFT OR RIGHT OF THE DESIGNED HDD ALIGNMENT.
7. DRILL CONTRACTOR AND GEOTECHNICAL ENGINEER TO DETERMINE LENGTH OF TEMPORARY SURFACE/CONDUCTOR CASING.
8. SPT N-VALUES SHOWN ON THIS DRAWING ARE NOT CORRECTED FOR SAMPLER SIZE OR HAMMER ENERGY. REFERENCE BORING LOGS AND GEOTECHNICAL REPORTS FOR ADDITIONAL SOIL INFORMATION.
9. DRILL CONTRACTOR SHALL UTILIZE BUOYANCY CONTROL MEASURES (INTERNAL WATER USED FOR BALLAST) DURING PULLBACK FOR ALL BUNDLED CASINGS.

GENERAL NOTES:

1. ALL BURIED LINE DEPTHS ARE APPROXIMATE. PRIOR TO ANY EXCAVATION OR EXPLORATORY BORING, CONTRACTOR MUST CONTACT 811 AND ABIDE BY ALL STATE EXCAVATION REQUIREMENTS.
2. TETRA TECH ENGINEERING AND SURVEYING P.C. IS NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ENGINEERING AND SURVEYING P.C. OR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
3. ALL COORDINATES ARE IN NEW YORK STATE PLANE, NAD83, EAST ZONE, US FOOT.

CHPE Champlain Hudson Power Express

Kiewit

TETRA TECH
TETRA TECH ENGINEERING AND SURVEYING P.C.
(A NEW YORK PROFESSIONAL CORPORATION)

No.	DATE	SUBMITTAL / REVISION DESCRIPTION	DB	APP
D	04/14/2023	FINAL SUBMISSION	MRS	EJK
C	03/01/2023	DRAFT FINAL REV 1 SUBMISSION	MRS	EJK
B	11/16/2022	DRAFT FINAL SUBMISSION	MRS	EJK
A	05/20/2022	60% DESIGN SUBMISSION	MRS	EJK

CHAMPLAIN HUDSON POWER EXPRESS
SEGMENT 12 (PACKAGE 7B) - ROUTE 9W: ROCKLAND
PLAN AND PROFILE - HDD 131 PAGE 2 0F 2
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