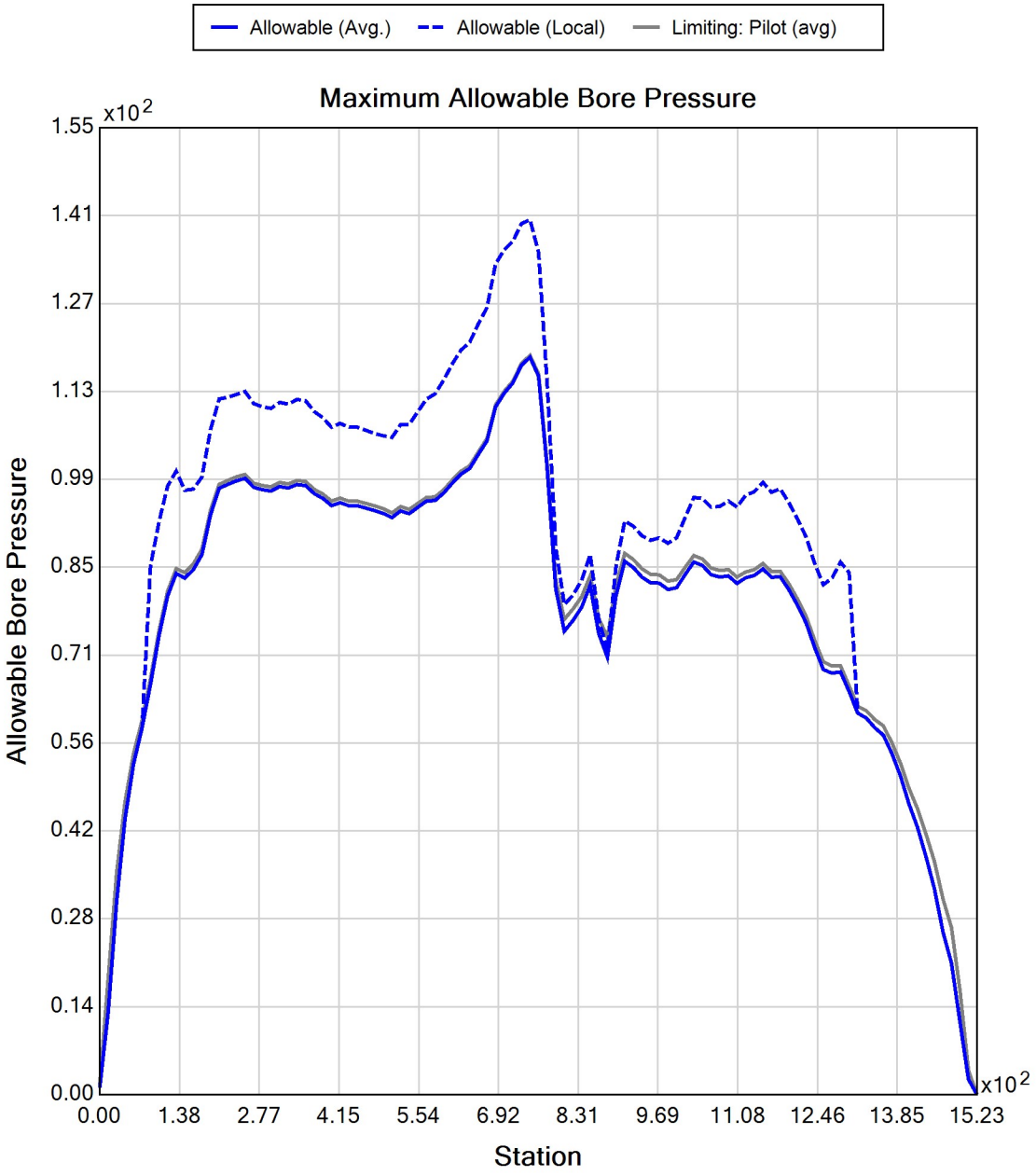

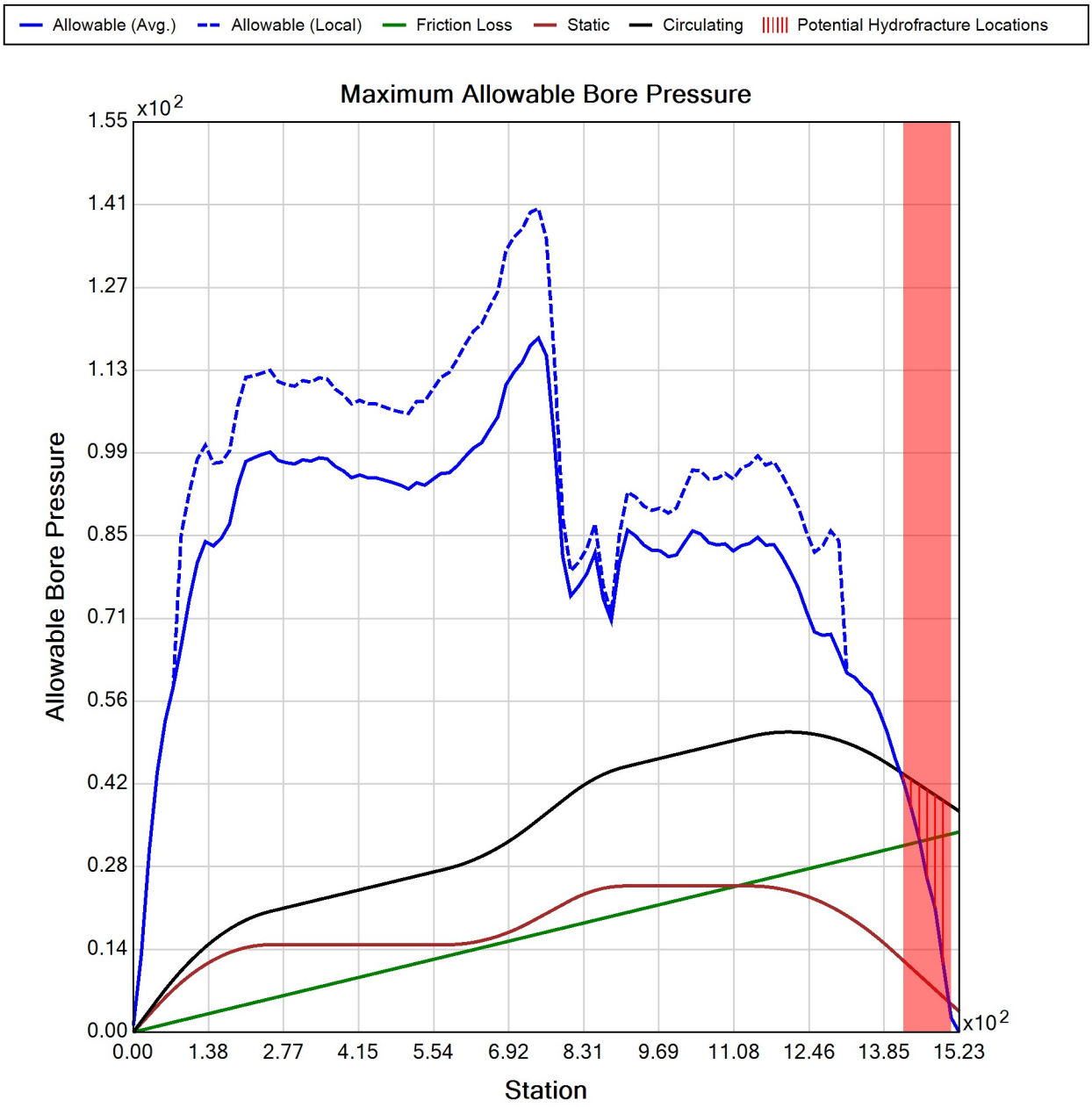

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Input Summary

Start Coordinate	(0.00, 0.00, 319.00) ft
End Coordinate	(1515.00, 0.00, 310.00) ft
Project Length	1515.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1530.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.3	26.0
Water Pressure	11.7	9.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.9	35.4
Deflection		
Earth Load Deflection	0.588	7.093
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.617	7.122
Compressive Stress [psi]		
Compressive Wall Stress	58.2	159.4

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1429.0	1429.0
Pullback Stress [psi]	816.5	816.5
Pullback Strain	1.420E-2	1.420E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	816.5	816.8
Tensile Strain	1.420E-2	1.430E-2

Net External Pressure = 14.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.617	7.5	12.2	OK
Unconstrained Collapse [psi]	34.0	132.5	3.9	OK
Compressive Wall Stress [psi]	58.2	1150.0	19.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	43.9	216.7	4.9	OK
Tensile Stress [psi]	816.8	1200.0	1.5	OK

Generated Output

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Project Summary

General:	CHPE HDD 38 Conduit 2
	P3
	Start Date: 11-15-2022
	End Date: 11-15-2022
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	HDD 38 10-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(60.00, 0.00, 320.00) ft
End Coordinate	(1515.00, 0.00, 310.00) ft
Project Length	1455.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

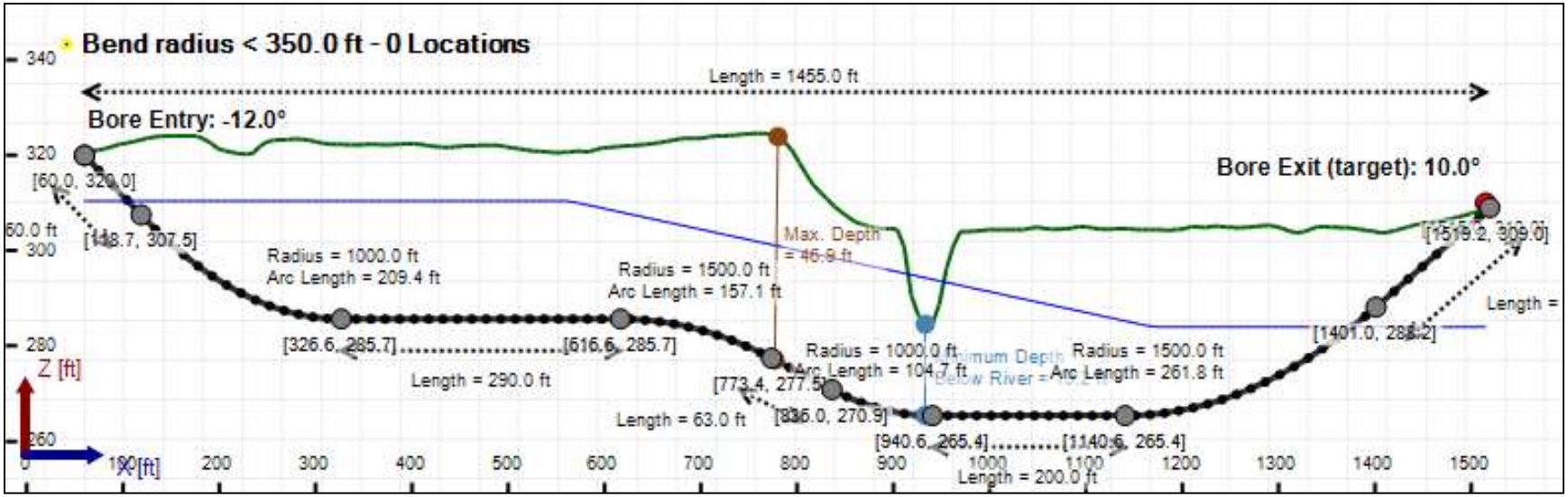
Soil Summary

Number of Layers: 2

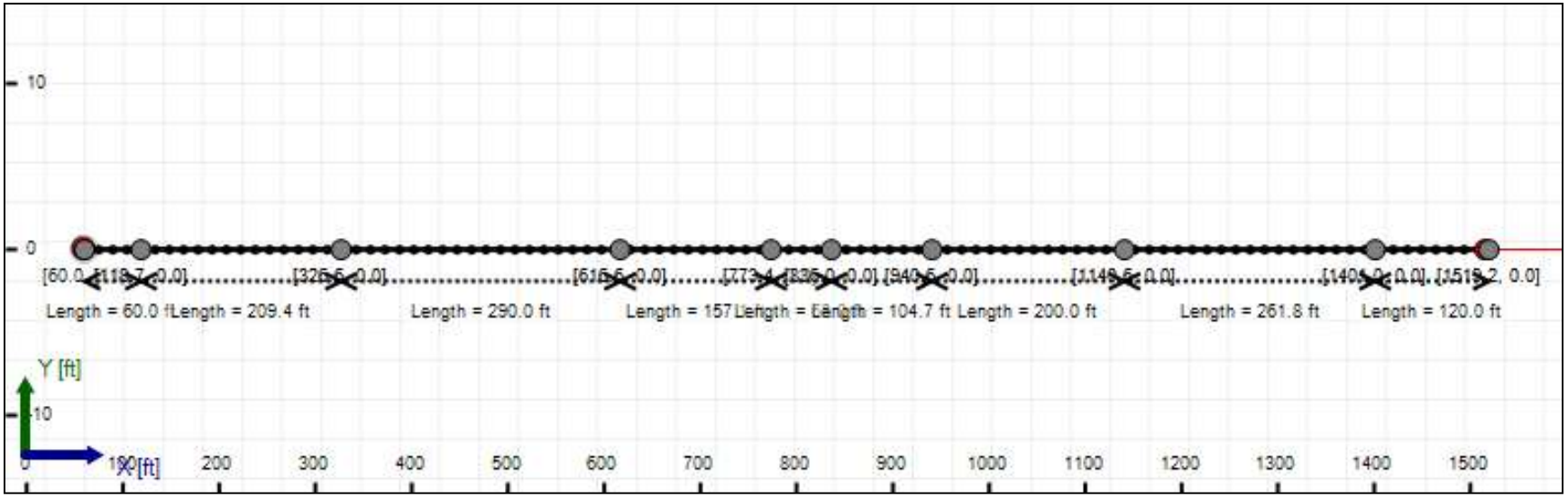
Soil Layer #1 USCS, Sand (S), SP
From Assistant
Unit Weight: 109.5552 (dry), 126.6624 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
From Assistant
Unit Weight: 117.1584 (dry), 132.8832 (sat) [lb/ft3]
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: 10" (10.75")
Pipe DR: 9
Pipe Length: 1470.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.1	28.9
Water Pressure	12.8	10.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	16.9	39.3
Deflection		
Earth Load Deflection	1.458	7.872
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.590	8.004
Compressive Stress [psi]		
Compressive Wall Stress	75.9	177.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	25932.7	25932.7
Pullback Stress [psi]	723.2	723.2
Pullback Strain	1.258E-2	1.258E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	723.2	744.0
Tensile Strain	1.258E-2	1.339E-2

Net External Pressure = 16.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.590	7.5	4.7	OK
Unconstrained Collapse [psi]	35.5	121.9	3.4	OK
Compressive Wall Stress [psi]	75.9	1150.0	15.2	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	45.4	220.3	4.8	OK
Tensile Stress [psi]	744.0	1200.0	1.6	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	106.724 psi	112.067 psi
1	8.00 in	12.00 in	106.681 psi	112.026 psi
2	12.00 in	16.13 in	106.619 psi	111.967 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 120.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

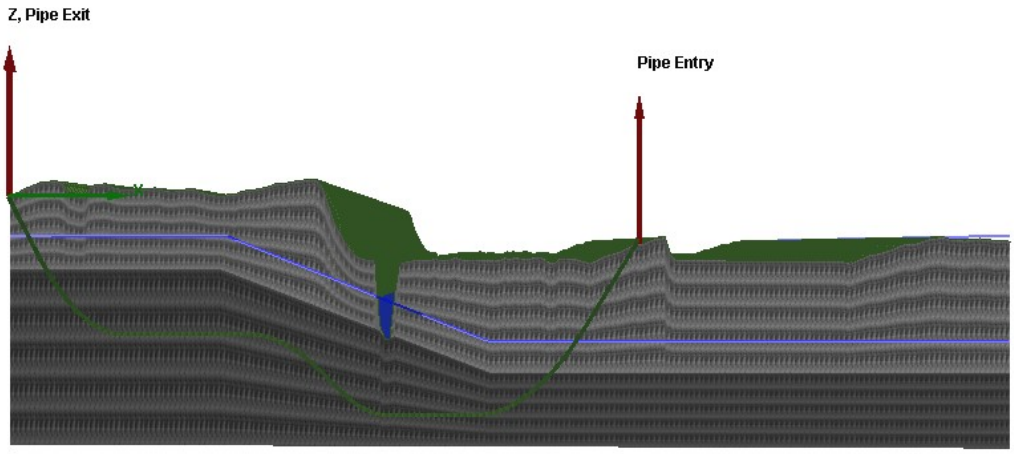
Rheological model: Bingham-Plastic

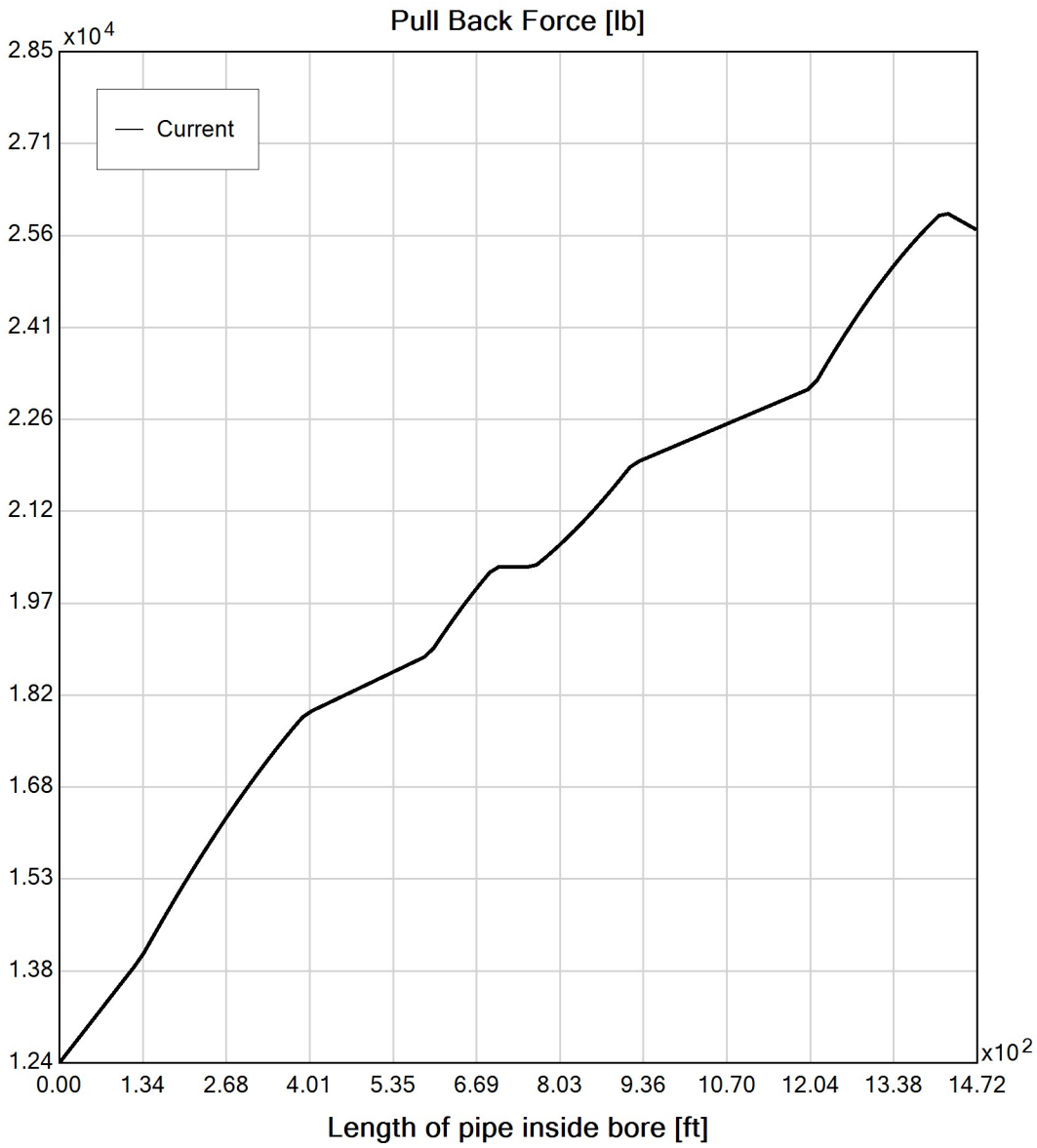
Plastic Viscosity (PV): 25.53

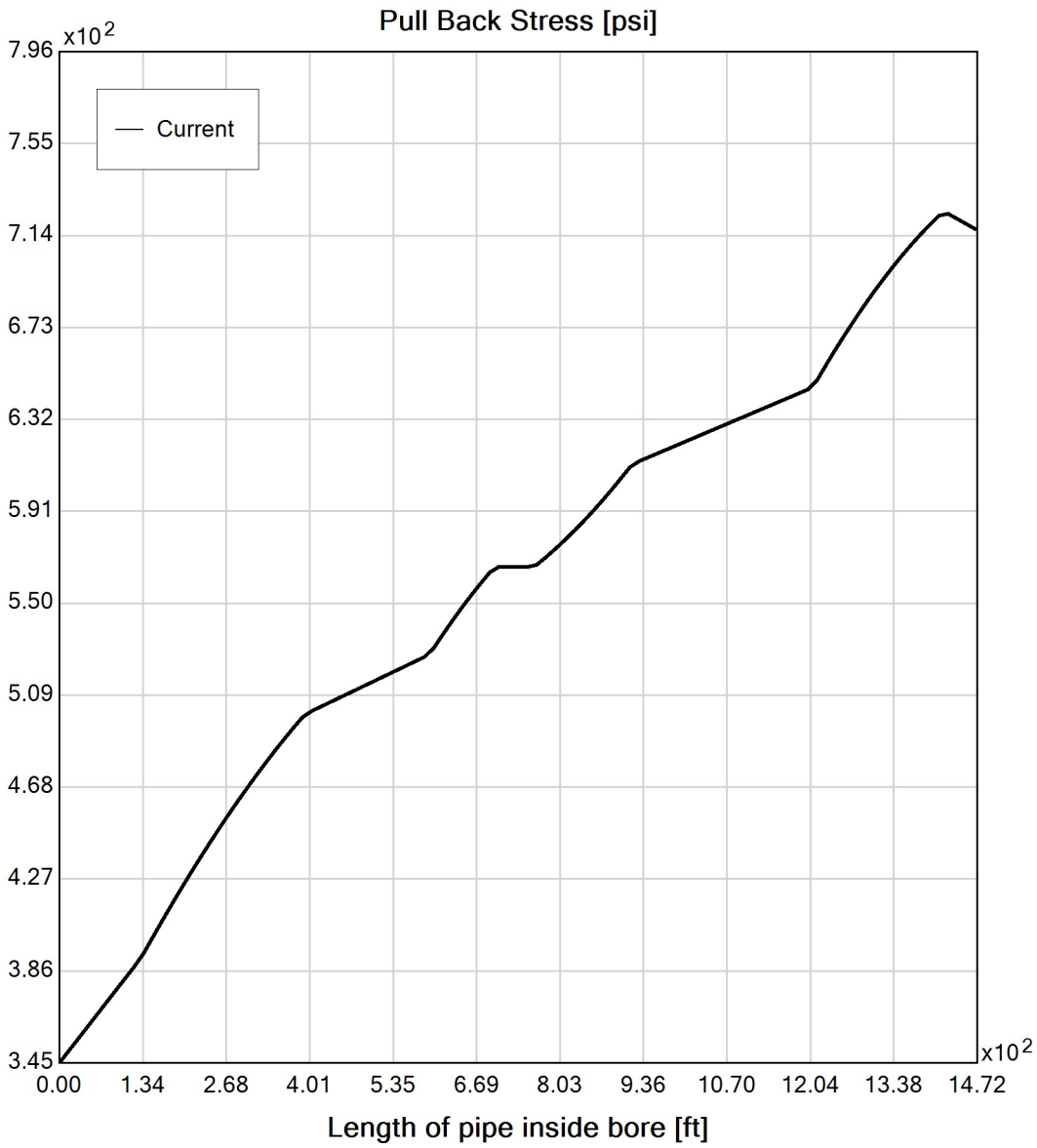
Yield Point (YP): 16.49

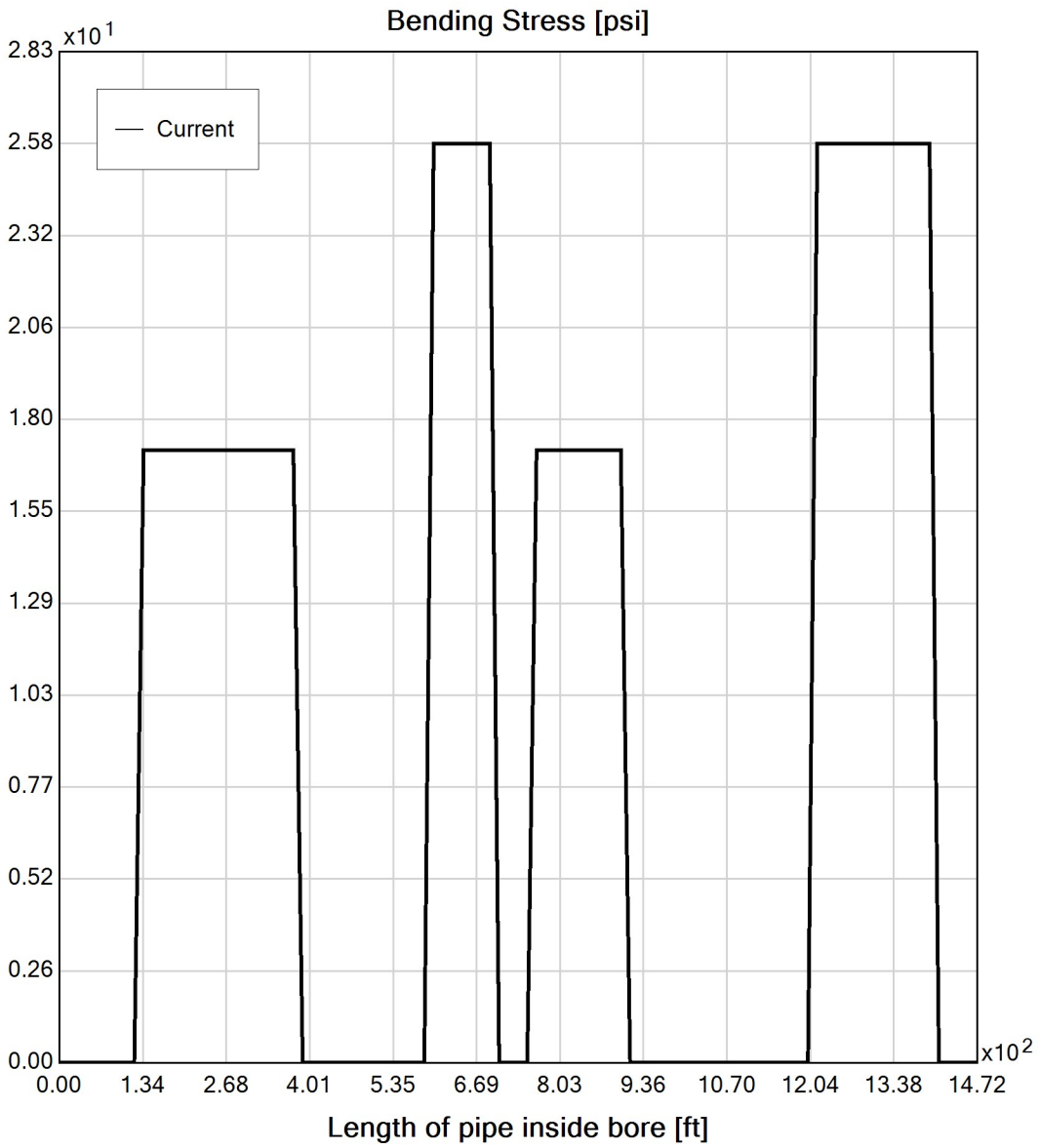
Effective Viscosity (cP): 417.7

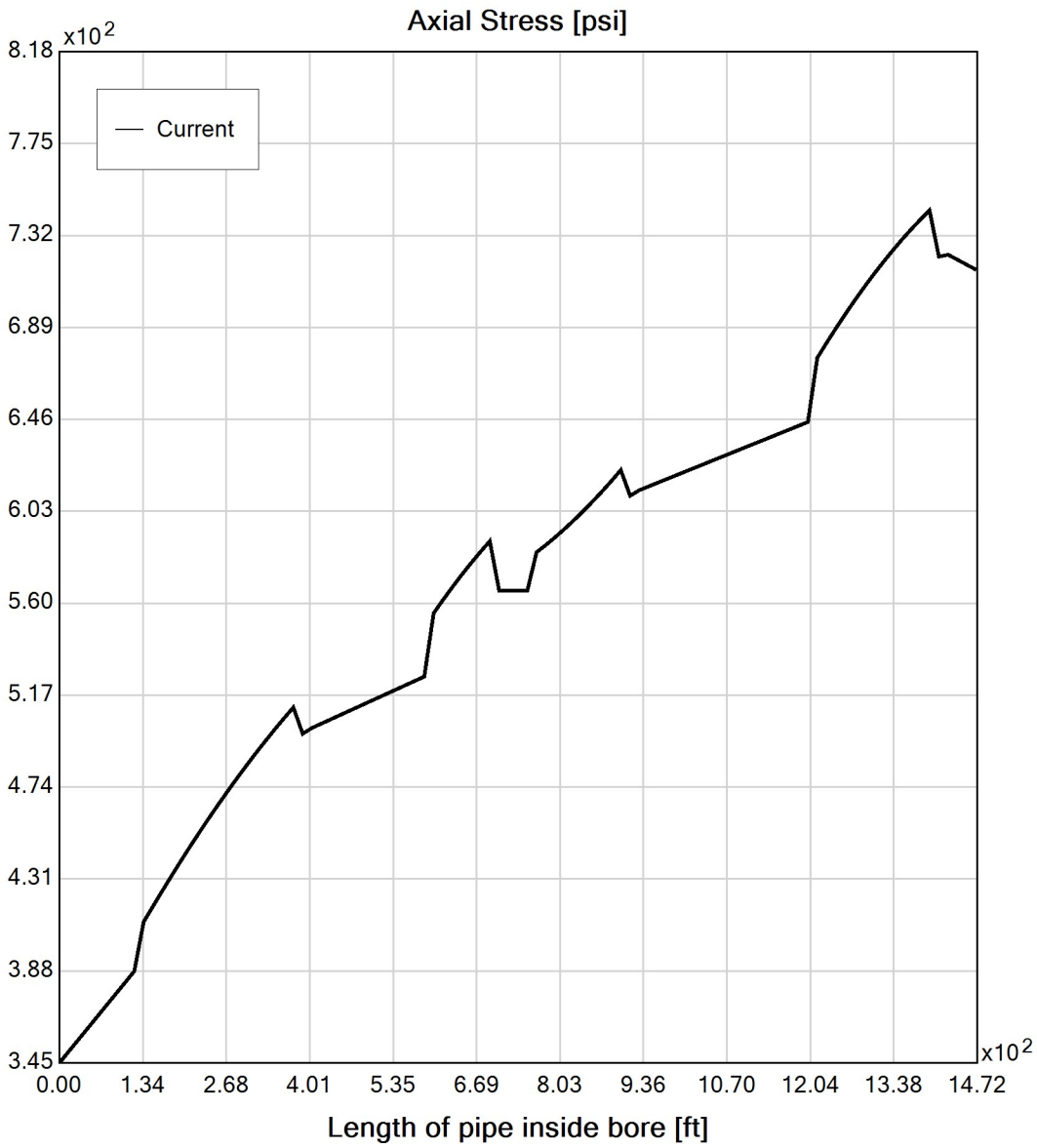
Virtual Site

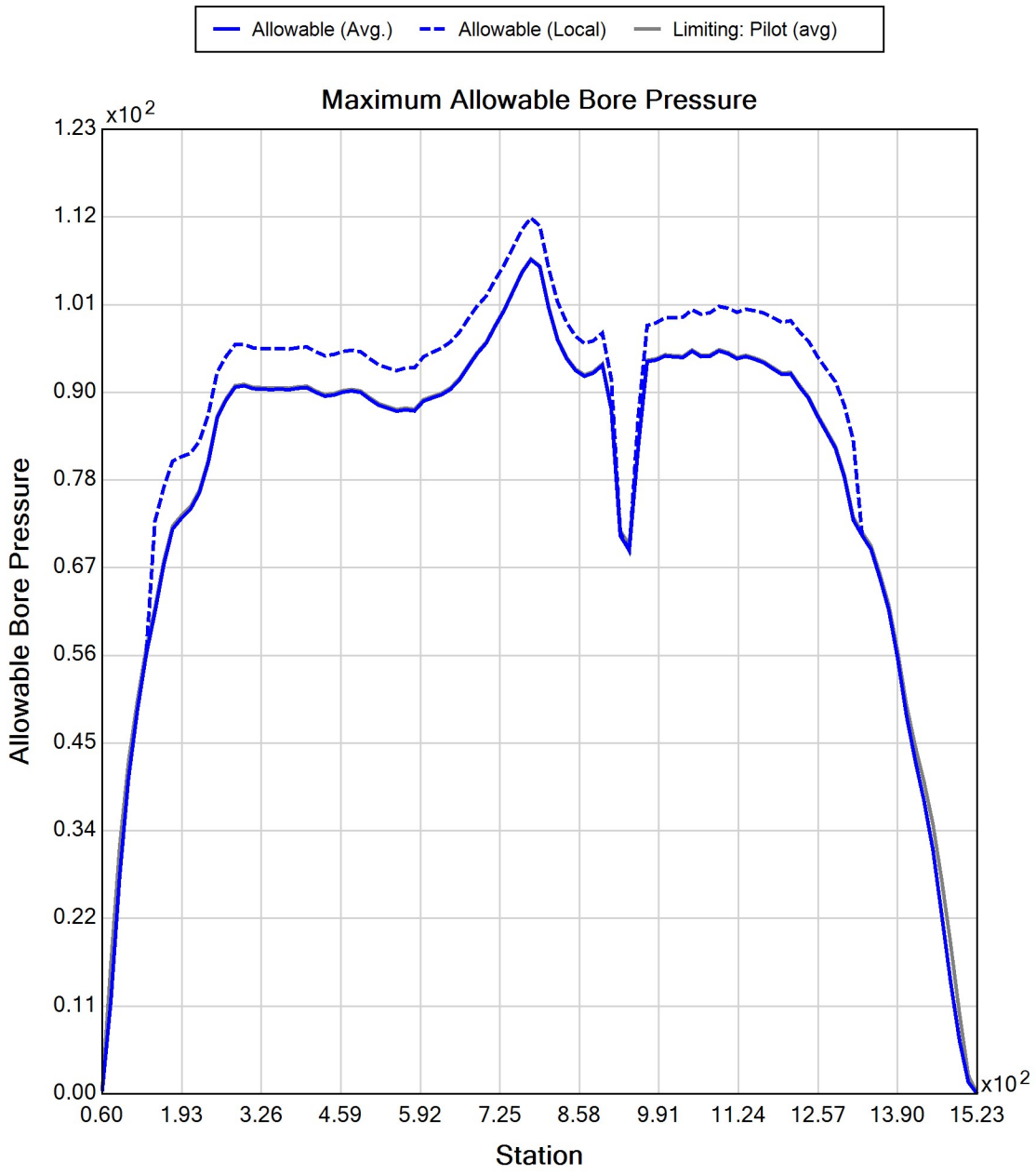


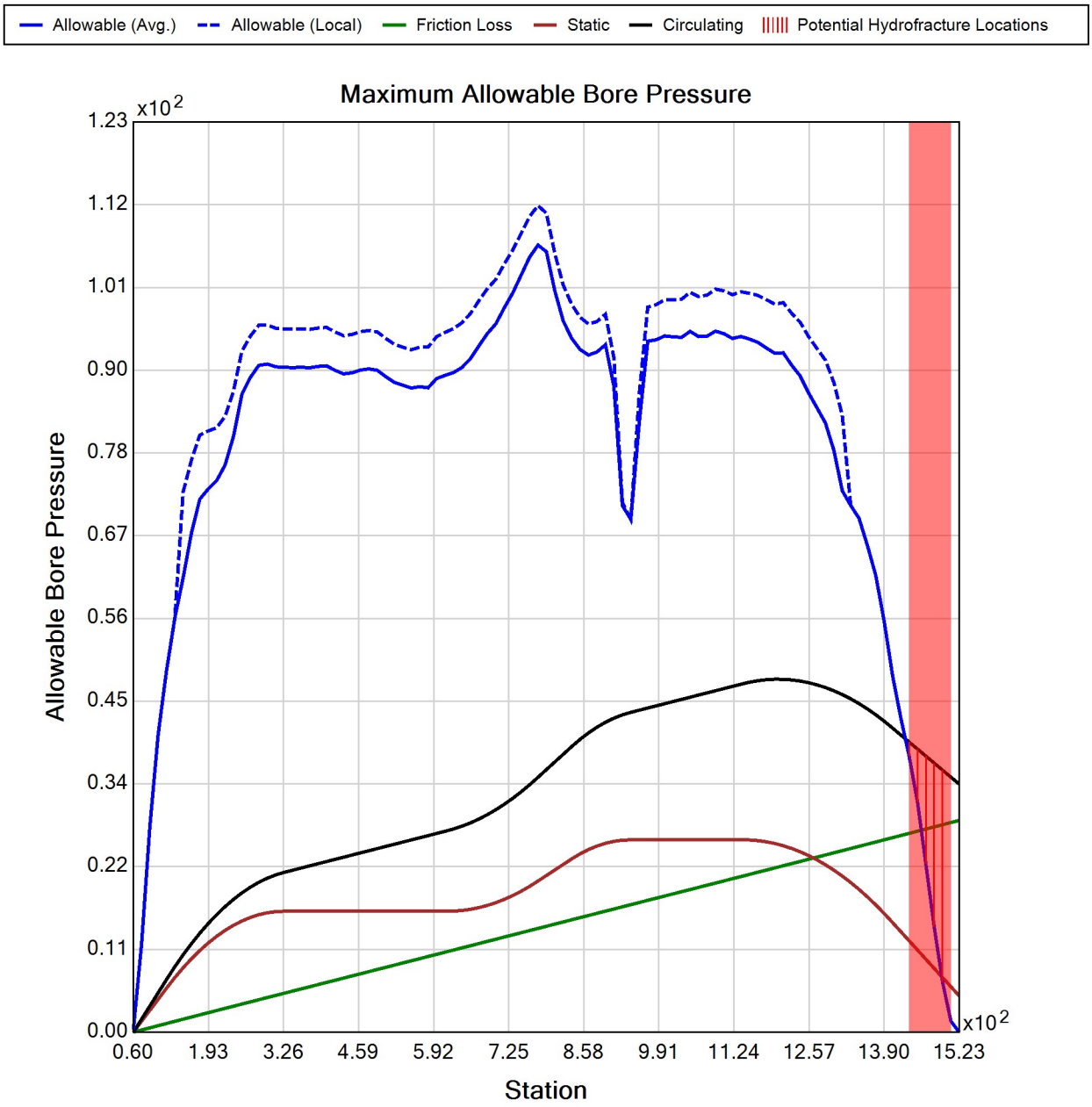












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Input Summary

Start Coordinate	(60.00, 0.00, 320.00) ft
End Coordinate	(1515.00, 0.00, 310.00) ft
Project Length	1455.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1470.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.6	28.9
Water Pressure	12.8	10.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.4	39.3
Deflection		
Earth Load Deflection	0.614	7.872
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.644	7.901
Compressive Stress [psi]		
Compressive Wall Stress	64.9	177.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1375.4	1375.4
Pullback Stress [psi]	785.8	785.8
Pullback Strain	1.367E-2	1.367E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	785.8	786.6
Tensile Strain	1.367E-2	1.378E-2

Net External Pressure = 16.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.644	7.5	11.7	OK
Unconstrained Collapse [psi]	35.5	131.7	3.7	OK
Compressive Wall Stress [psi]	64.9	1150.0	17.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	45.4	218.2	4.8	OK
Tensile Stress [psi]	786.6	1200.0	1.5	OK

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Project Summary

General:	CHPE HDD 39 REV 1 Conduit 1
	P3
	Start Date: 12-10-2021
	End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS
	CHA
Description:	HDD 39 10-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 321.00) ft
End Coordinate	(600.00, 0.00, 329.30) ft
Project Length	600.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

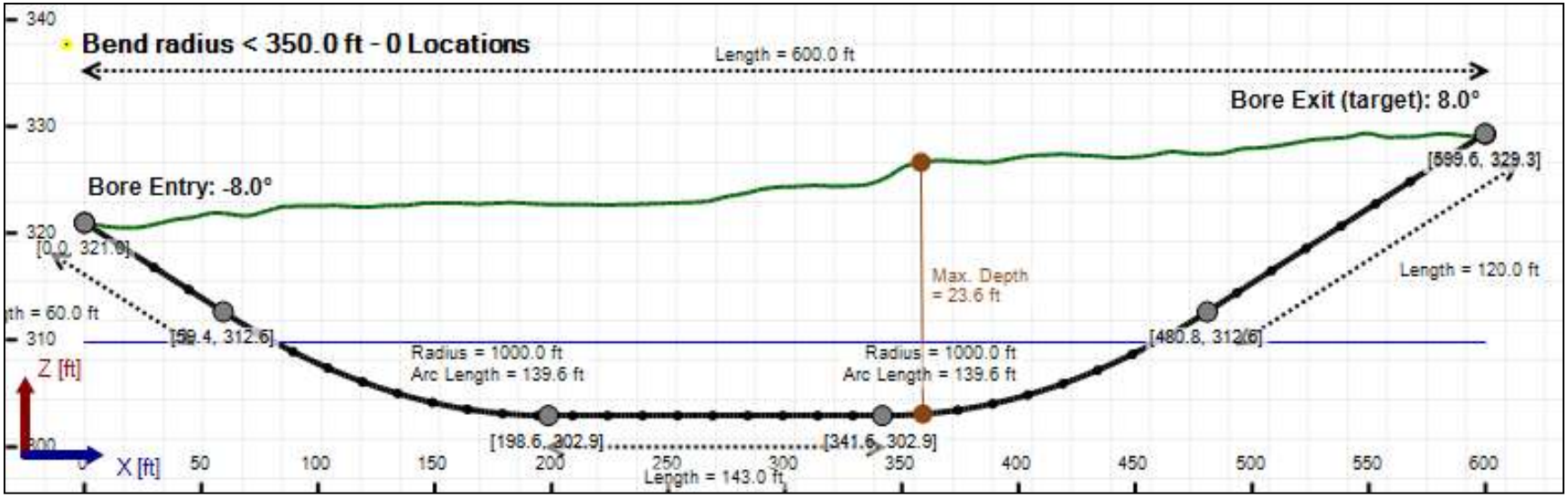
Soil Layer #1 USCS, Sand (S), SP
Depth: 8.60 ft
Unit Weight: 110.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 11.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

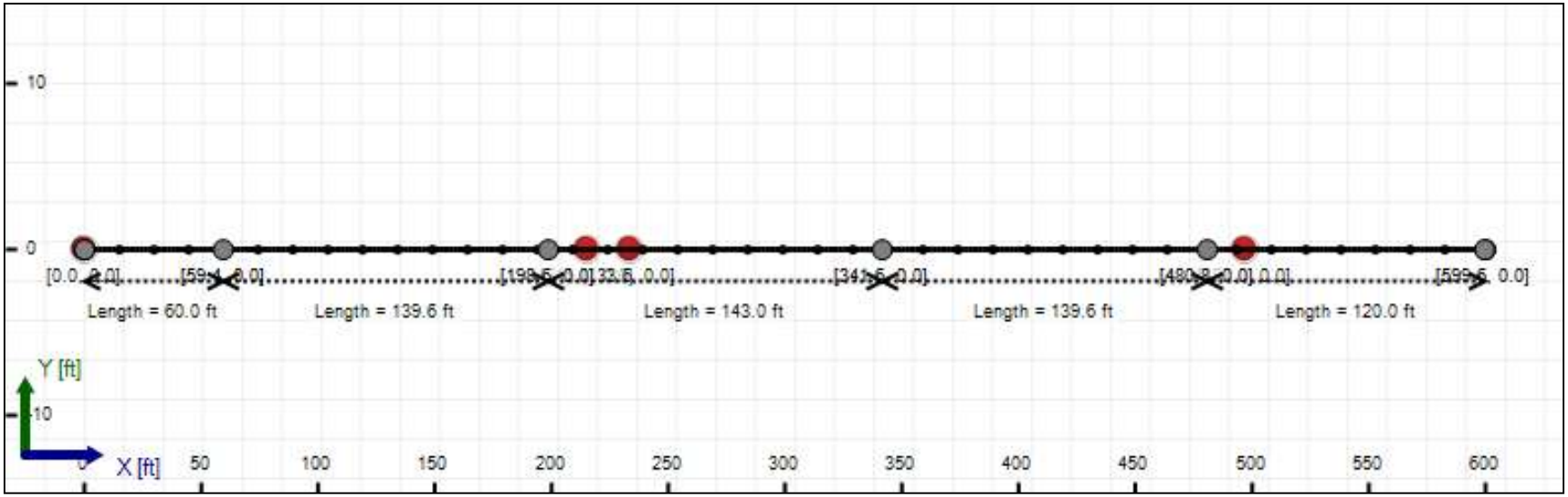
Soil Layer #3 USCS, Sand (S), SP
Depth: 9.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #4 USCS, Sand (S), SM
Depth: 15.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 615.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.7	15.3
Water Pressure	2.9	2.9
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	7.6	18.2
Deflection		
Earth Load Deflection	1.399	4.160
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.531	4.292
Compressive Stress [psi]		
Compressive Wall Stress	34.1	81.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	10448.1	10448.1
Pullback Stress [psi]	291.4	291.4
Pullback Strain	5.068E-3	5.068E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	291.4	314.6
Tensile Strain	5.068E-3	5.918E-3

Net External Pressure = 20.7 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.531	7.5	4.9	OK
Unconstrained Collapse [psi]	18.3	122.1	6.7	OK
Compressive Wall Stress [psi]	34.1	1150.0	33.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	28.3	238.2	8.4	OK
Tensile Stress [psi]	314.6	1200.0	3.8	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	63.871 psi	63.871 psi
1	8.00 in	12.00 in	63.658 psi	63.658 psi
2	12.00 in	16.13 in	63.355 psi	63.355 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

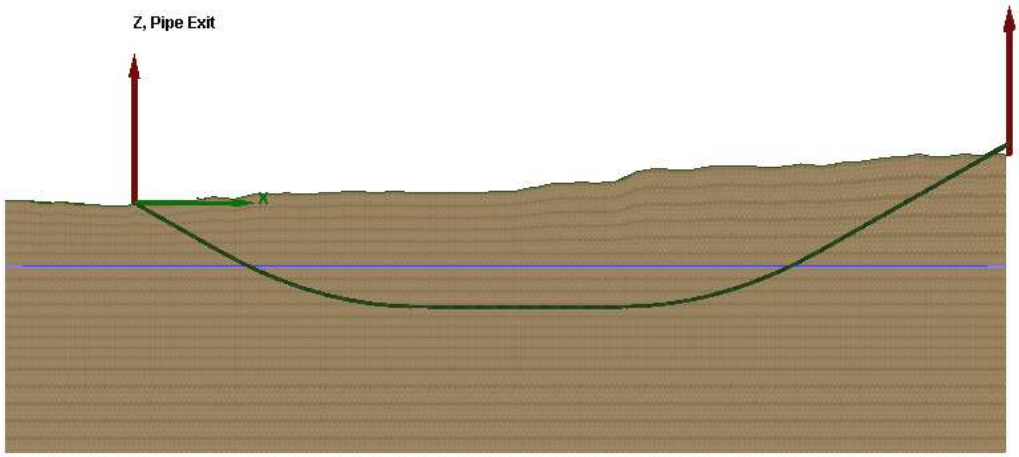
Rheological model: Bingham-Plastic

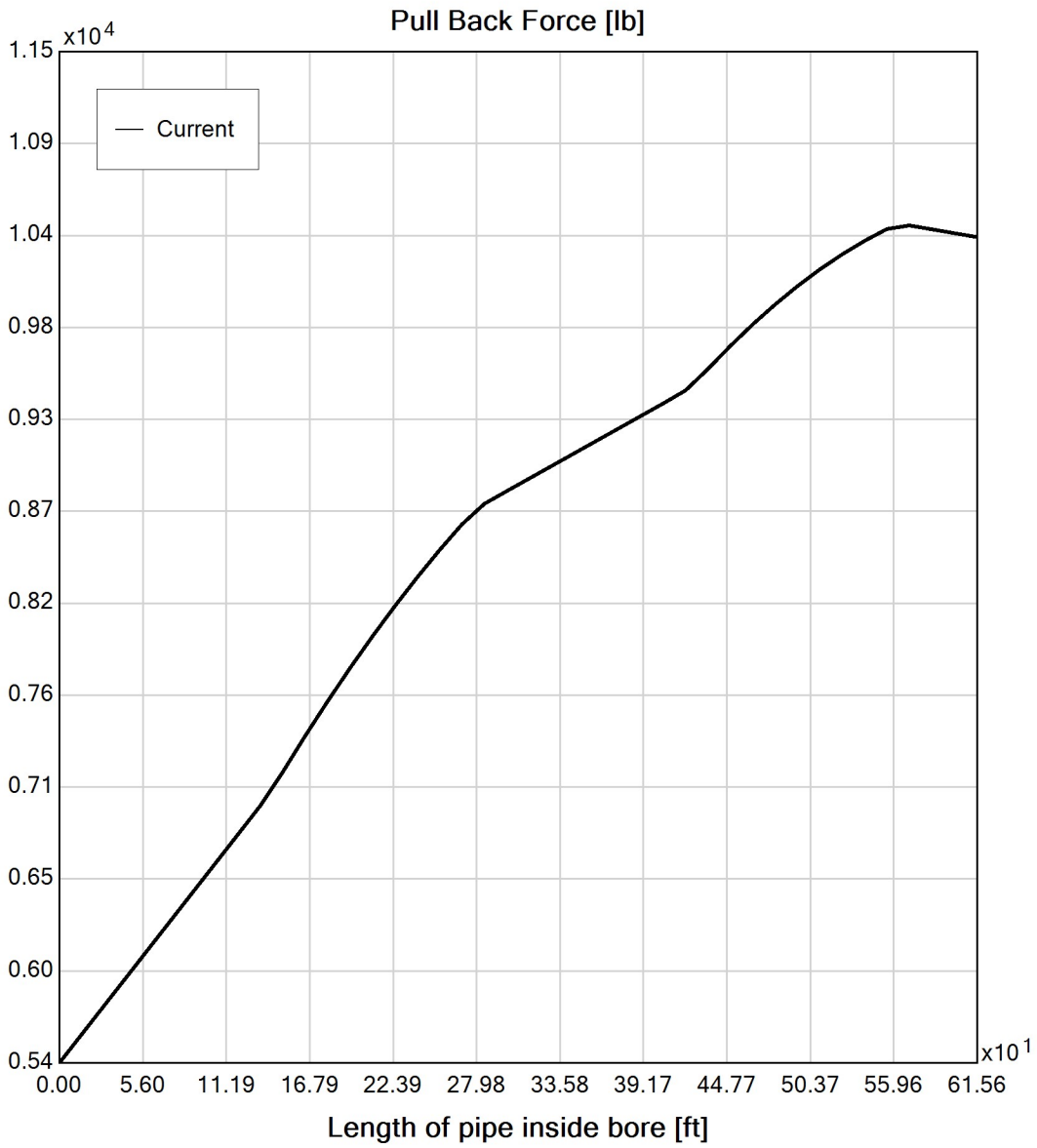
Plastic Viscosity (PV): 25.53

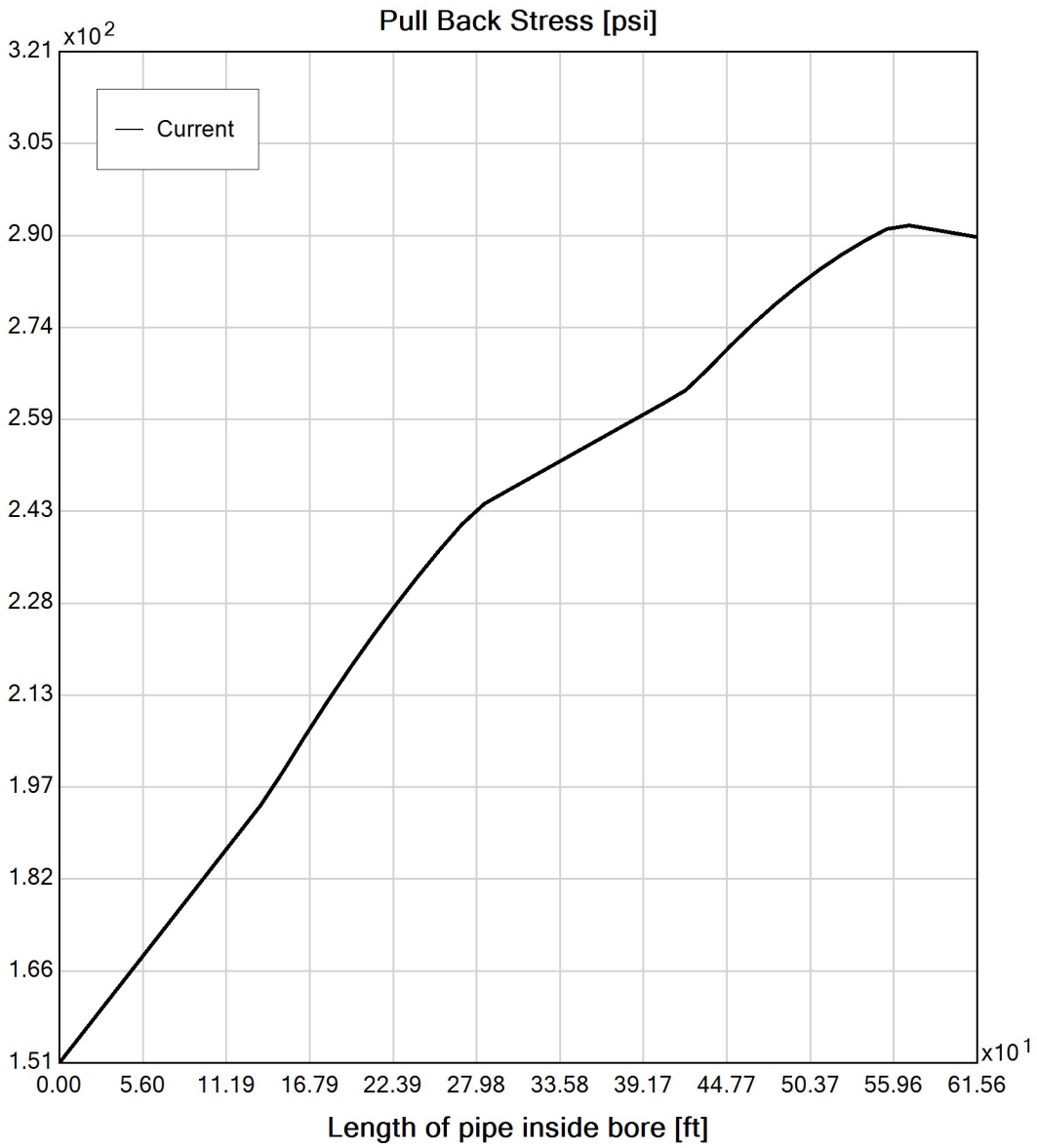
Yield Point (YP): 16.49

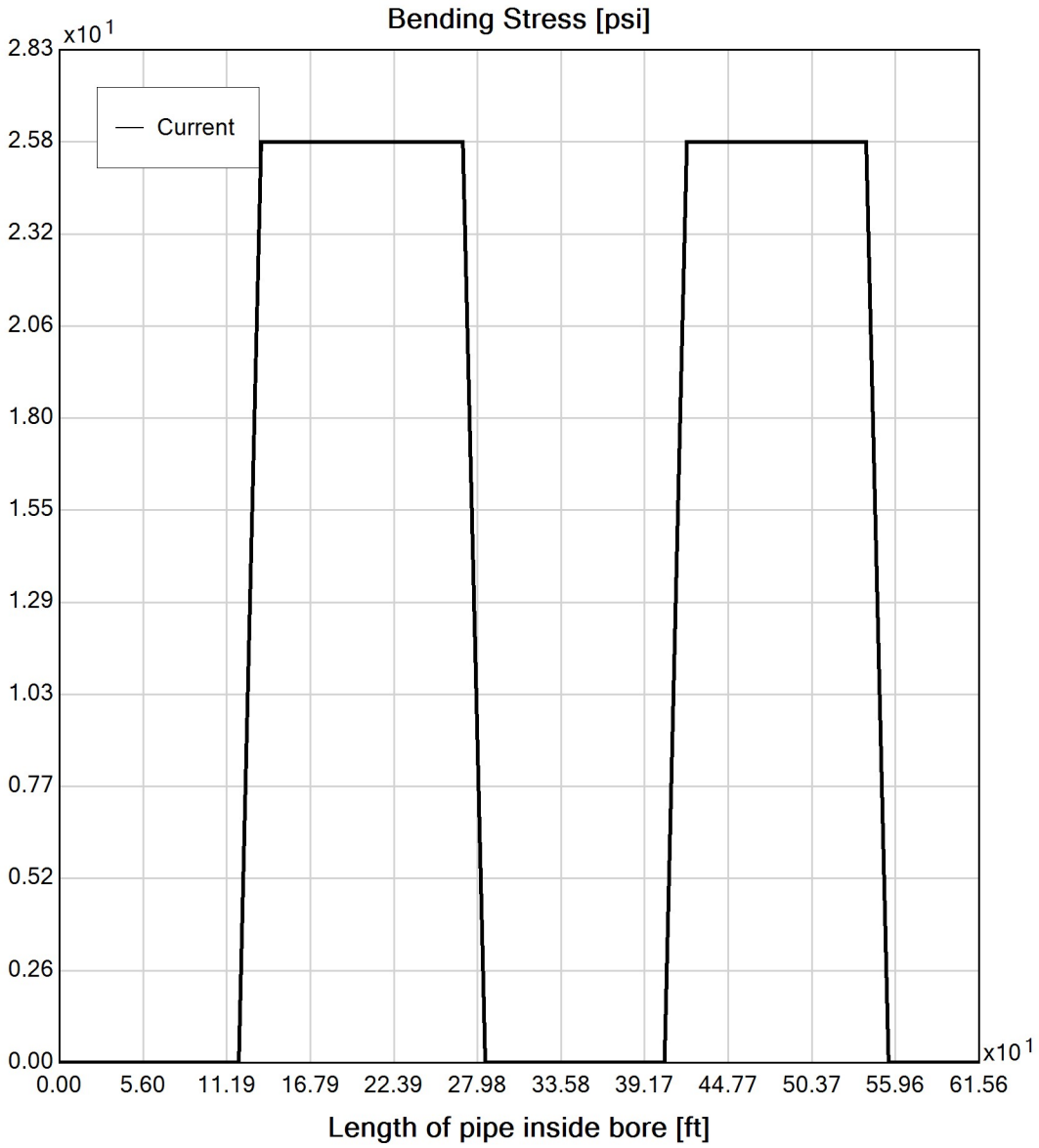
Effective Viscosity (cP): 1202.0

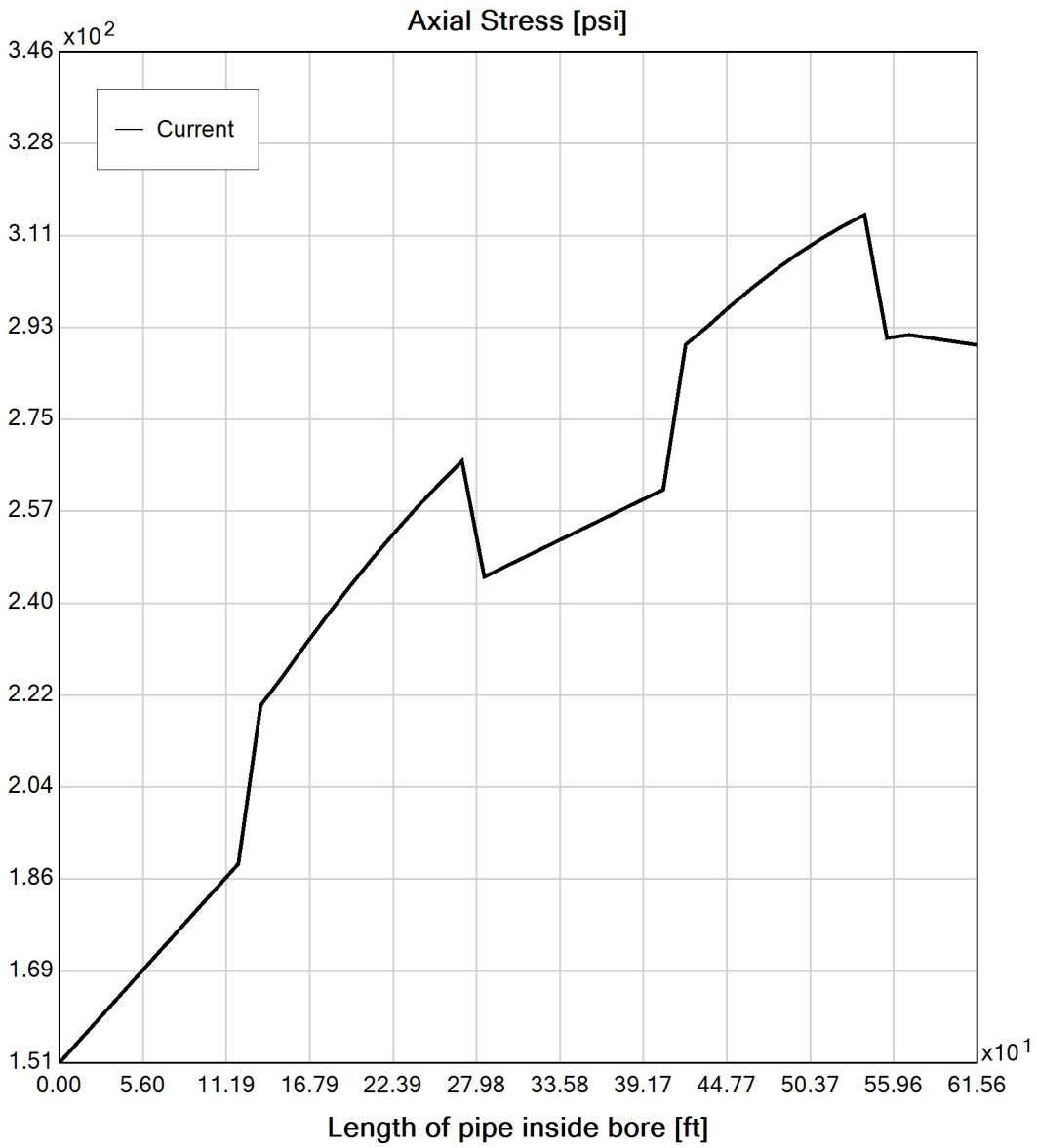
Virtual Site

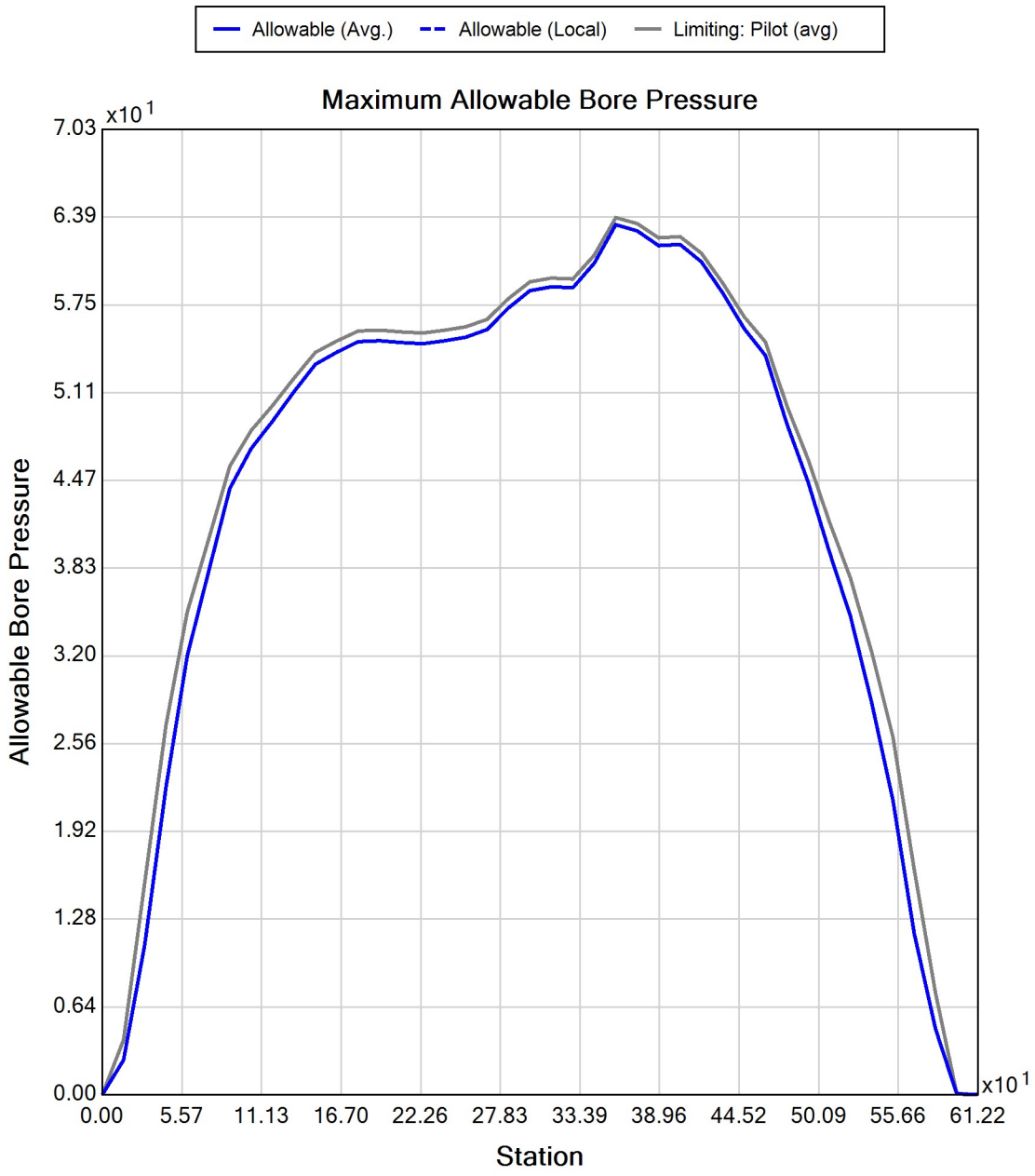


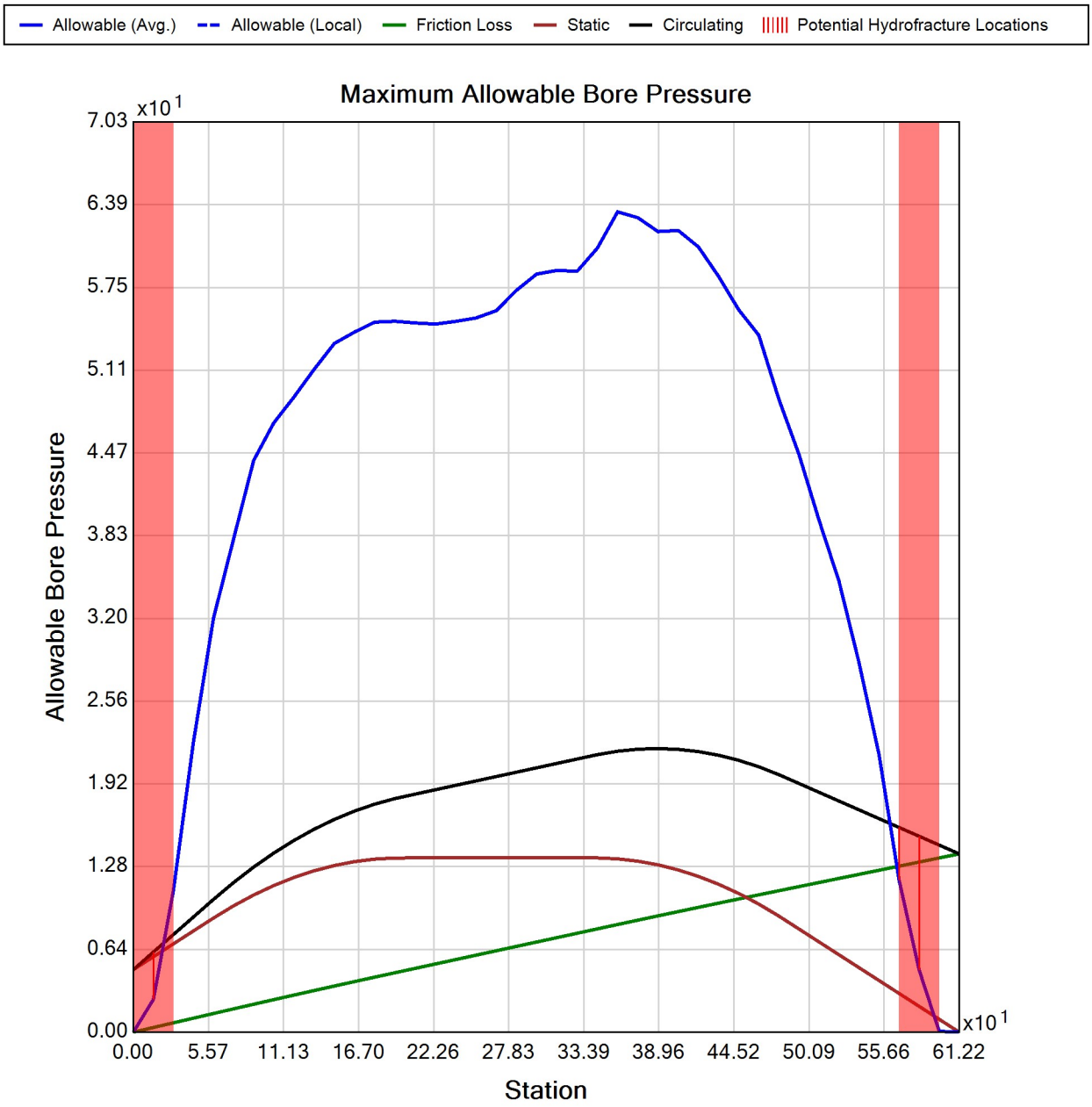












Generated Output

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Input Summary

Start Coordinate	(0.00, 0.00, 321.00) ft
End Coordinate	(600.00, 0.00, 329.30) ft
Project Length	600.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 615.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.9	15.3
Water Pressure	3.0	2.9
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	4.9	18.2
Deflection		
Earth Load Deflection	0.614	4.160
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.644	4.189
Compressive Stress [psi]		
Compressive Wall Stress	21.9	81.9

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	619.6	619.6
Pullback Stress [psi]	354.0	354.0
Pullback Strain	6.156E-3	6.156E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	354.0	357.1
Tensile Strain	6.156E-3	6.309E-3

Net External Pressure = 20.7 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.644	7.5	11.7	OK
Unconstrained Collapse [psi]	18.3	131.5	7.2	OK
Compressive Wall Stress [psi]	21.9	1150.0	52.4	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	28.3	236.5	8.3	OK
Tensile Stress [psi]	357.1	1200.0	3.4	OK

Generated Output

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Project Summary

General:	CHPE HDD 39 REV 1 Conduit 2 P3 Start Date: 12-10-2021 End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS CHA
Description:	HDD 39 10-inch DR 9 REV 1 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 322.00) ft
End Coordinate	(968.00, 0.00, 325.50) ft
Project Length	968.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 5

Soil Layer #1 USCS, Sand (S), SP
Depth: 8.60 ft
Unit Weight: 110.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

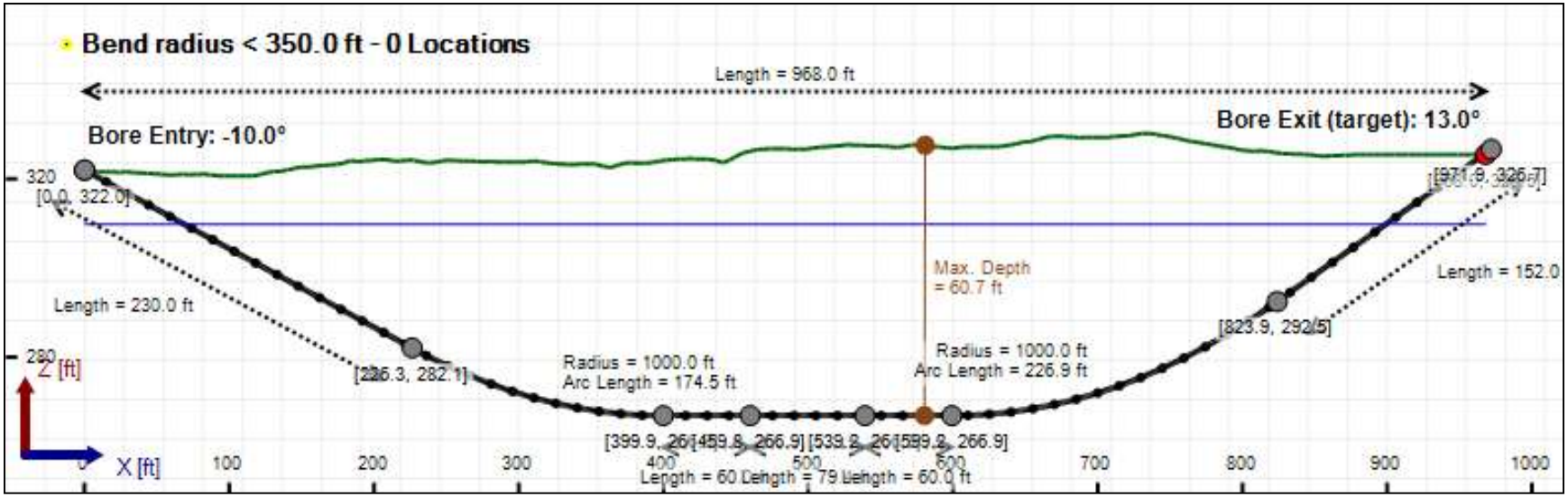
Soil Layer #2 USCS, Sand (S), SM
Depth: 11.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #3 USCS, Sand (S), SP
Depth: 9.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

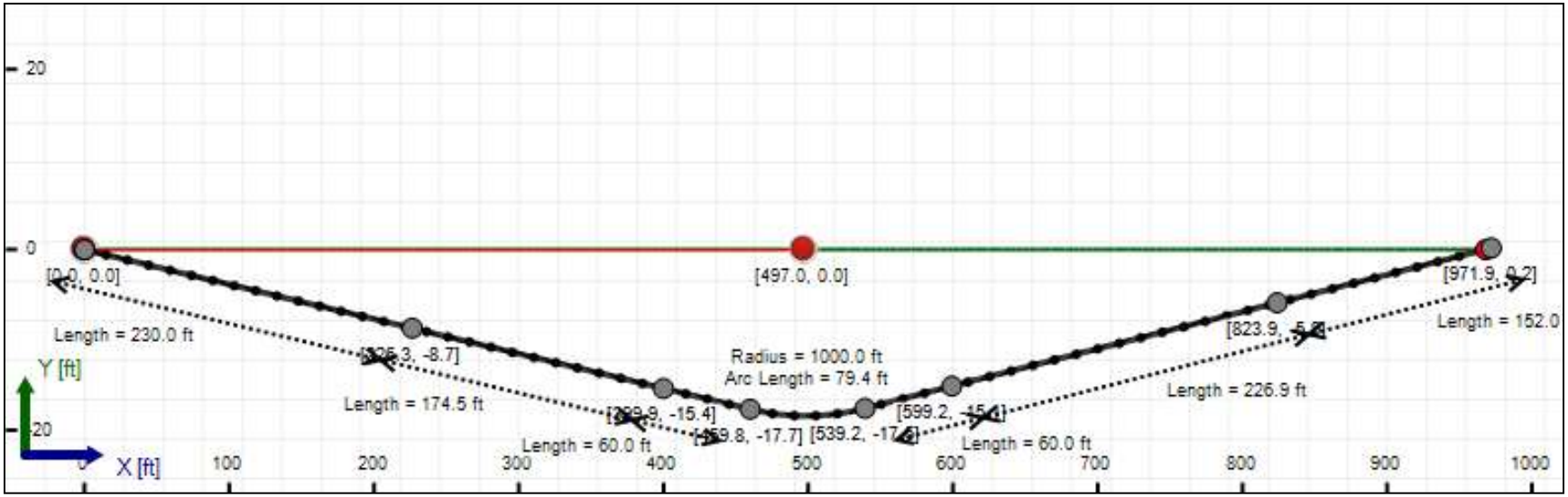
Soil Layer #4 USCS, Sand (S), SM
Depth: 15.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #5 USCS, Sand (S), SM
Depth: 20.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 500.00, 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: 10" (10.75")
Pipe DR: 9
Pipe Length: 990.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.0	31.6
Water Pressure	18.6	18.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	22.6	50.2
Deflection		
Earth Load Deflection	1.322	8.719
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.454	8.851
Compressive Stress [psi]		
Compressive Wall Stress	101.7	226.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	17942.1	17942.1
Pullback Stress [psi]	500.4	500.4
Pullback Strain	8.702E-3	8.702E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	500.4	523.6
Tensile Strain	8.702E-3	9.555E-3

Net External Pressure = 39.5 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.454	7.5	5.2	OK
Unconstrained Collapse [psi]	39.9	123.8	3.1	OK
Compressive Wall Stress [psi]	101.7	1150.0	11.3	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	49.9	225.4	4.5	OK
Tensile Stress [psi]	523.6	1200.0	2.3	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	137.618 psi	196.466 psi
1	8.00 in	12.00 in	137.576 psi	196.334 psi
2	12.00 in	16.13 in	137.514 psi	196.141 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

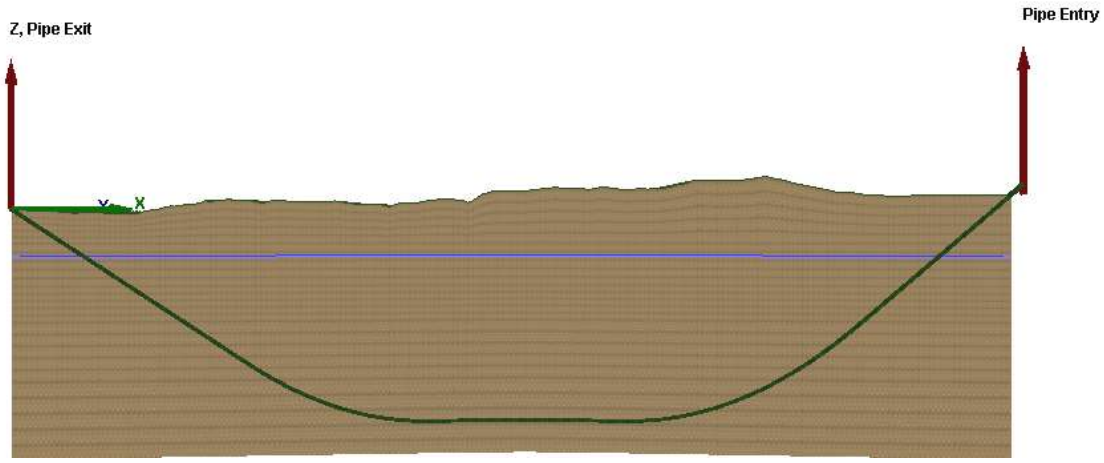
Rheological model: Bingham-Plastic

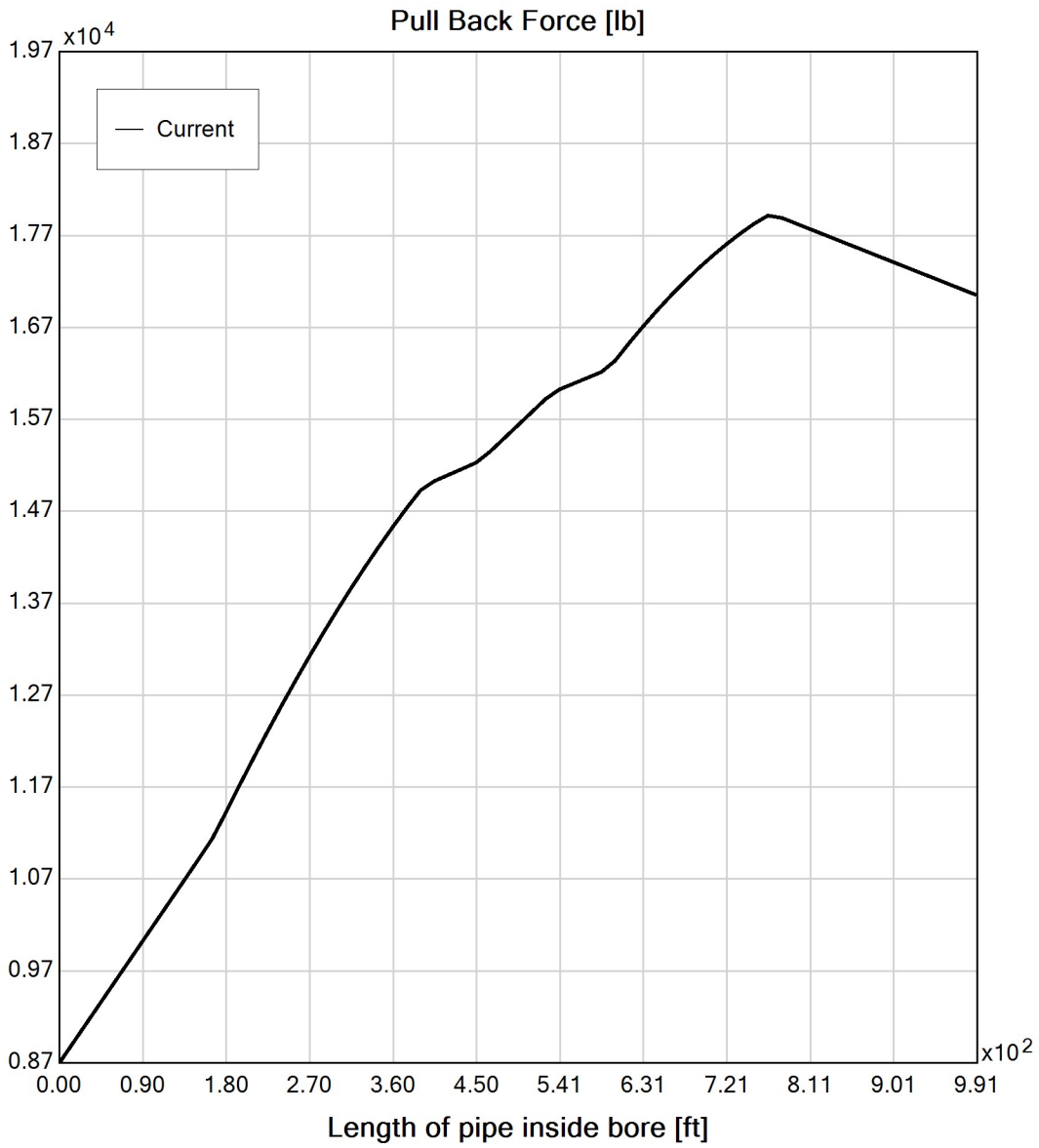
Plastic Viscosity (PV): 25.53

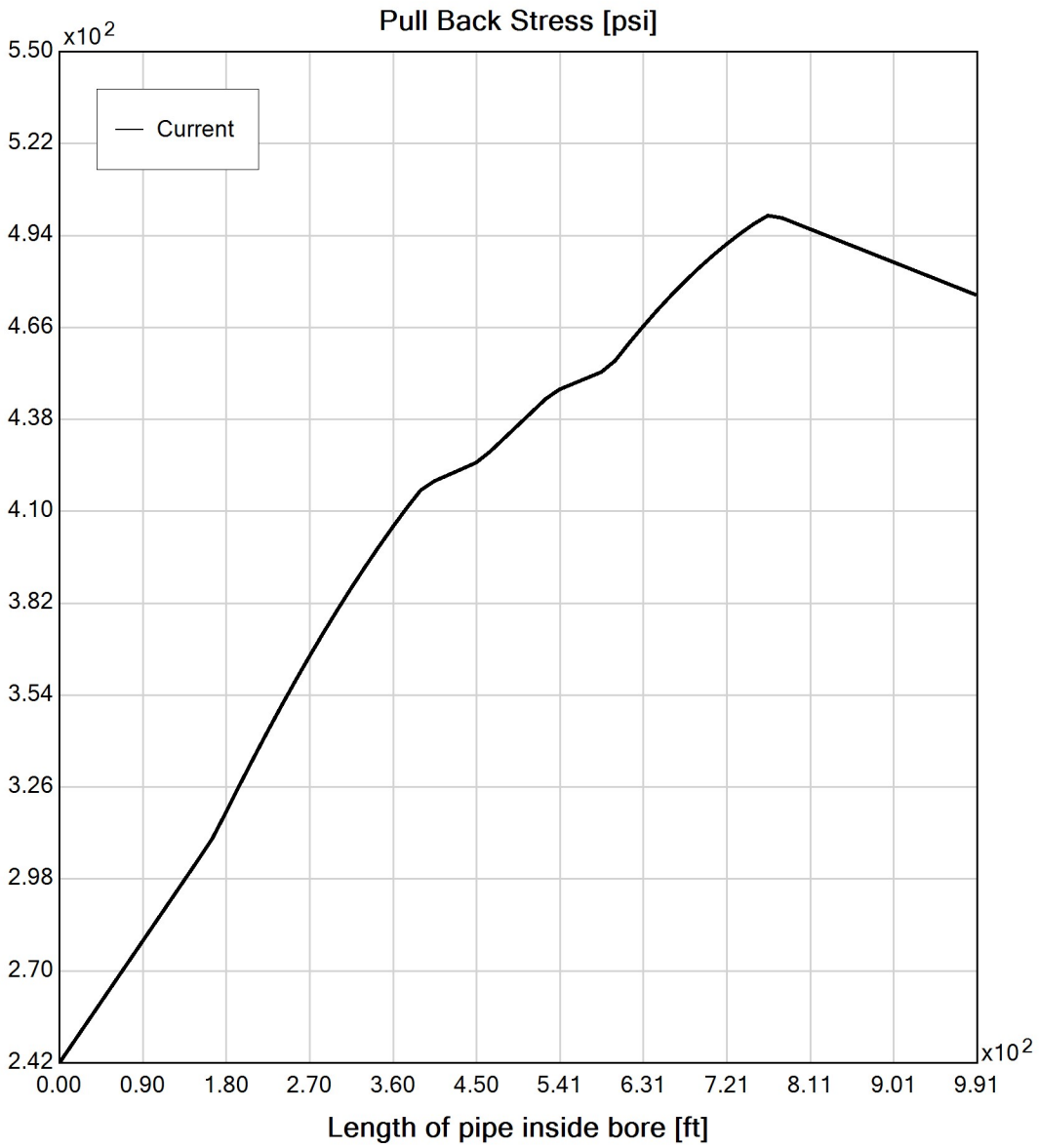
Yield Point (YP): 16.49

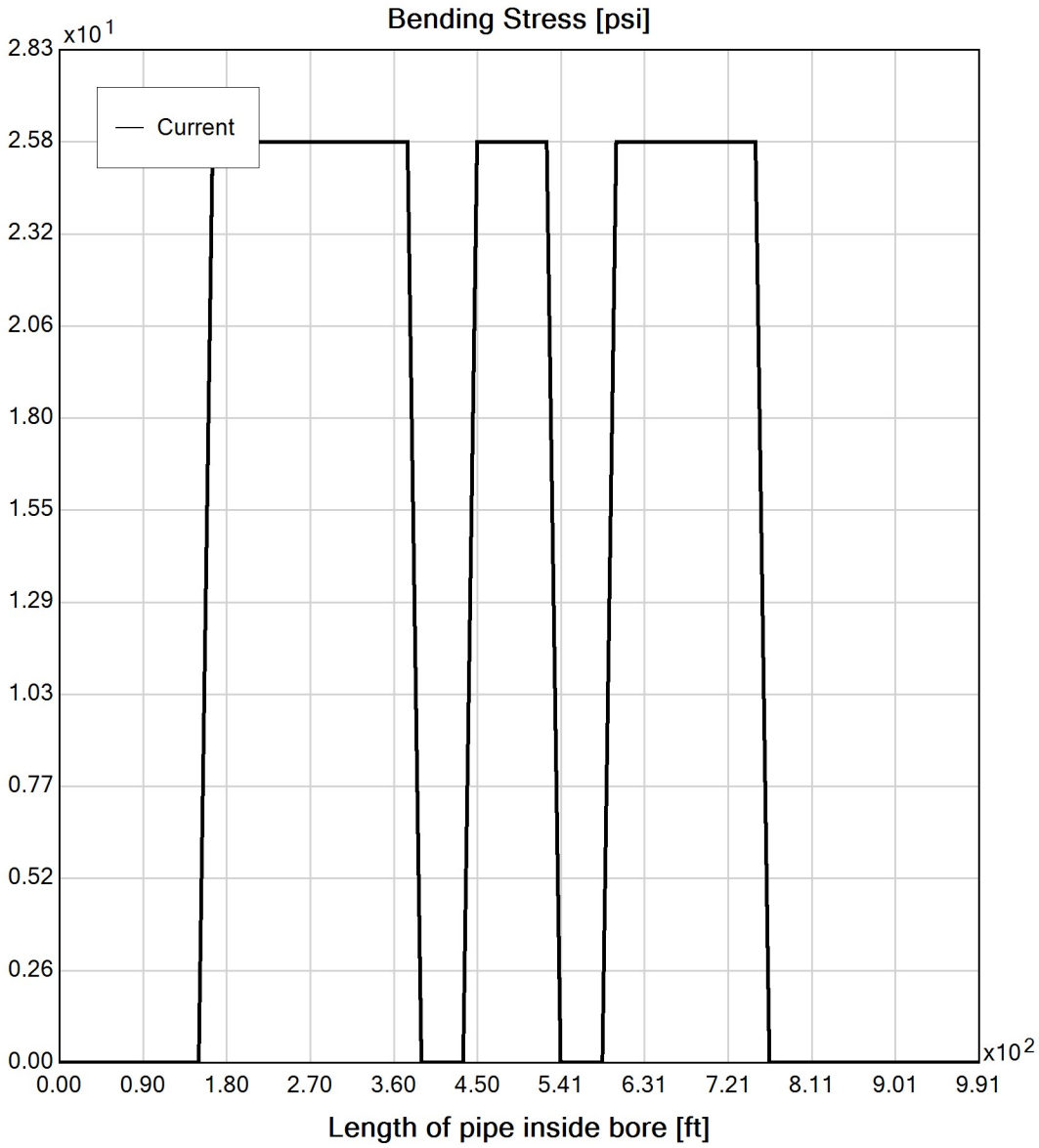
Effective Viscosity (cP): 1202.0

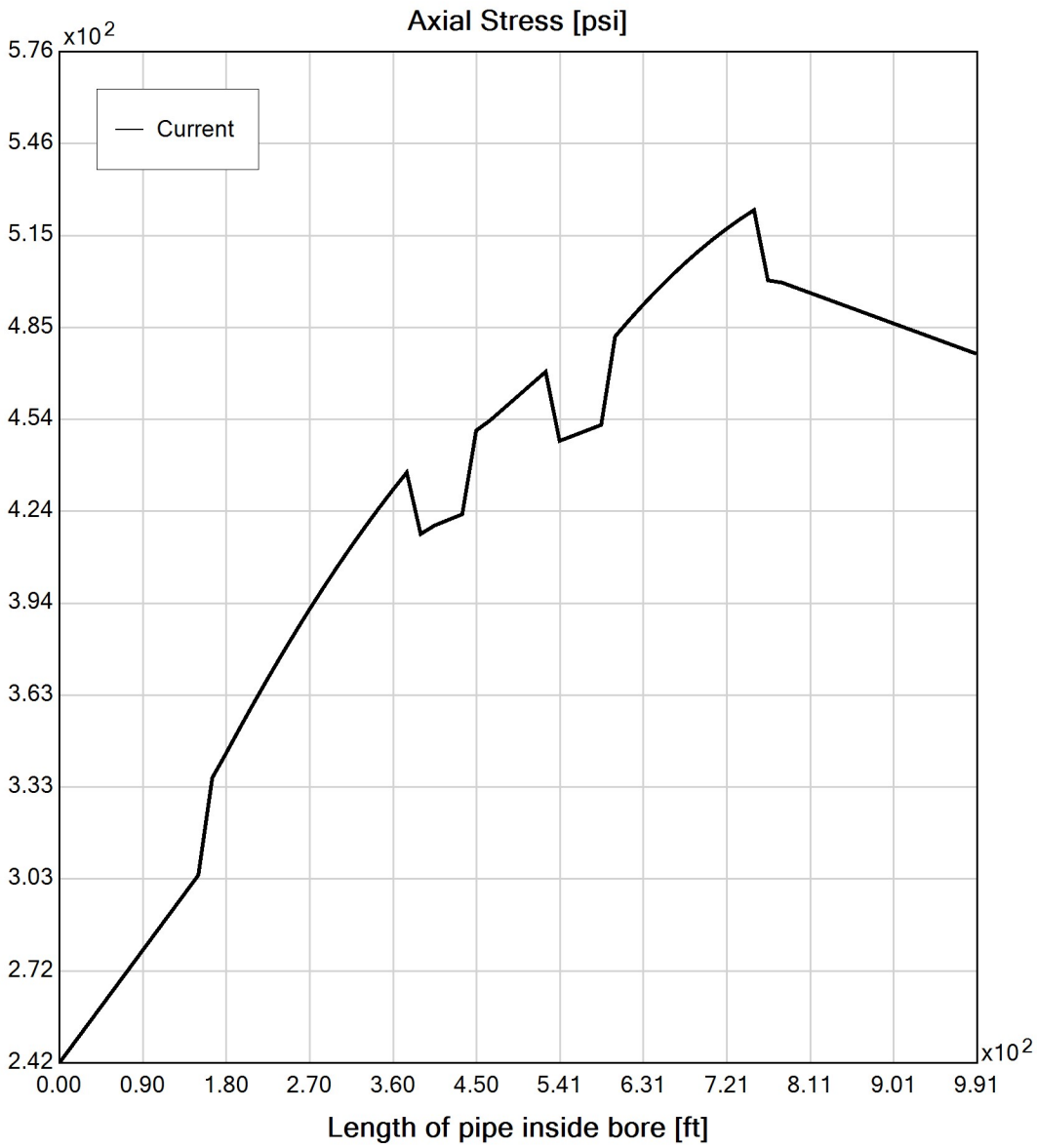
Virtual Site

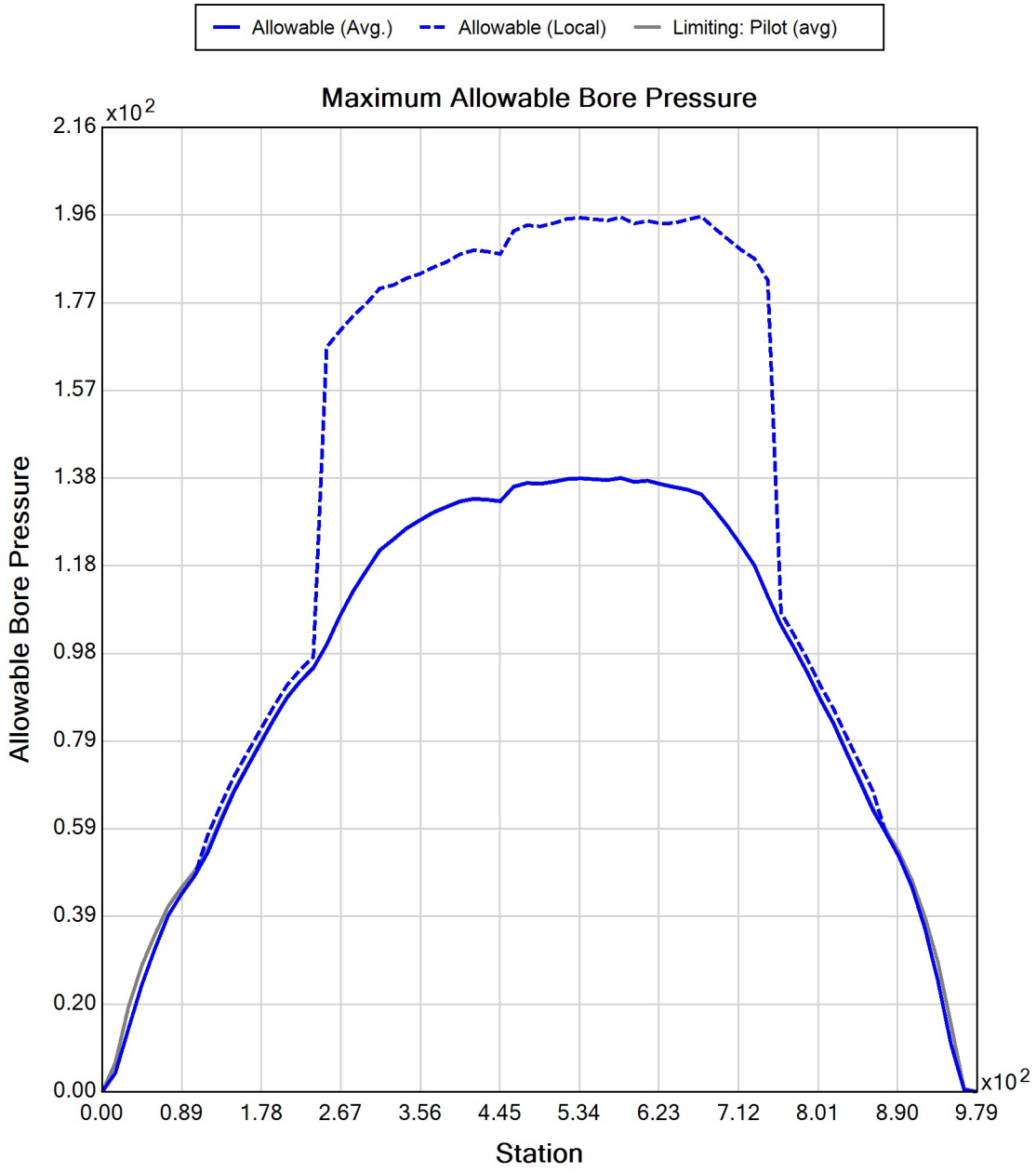


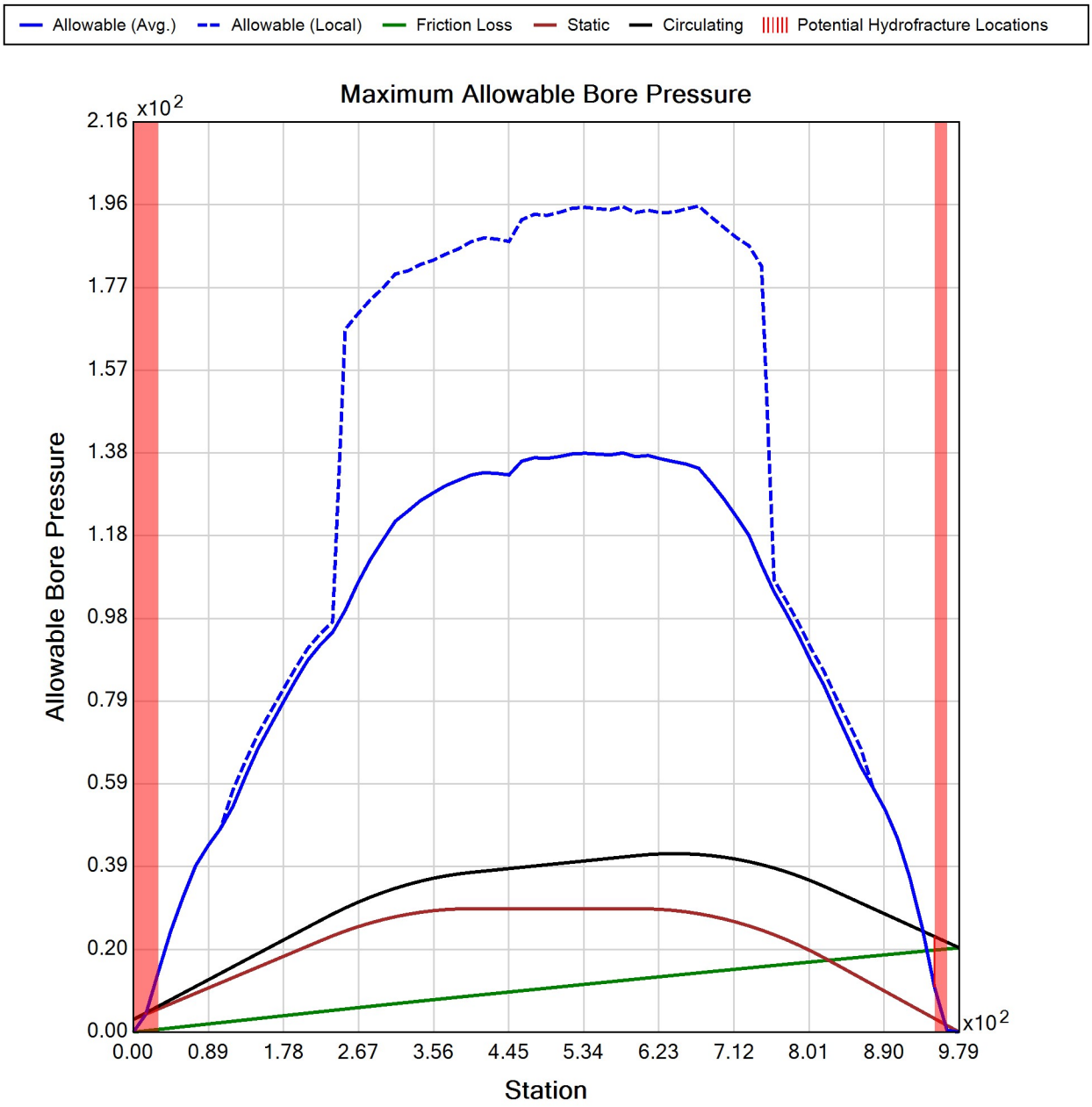












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Input Summary

Start Coordinate	(0.00, 0.00, 322.00) ft
End Coordinate	(968.00, 0.00, 325.50) ft
Project Length	968.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 990.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.6	31.6
Water Pressure	18.6	18.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	20.2	50.2
Deflection		
Earth Load Deflection	0.609	8.719
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.638	8.748
Compressive Stress [psi]		
Compressive Wall Stress	90.8	226.0

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	985.3	985.3
Pullback Stress [psi]	563.0	563.0
Pullback Strain	9.791E-3	9.791E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	563.0	566.2
Tensile Strain	9.791E-3	9.946E-3

Net External Pressure = 39.5 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.638	7.5	11.8	OK
Unconstrained Collapse [psi]	39.9	132.6	3.3	OK
Compressive Wall Stress [psi]	90.8	1150.0	12.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	49.9	223.5	4.5	OK
Tensile Stress [psi]	566.2	1200.0	2.1	OK

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Project Summary

General:	CHPE HDD 40 Conduit 1
	P3
	Start Date: 12-10-2021
	End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	AB
	CHA
Description:	HDD 40 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 339.39) ft
End Coordinate	(1350.00, 0.00, 332.00) ft
Project Length	1350.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

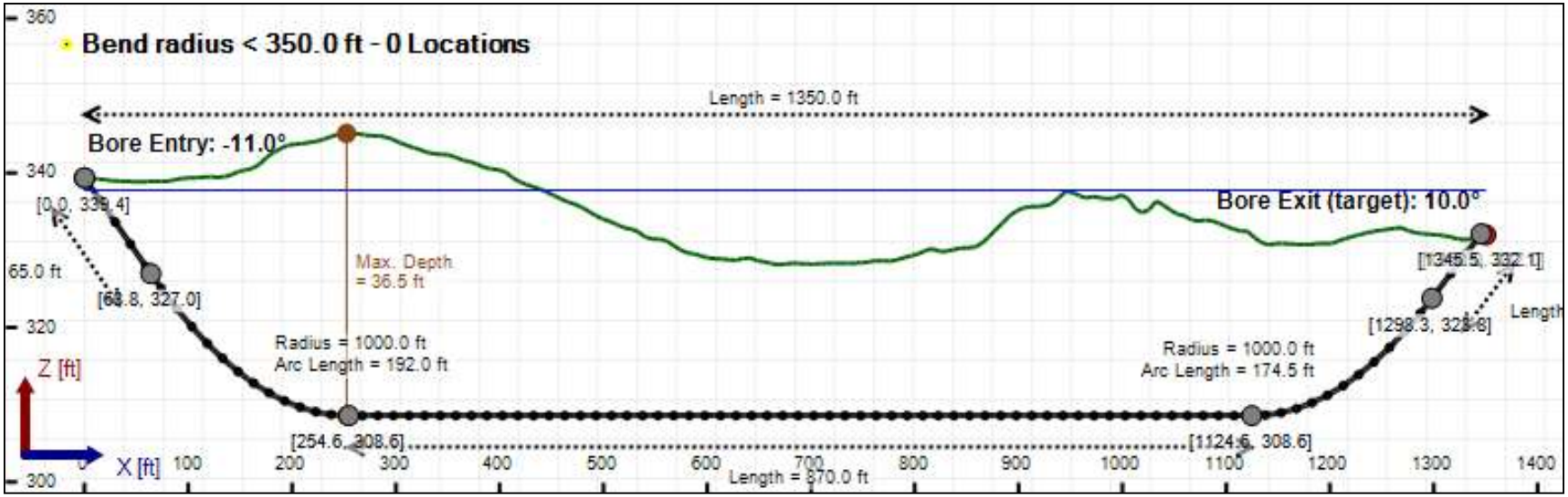
Soil Summary

Number of Layers: 2

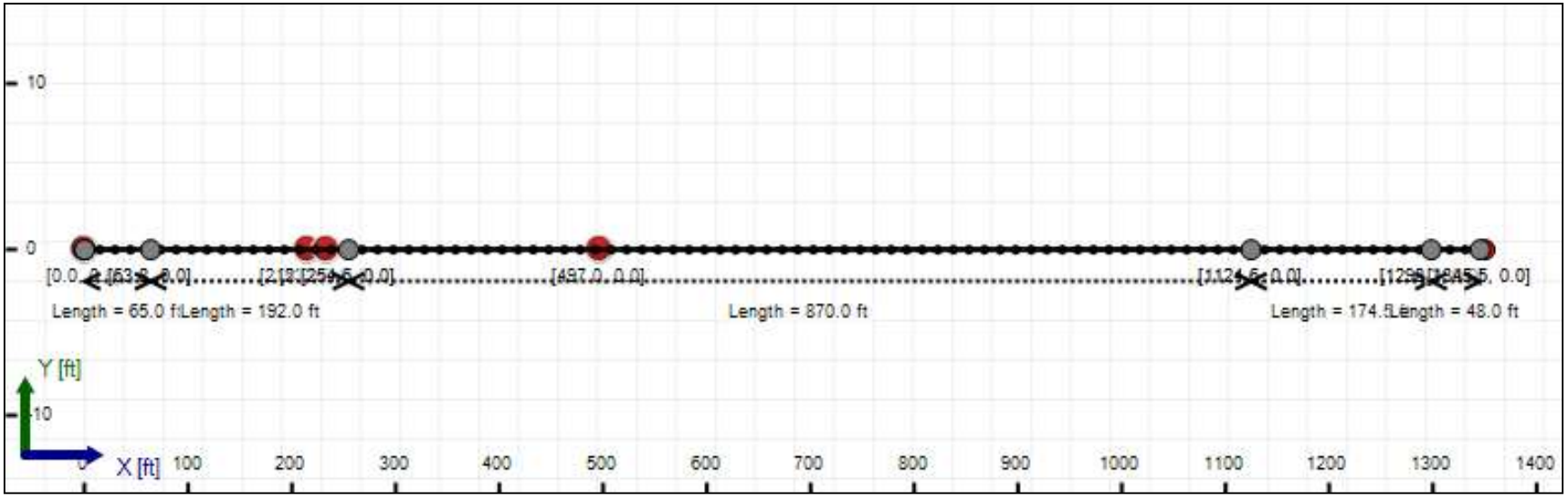
Soil Layer #1 USCS, Sand (S), SP
Depth: 17.30 ft
Unit Weight: 109.5552 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Silt (M), ML
Depth: 13.00 ft
Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 28.00, 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: 10" (10.75")
Pipe DR: 9
Pipe Length: 1350.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.9	18.3
Water Pressure	12.7	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	16.5	30.9
Deflection		
Earth Load Deflection	1.049	4.975
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.181	5.107
Compressive Stress [psi]		
Compressive Wall Stress	74.3	139.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	21394.2	21394.2
Pullback Stress [psi]	596.7	596.7
Pullback Strain	1.038E-2	1.038E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	596.7	619.2
Tensile Strain	1.038E-2	1.122E-2

Net External Pressure = 17.4 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.181	7.5	6.3	OK
Unconstrained Collapse [psi]	20.0	124.2	6.2	OK
Compressive Wall Stress [psi]	74.3	1150.0	15.5	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	30.0	220.0	7.3	OK
Tensile Stress [psi]	619.2	1200.0	1.9	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	86.336 psi	86.336 psi
1	8.00 in	12.00 in	86.248 psi	86.248 psi
2	12.00 in	16.13 in	86.122 psi	86.122 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

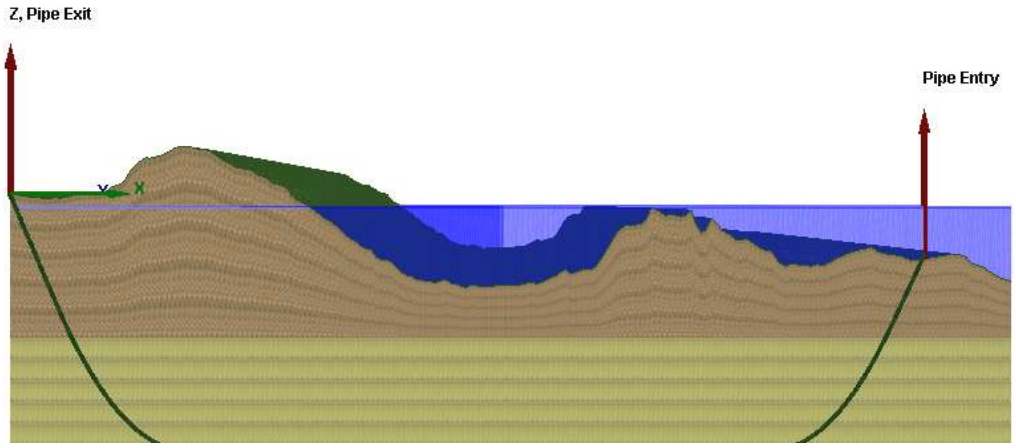
Rheological model: Bingham-Plastic

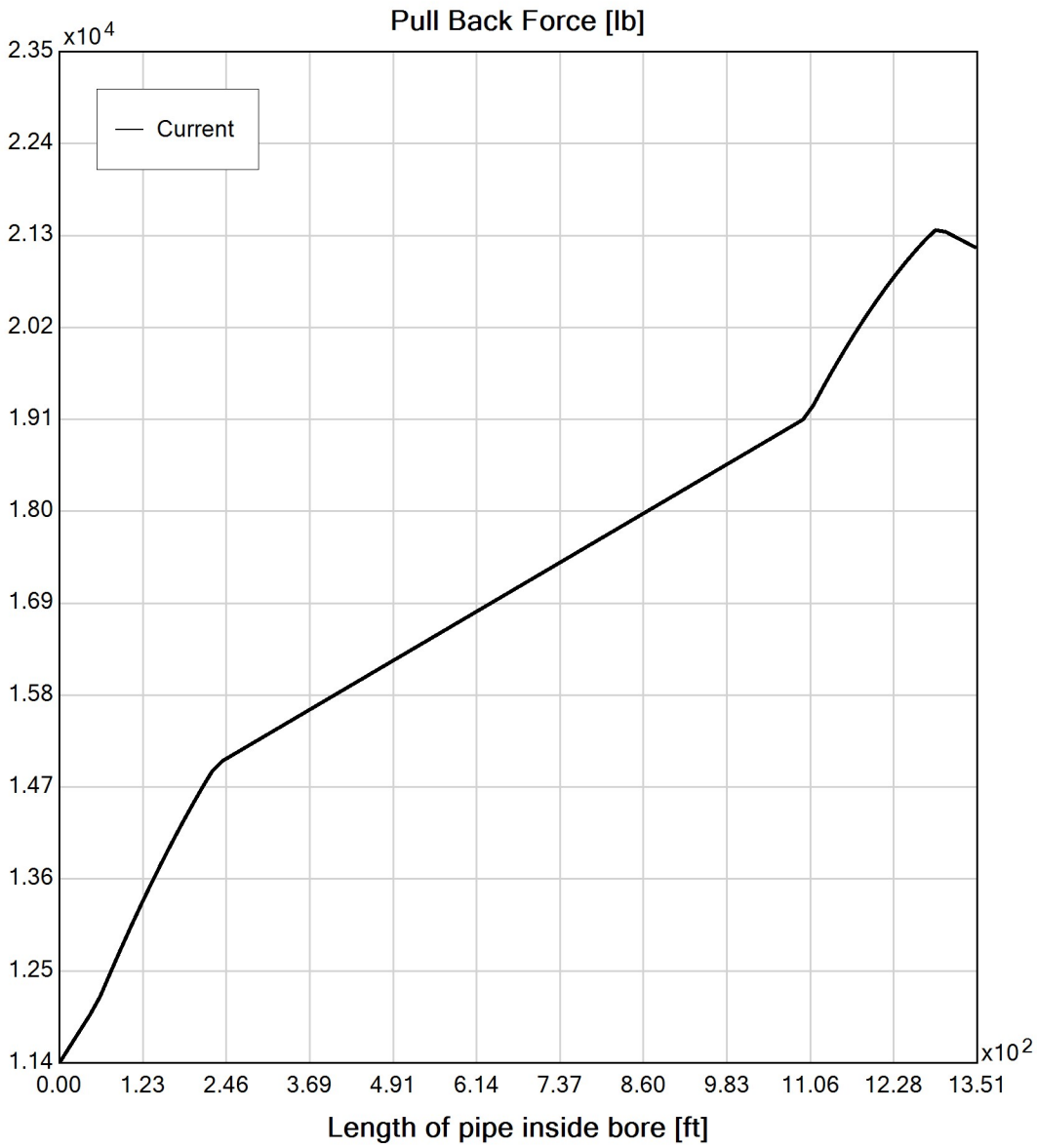
Plastic Viscosity (PV): 25.53

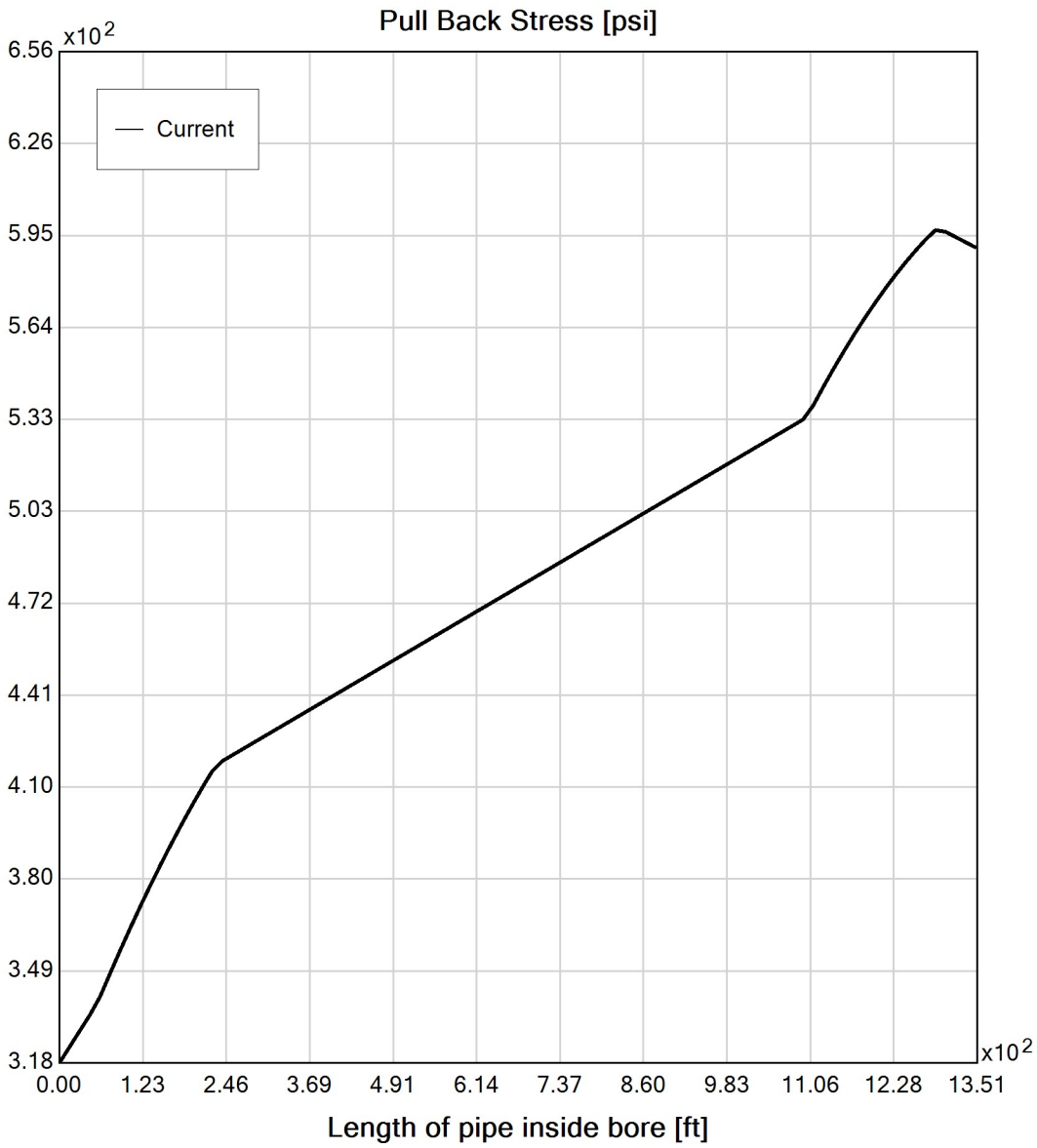
Yield Point (YP): 16.49

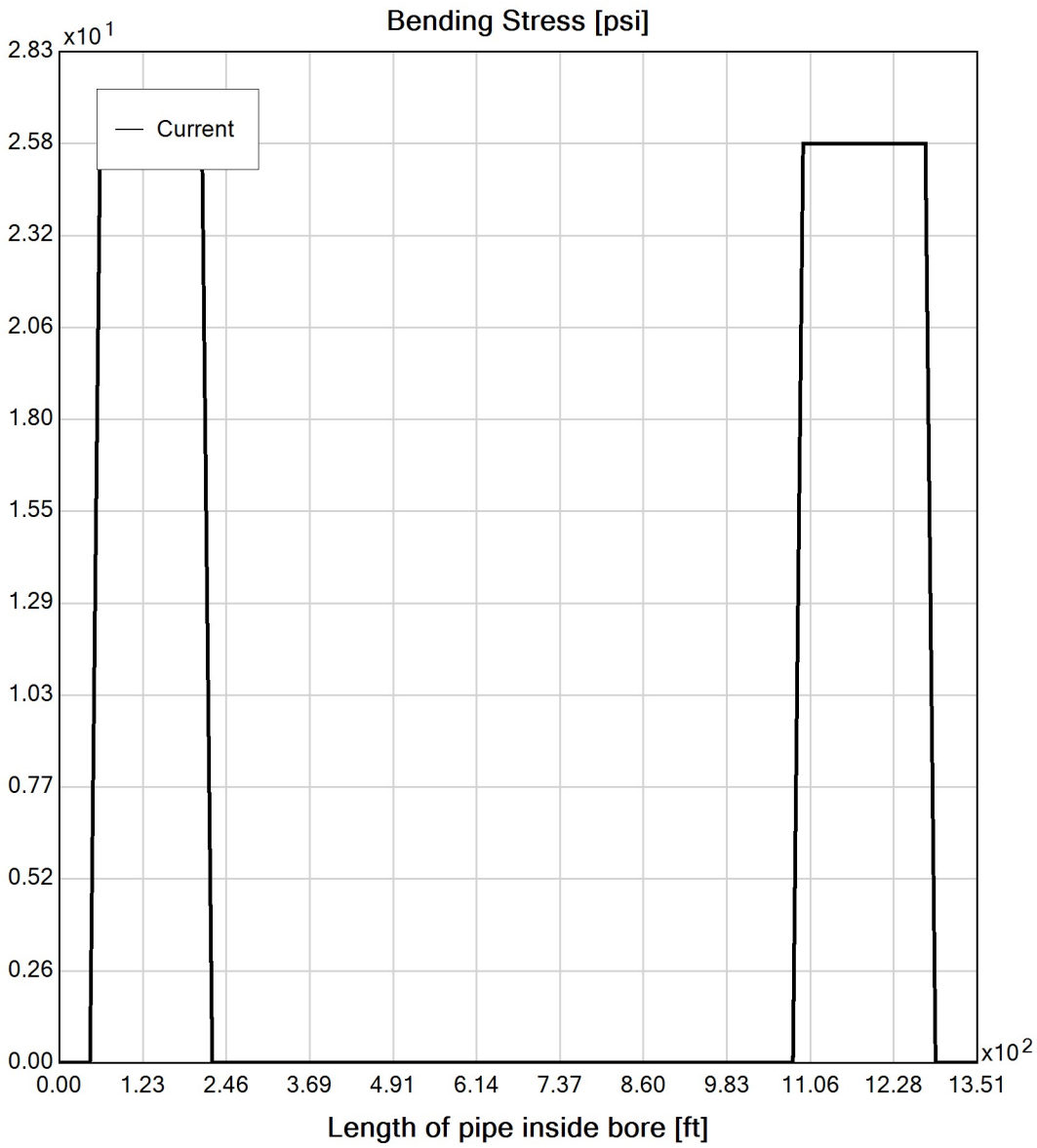
Effective Viscosity (cP): 1202.0

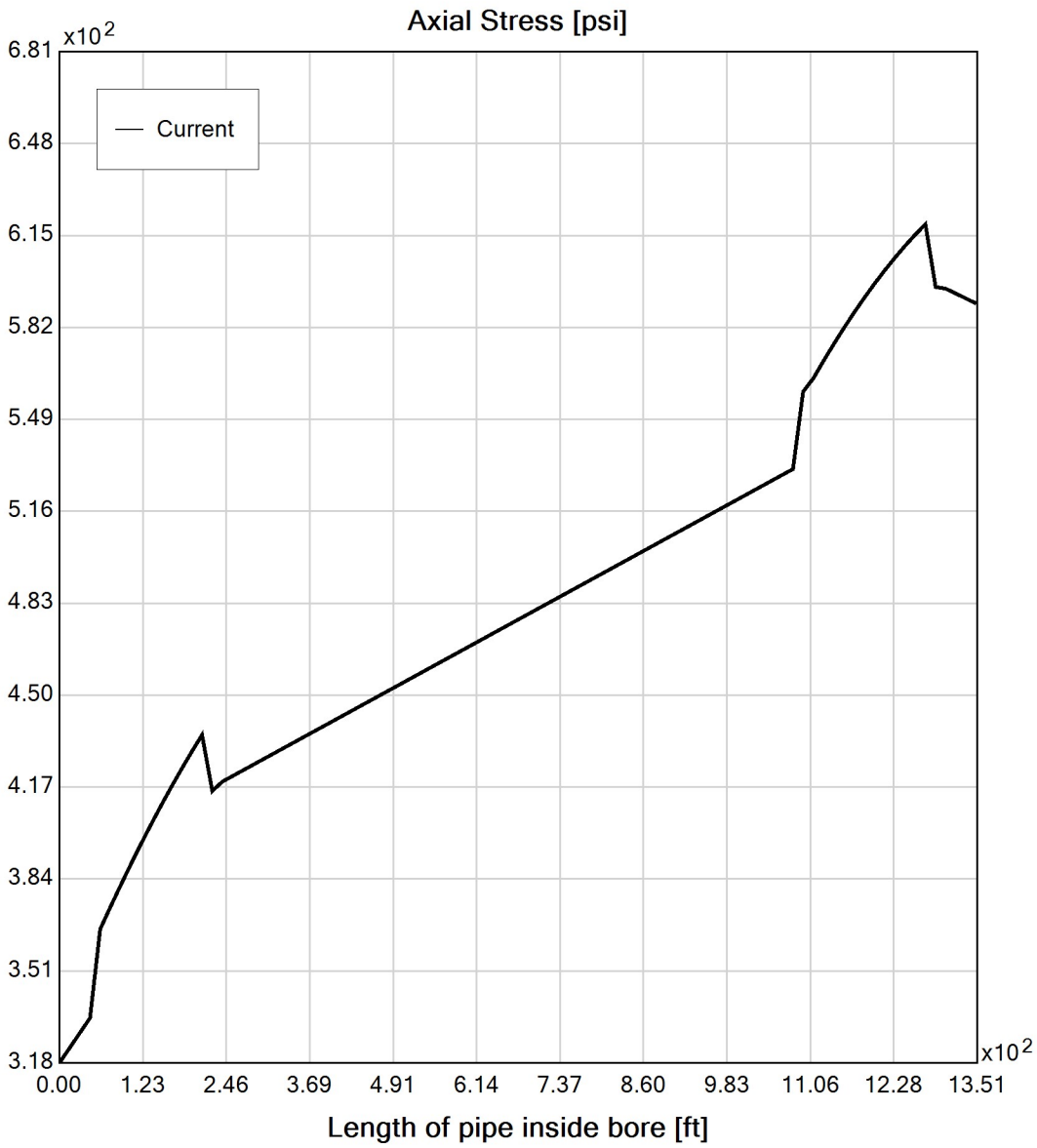
Virtual Site

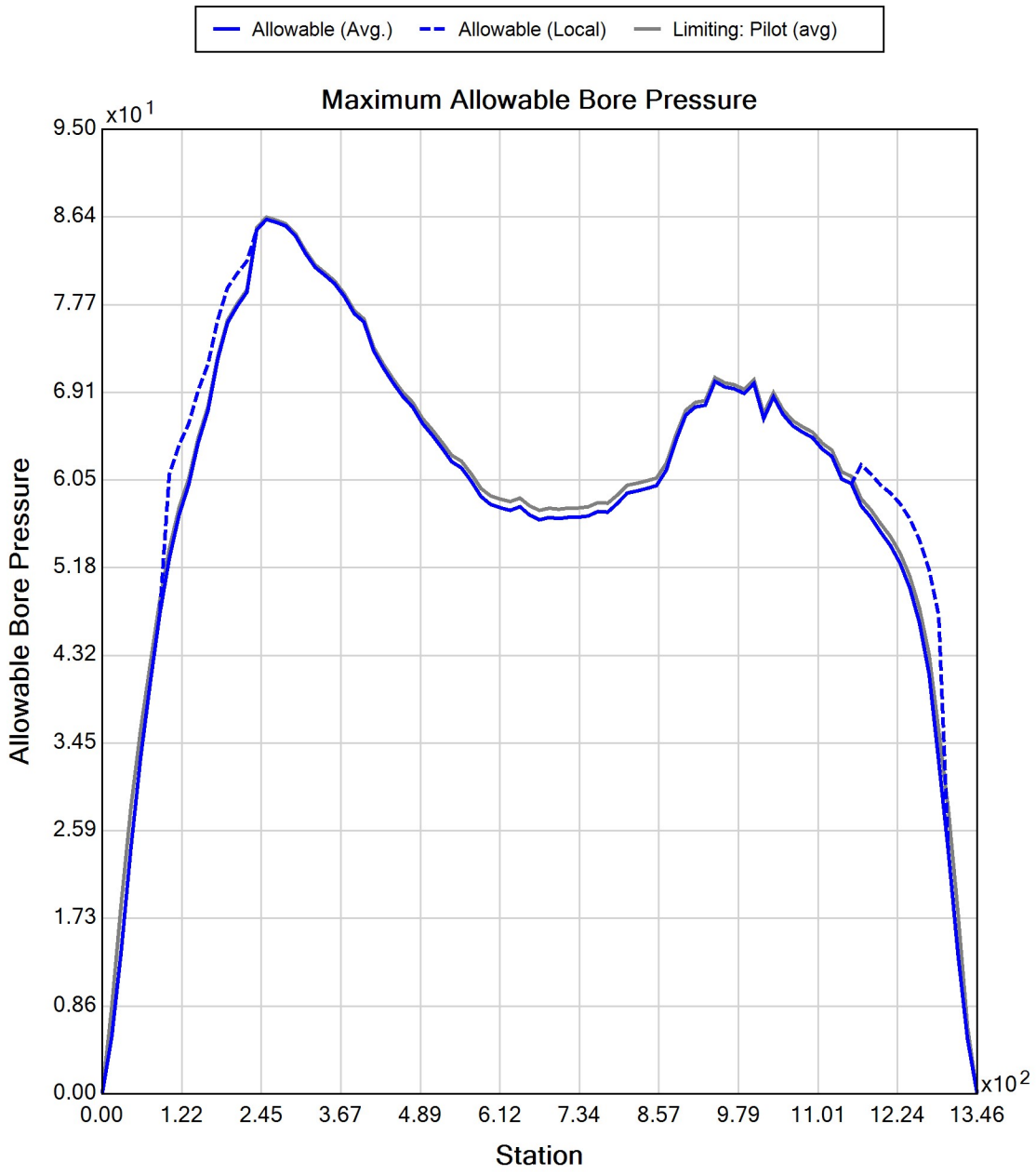


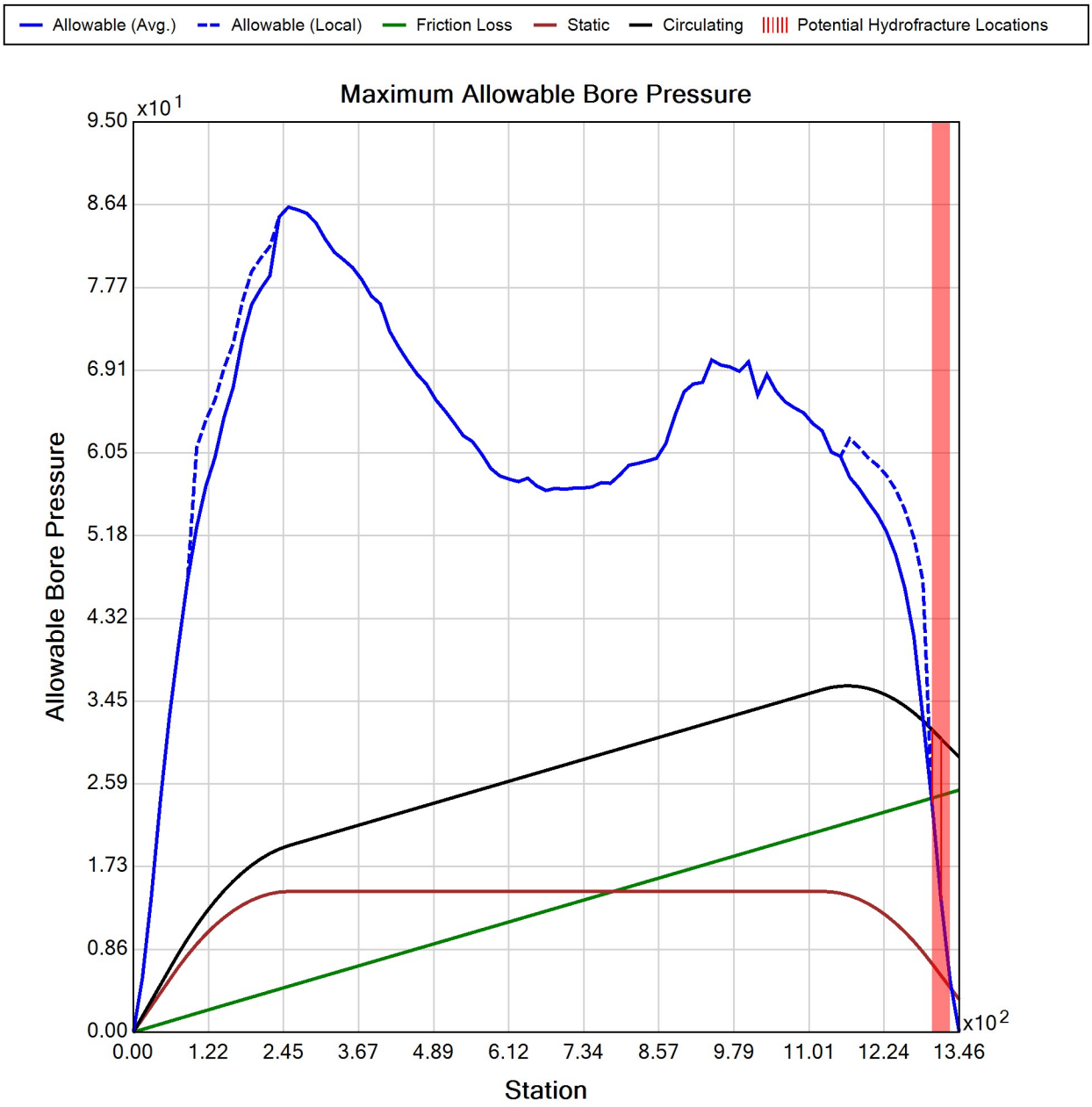












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Input Summary

Start Coordinate	(0.00, 0.00, 339.39) ft
End Coordinate	(1350.00, 0.00, 332.00) ft
Project Length	1350.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1350.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.5	18.3
Water Pressure	12.7	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.2	30.9
Deflection		
Earth Load Deflection	0.418	4.975
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.448	5.004
Compressive Stress [psi]		
Compressive Wall Stress	63.8	139.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1153.8	1153.8
Pullback Stress [psi]	659.3	659.3
Pullback Strain	1.147E-2	1.147E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	659.3	661.7
Tensile Strain	1.147E-2	1.161E-2

Net External Pressure = 17.4 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.448	7.5	16.8	OK
Unconstrained Collapse [psi]	20.0	132.7	6.6	OK
Compressive Wall Stress [psi]	63.8	1150.0	18.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	30.0	217.9	7.3	OK
Tensile Stress [psi]	661.7	1200.0	1.8	OK

Generated Output

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Project Summary

General:	CHPE HDD 40 Conduit 2
	P3
	Start Date: 12-10-2021
	End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	AB
	CHA
Description:	HDD 40 Conduit 2 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 339.39) ft
End Coordinate	(1300.00, 0.00, 335.40) ft
Project Length	1300.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

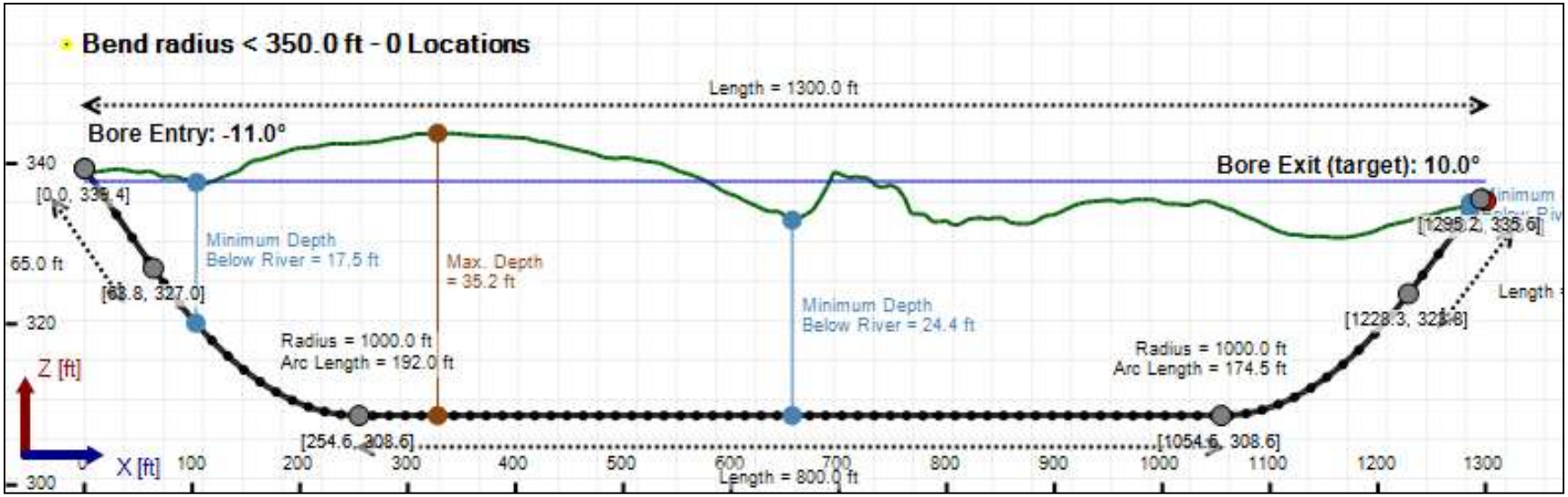
Soil Summary

Number of Layers: 2

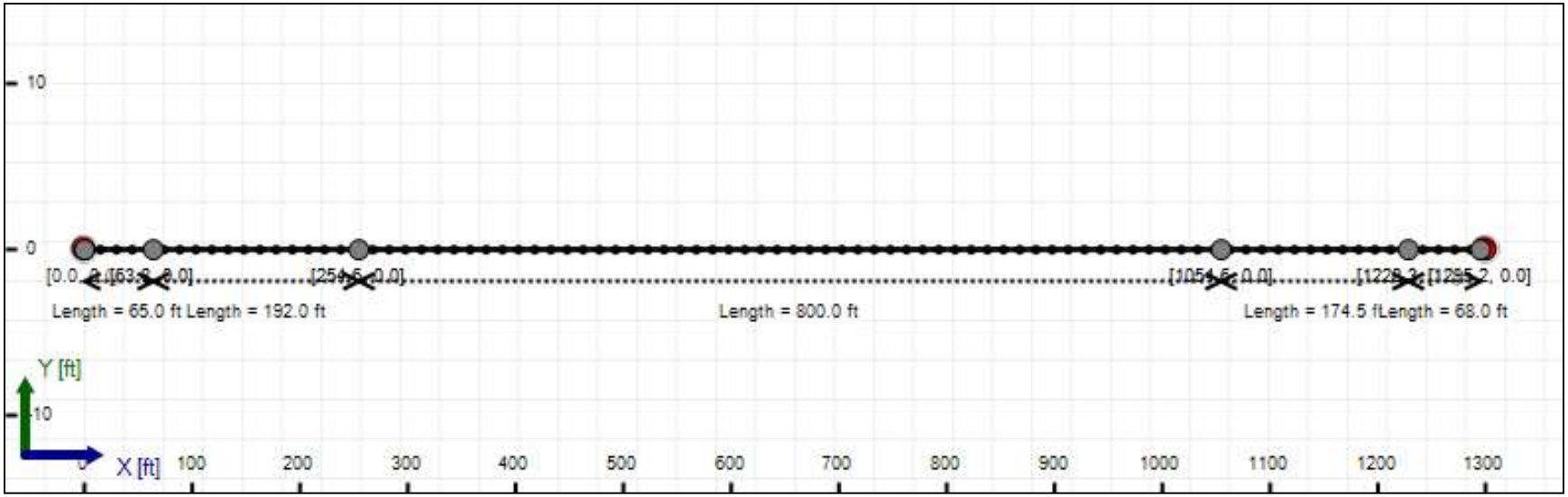
Soil Layer #1 USCS, Sand (S), SP
Depth: 17.30 ft
Unit Weight: 109.5552 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Silt (M), ML
Depth: 13.00 ft
Unit Weight: 80.0000 (dry), 100.0000 (sat) [lb/ft3]
Phi: 28.00, 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: 10" (10.75")
Pipe DR: 9
Pipe Length: 1305.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	3.8	17.2
Water Pressure	12.7	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	16.4	29.9
Deflection		
Earth Load Deflection	1.026	4.694
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.158	4.826
Compressive Stress [psi]		
Compressive Wall Stress	73.9	134.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	20963.1	20963.1
Pullback Stress [psi]	584.6	584.6
Pullback Strain	1.017E-2	1.017E-2
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	584.6	607.3
Tensile Strain	1.017E-2	1.101E-2

Net External Pressure = 17.4 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.158	7.5	6.5	OK
Unconstrained Collapse [psi]	20.0	124.5	6.2	OK
Compressive Wall Stress [psi]	73.9	1150.0	15.6	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	30.0	220.7	7.4	OK
Tensile Stress [psi]	607.3	1200.0	2.0	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	83.631 psi	83.631 psi
1	8.00 in	12.00 in	83.535 psi	83.535 psi
2	12.00 in	16.13 in	83.397 psi	83.397 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

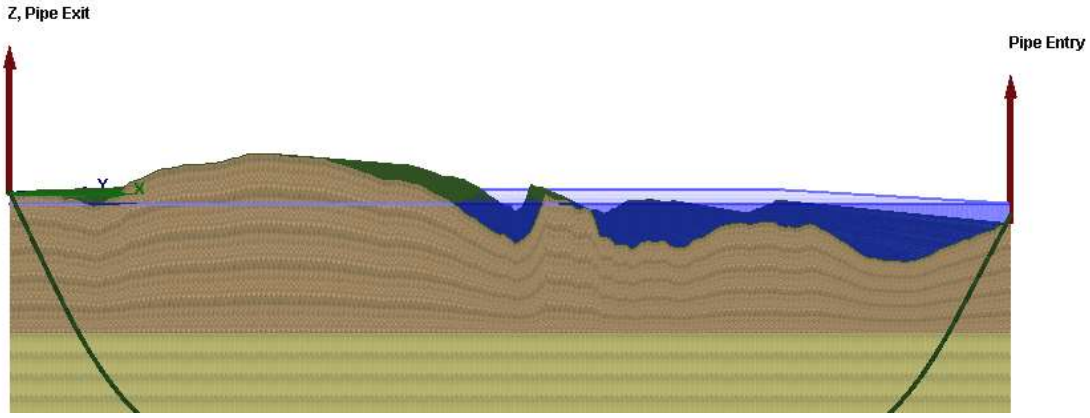
Rheological model: Bingham-Plastic

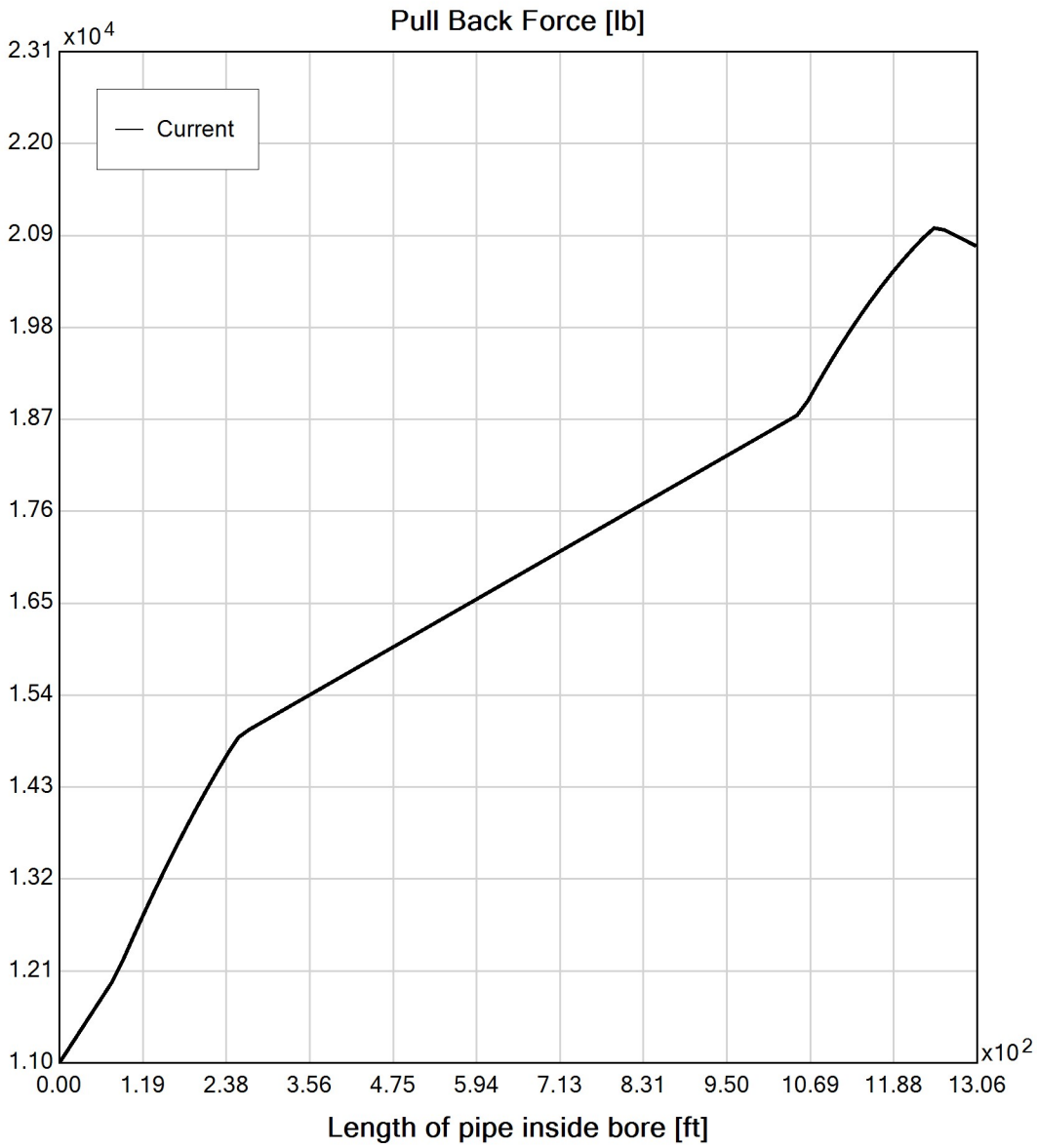
Plastic Viscosity (PV): 25.53

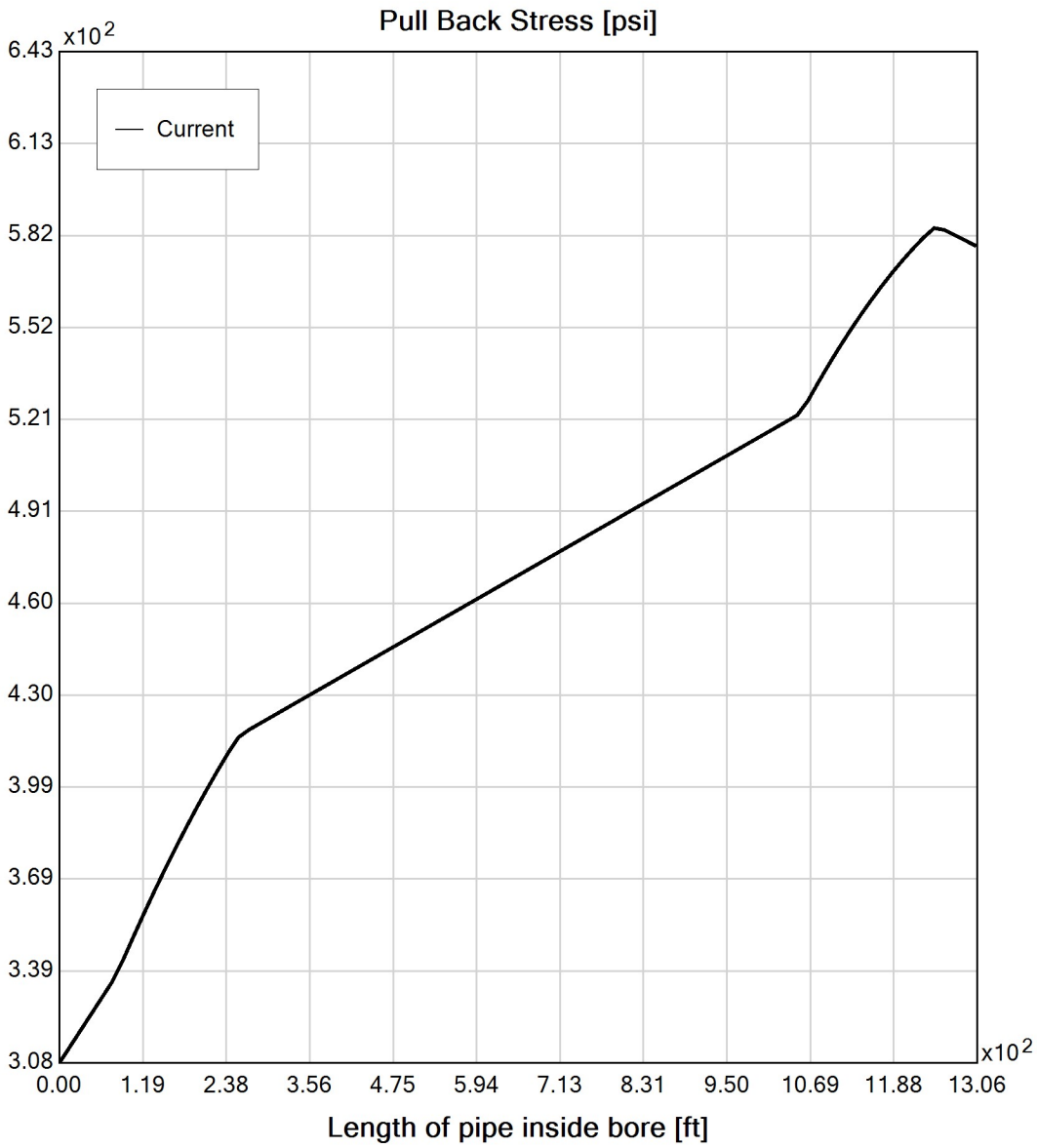
Yield Point (YP): 16.49

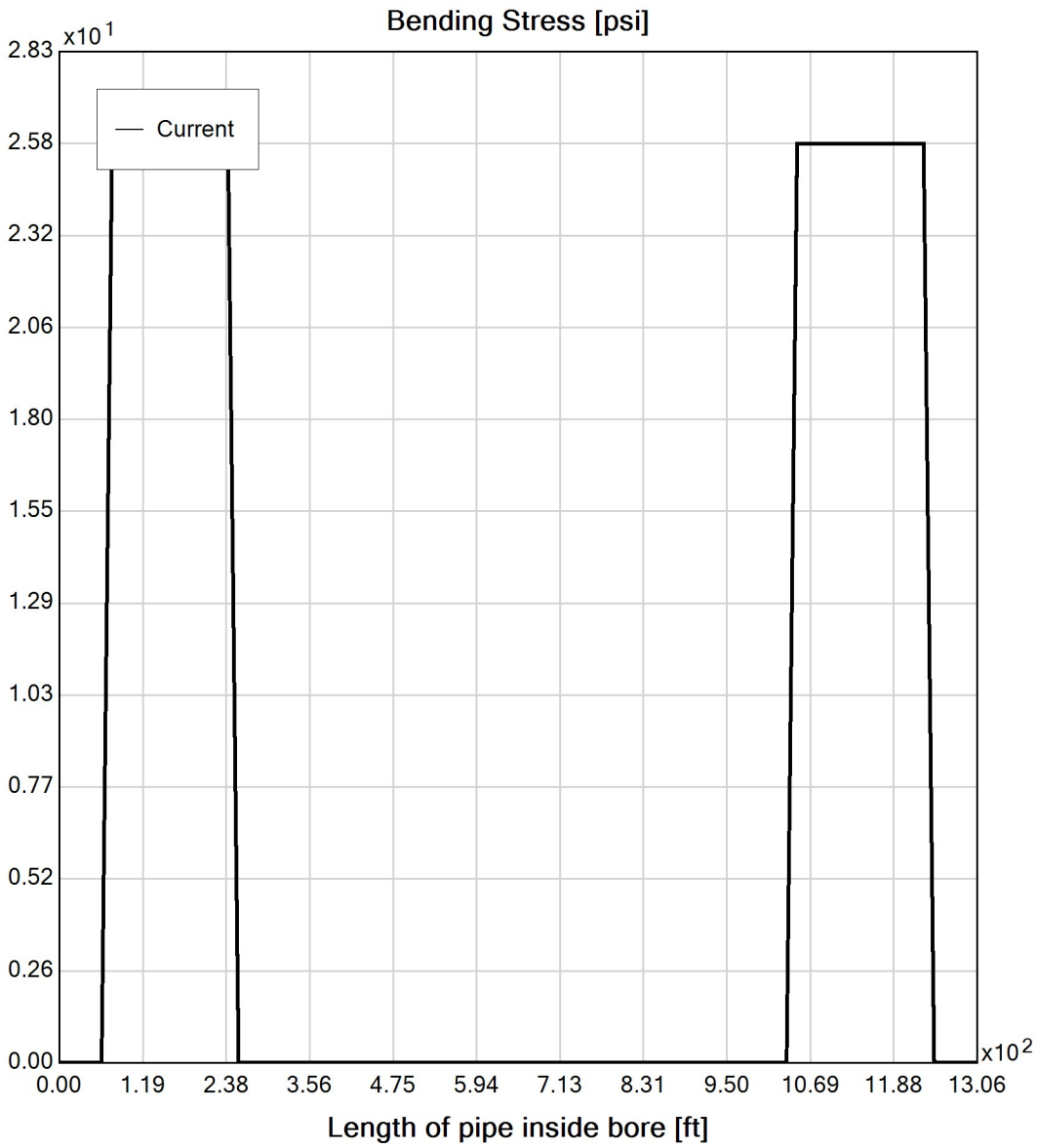
Effective Viscosity (cP): 1202.0

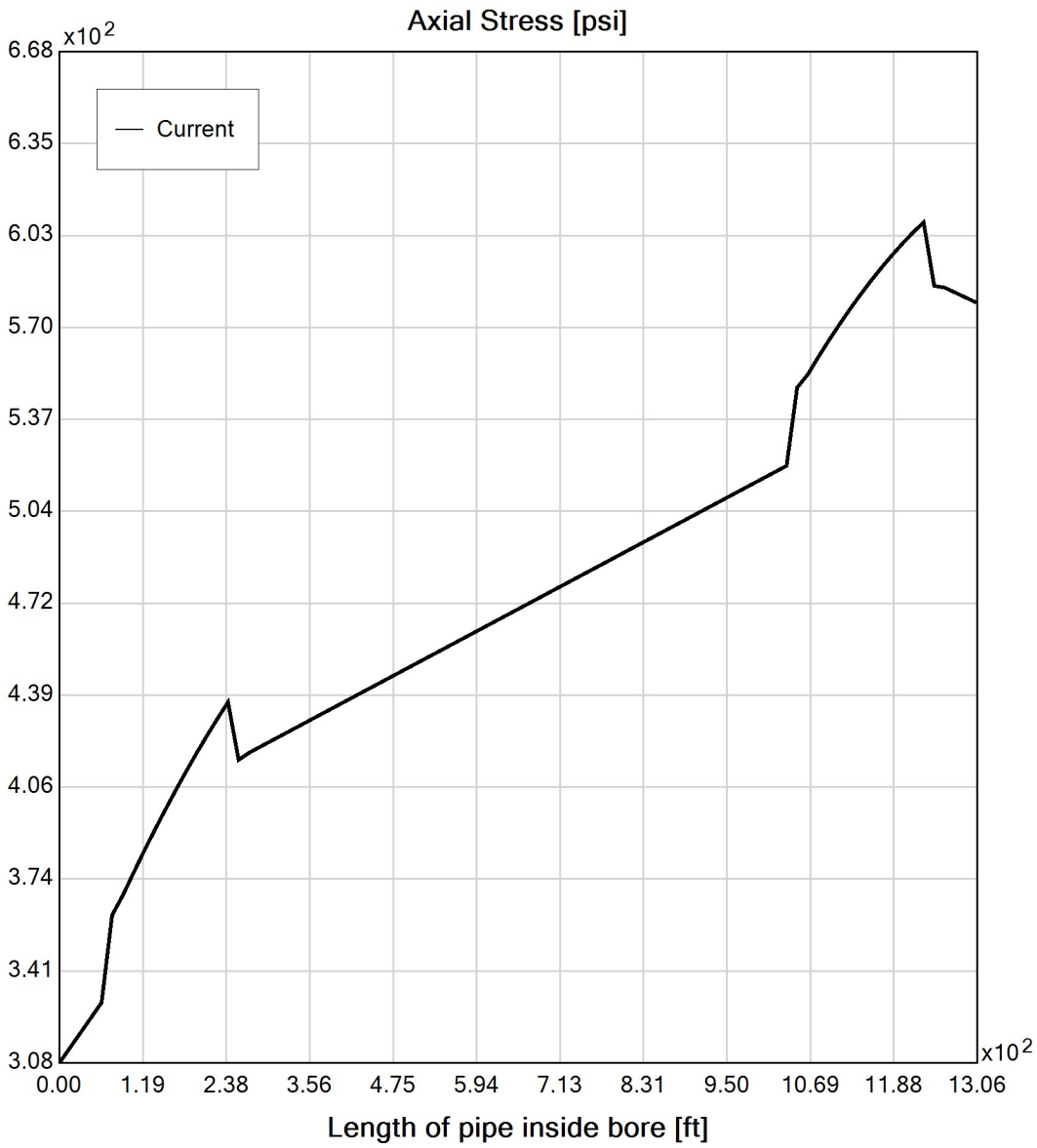
Virtual Site

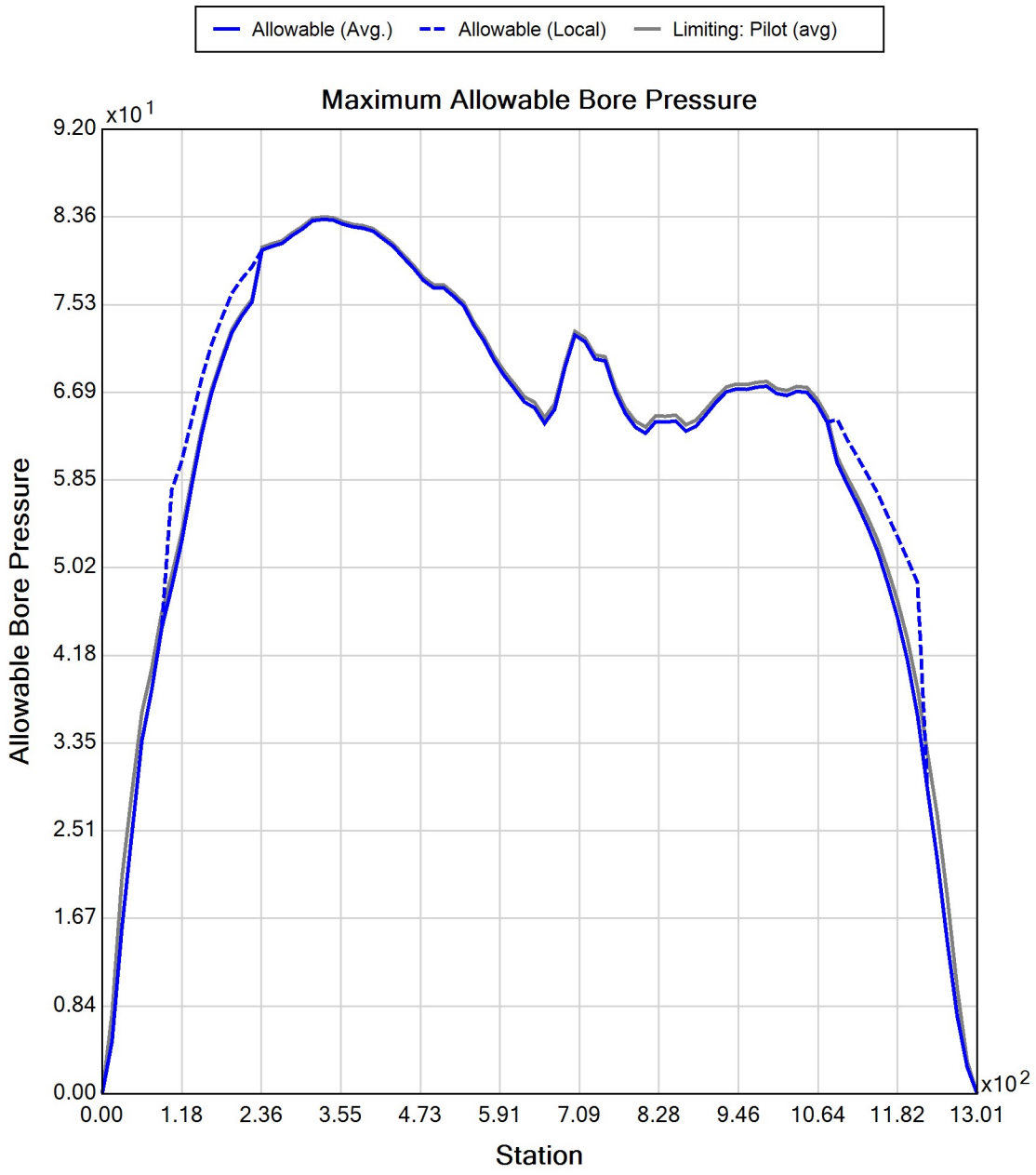


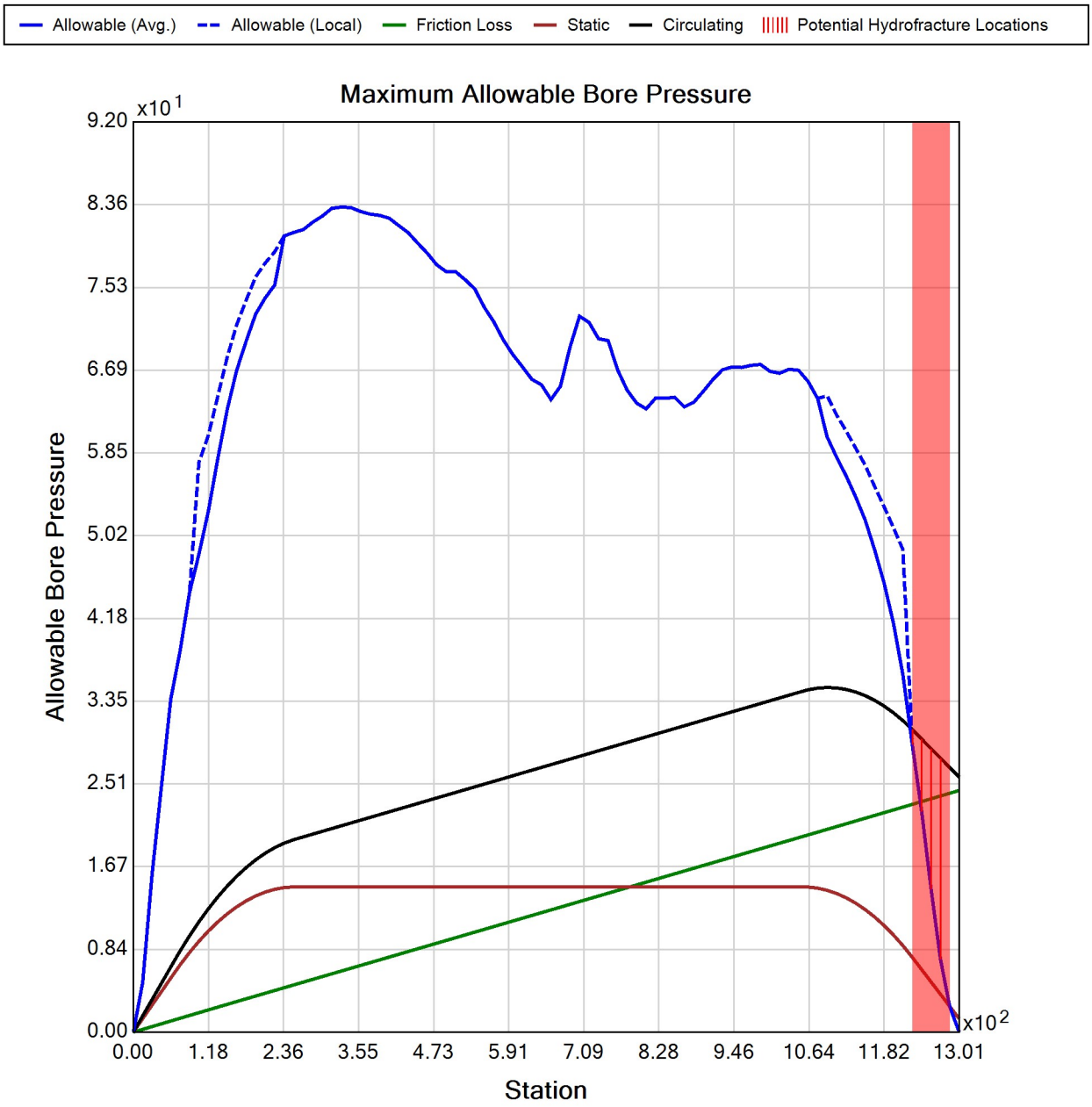












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Input Summary

Start Coordinate	(0.00, 0.00, 339.39) ft
End Coordinate	(1300.00, 0.00, 335.40) ft
Project Length	1300.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 1305.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.5	17.2
Water Pressure	12.7	12.7
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.2	29.9
Deflection		
Earth Load Deflection	0.410	4.694
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.439	4.723
Compressive Stress [psi]		
Compressive Wall Stress	63.7	134.5

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	1132.8	1132.8
Pullback Stress [psi]	647.2	647.2
Pullback Strain	1.126E-2	1.126E-2
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	647.2	649.8
Tensile Strain	1.126E-2	1.140E-2

Net External Pressure = 17.4 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.439	7.5	17.1	OK
Unconstrained Collapse [psi]	20.0	132.8	6.6	OK
Compressive Wall Stress [psi]	63.7	1150.0	18.1	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	30.0	218.7	7.3	OK
Tensile Stress [psi]	649.8	1200.0	1.8	OK

Generated Output

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Project Summary

General:	CHPE HDD 41 Conduit 1
	P3
	Start Date: 12-10-2021
	End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	AB
	CHA
Description:	HDD 41 10-inch DR 9 Conduit 1

Input Summary

Start Coordinate	(0.00, 0.00, 326.99) ft
End Coordinate	(709.00, 0.00, 322.00) ft
Project Length	709.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

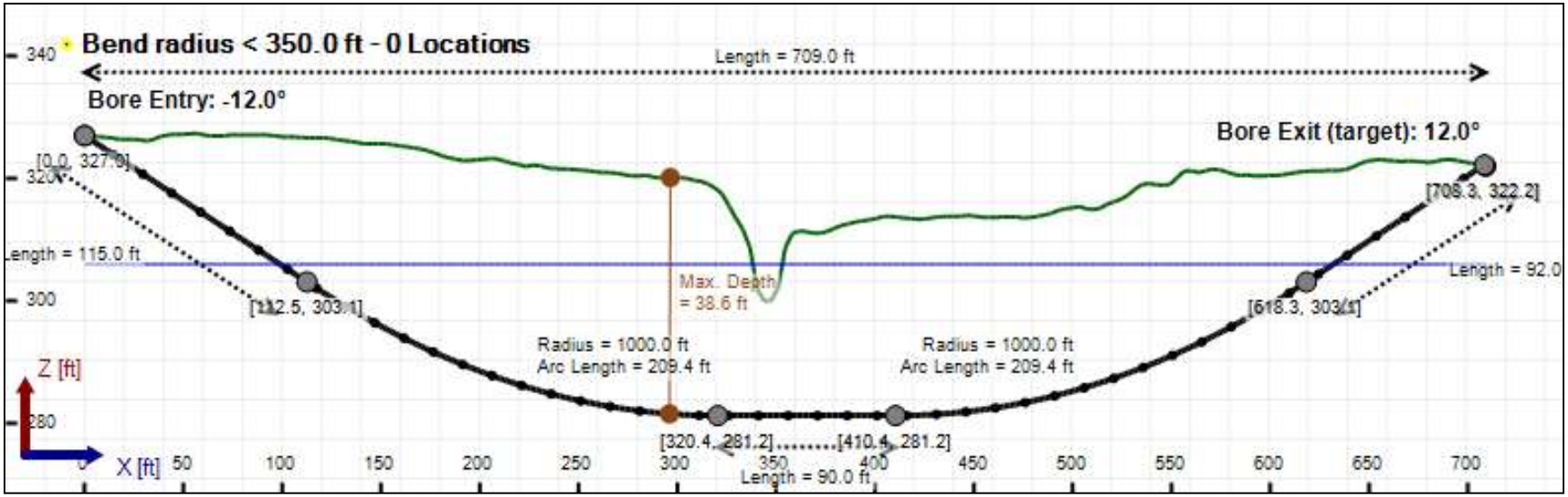
Soil Layer #1 USCS, Sand (S), SP
Depth: 8.50 ft
Unit Weight: 109.5552 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 7.40 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

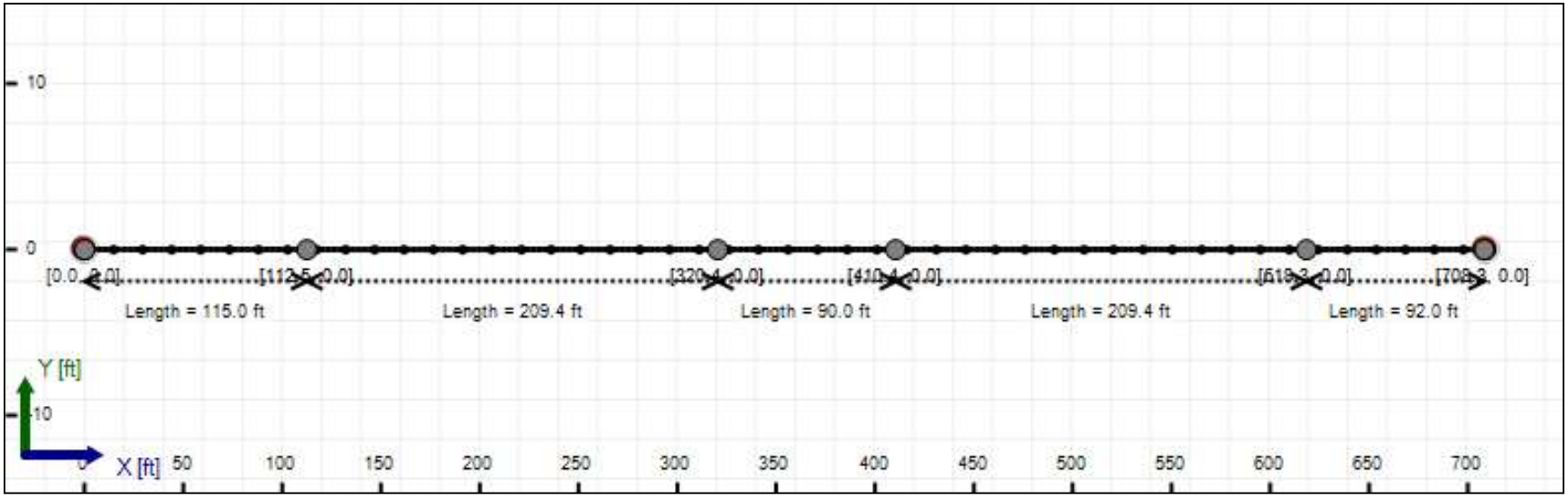
Soil Layer #3 USCS, Silt (M), ML
Depth: 5.10 ft
Unit Weight: 100.0000 (dry), 120.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 145.00, Coh: 8.33 [psi]

Soil Layer #4 USCS, Sand (S), SM
Depth: 28.50 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.0	21.1
Water Pressure	10.7	10.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.8	31.7
Deflection		
Earth Load Deflection	1.411	5.767
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.543	5.899
Compressive Stress [psi]		
Compressive Wall Stress	66.4	142.7

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	12598.2	12598.2
Pullback Stress [psi]	351.3	351.3
Pullback Strain	6.110E-3	6.110E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	351.3	376.9
Tensile Strain	6.110E-3	7.004E-3

Net External Pressure = 24.2 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.543	7.5	4.9	OK
Unconstrained Collapse [psi]	29.7	123.7	4.2	OK
Compressive Wall Stress [psi]	66.4	1150.0	17.3	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	39.7	234.8	5.9	OK
Tensile Stress [psi]	376.9	1200.0	3.2	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	87.332 psi	91.431 psi
1	8.00 in	12.00 in	87.263 psi	91.356 psi
2	12.00 in	16.13 in	87.162 psi	91.249 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

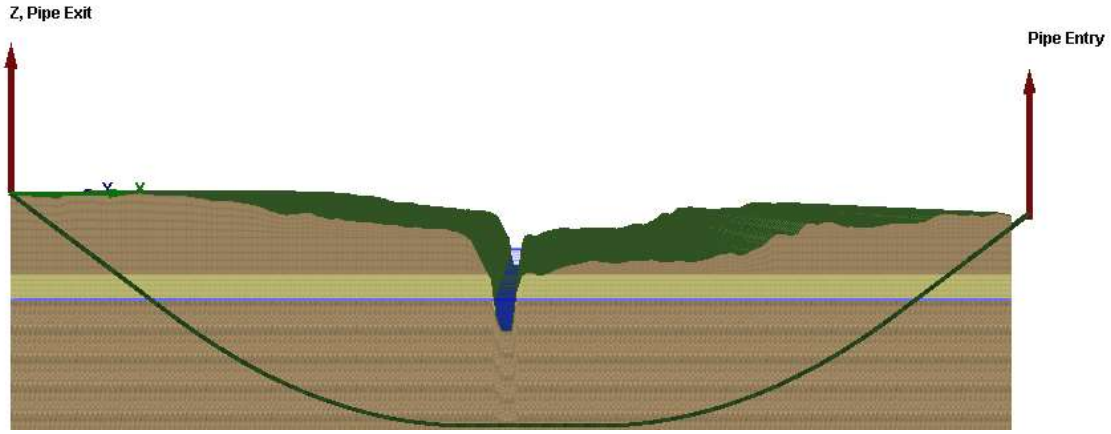
Rheological model: Power-Law

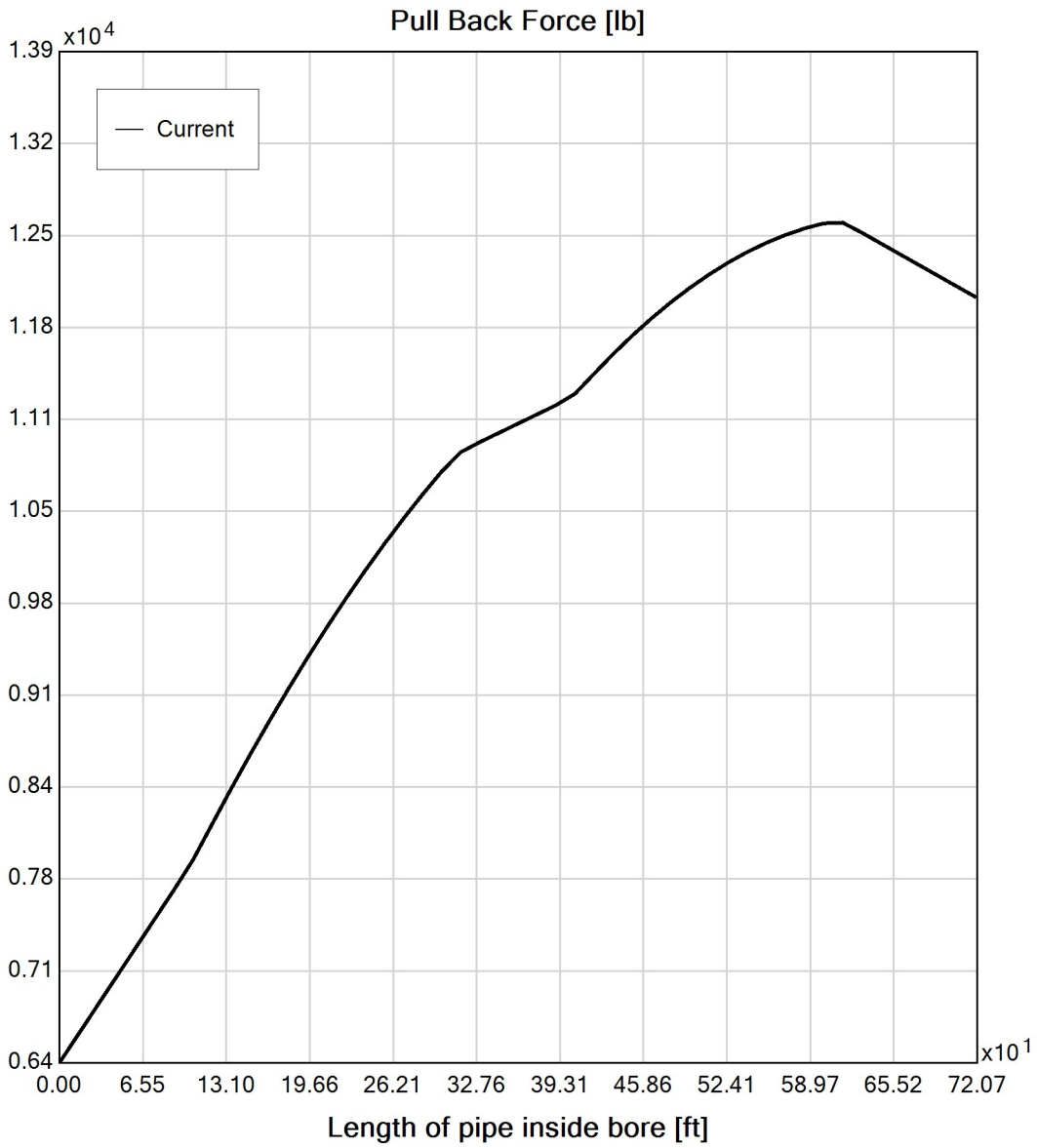
Fluid Consistency Index (K): 63.17

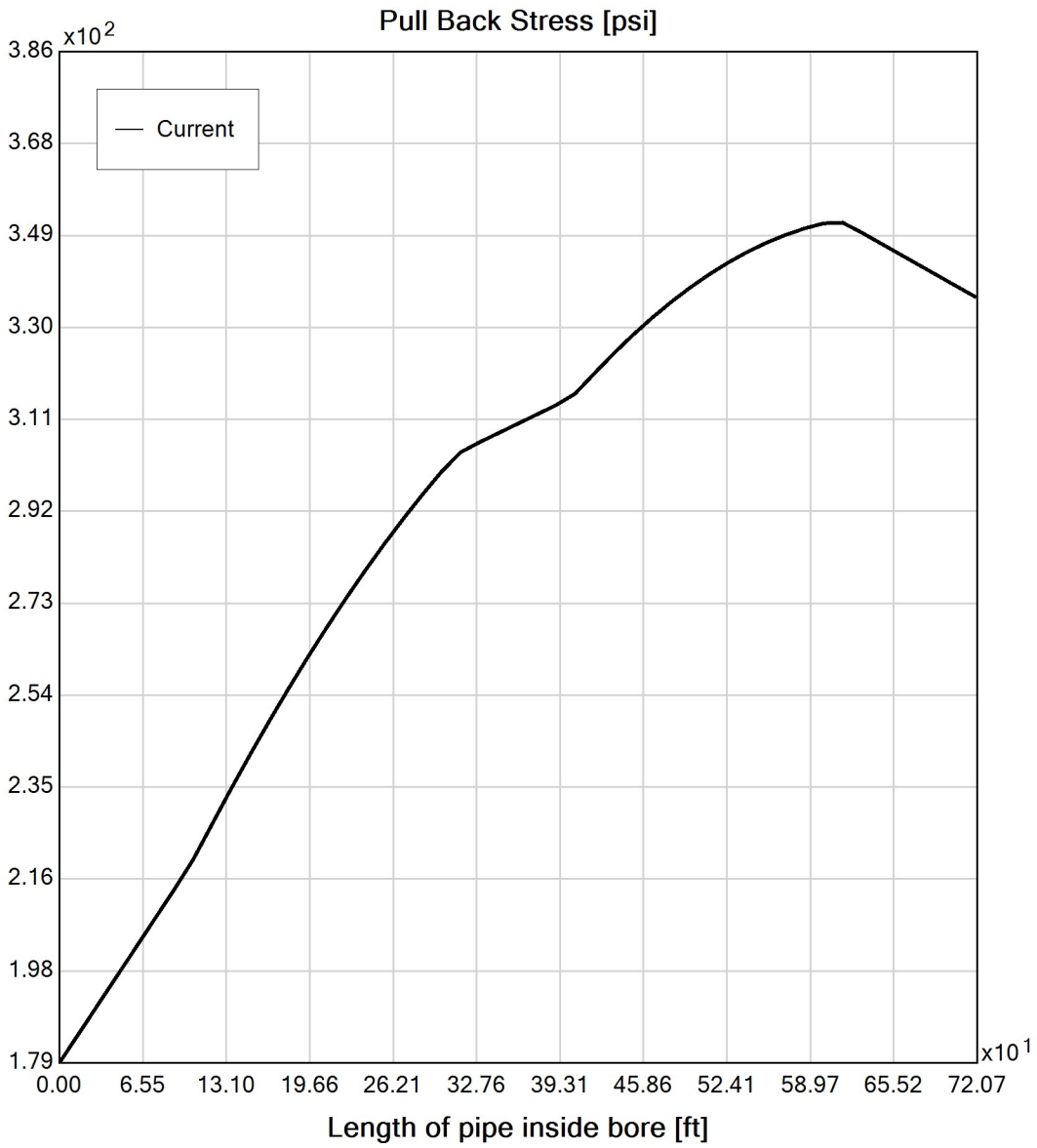
Power Law Exponent (n): 0.14

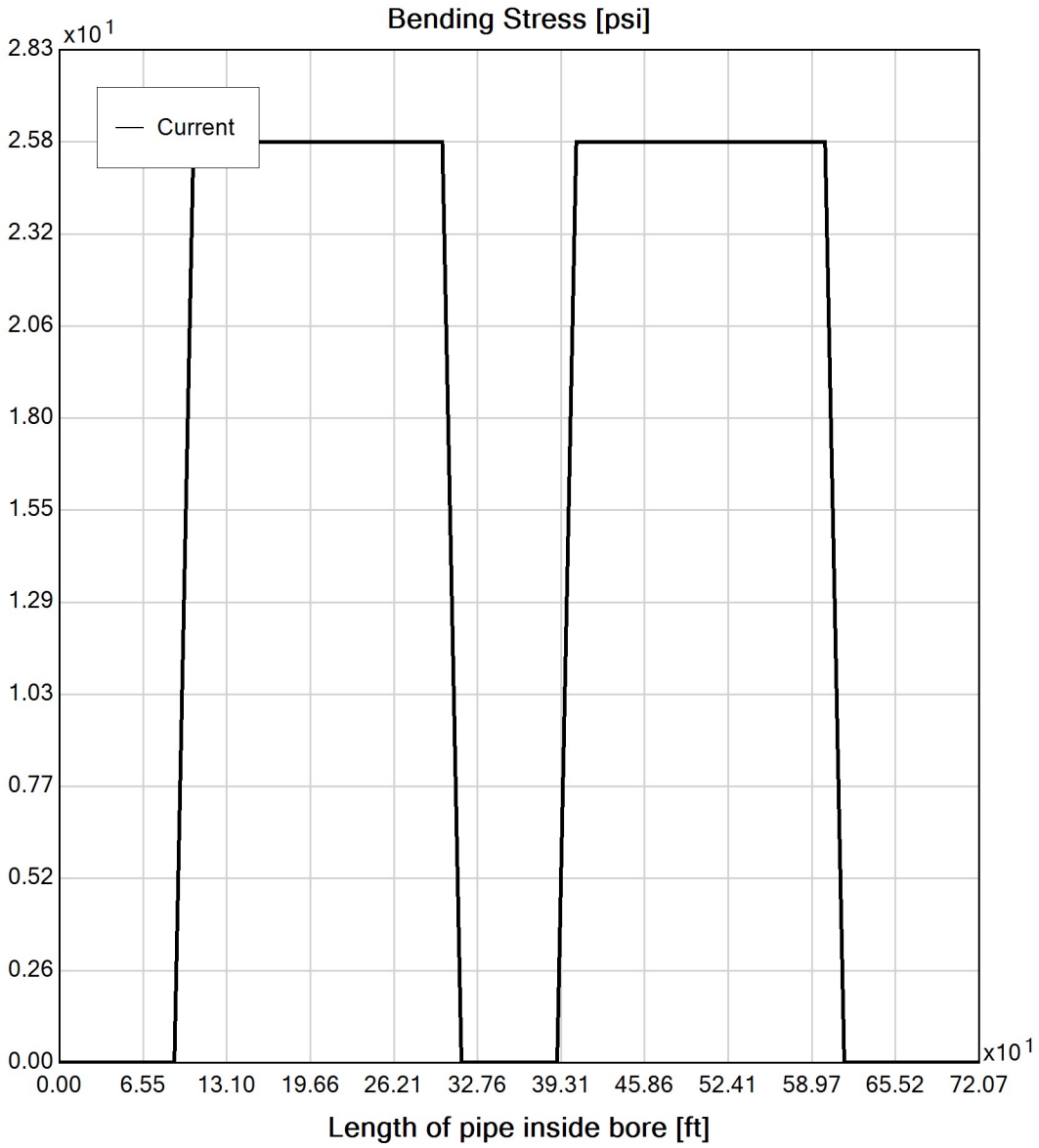
Effective Viscosity (cP): 859.3

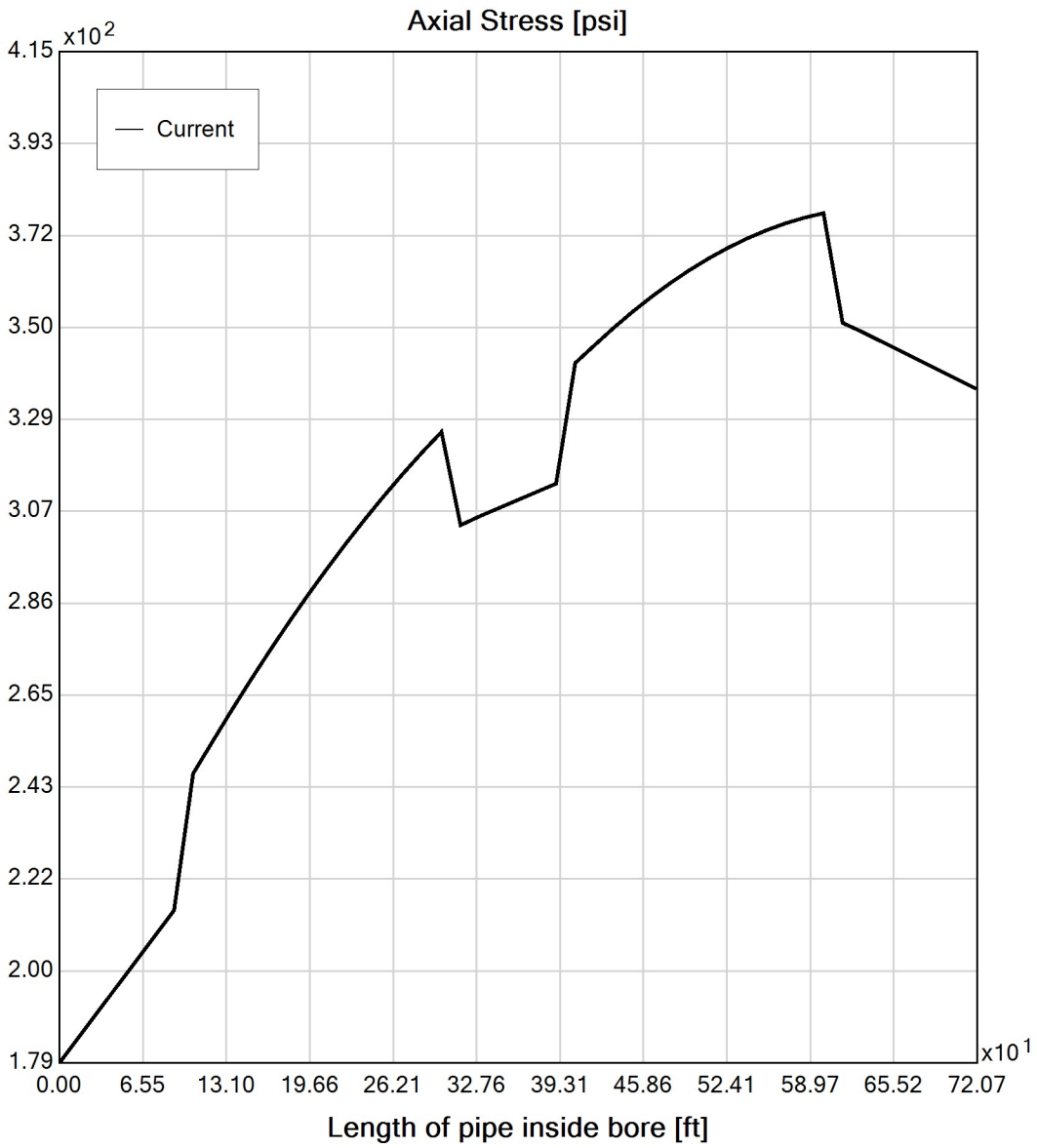
Virtual Site

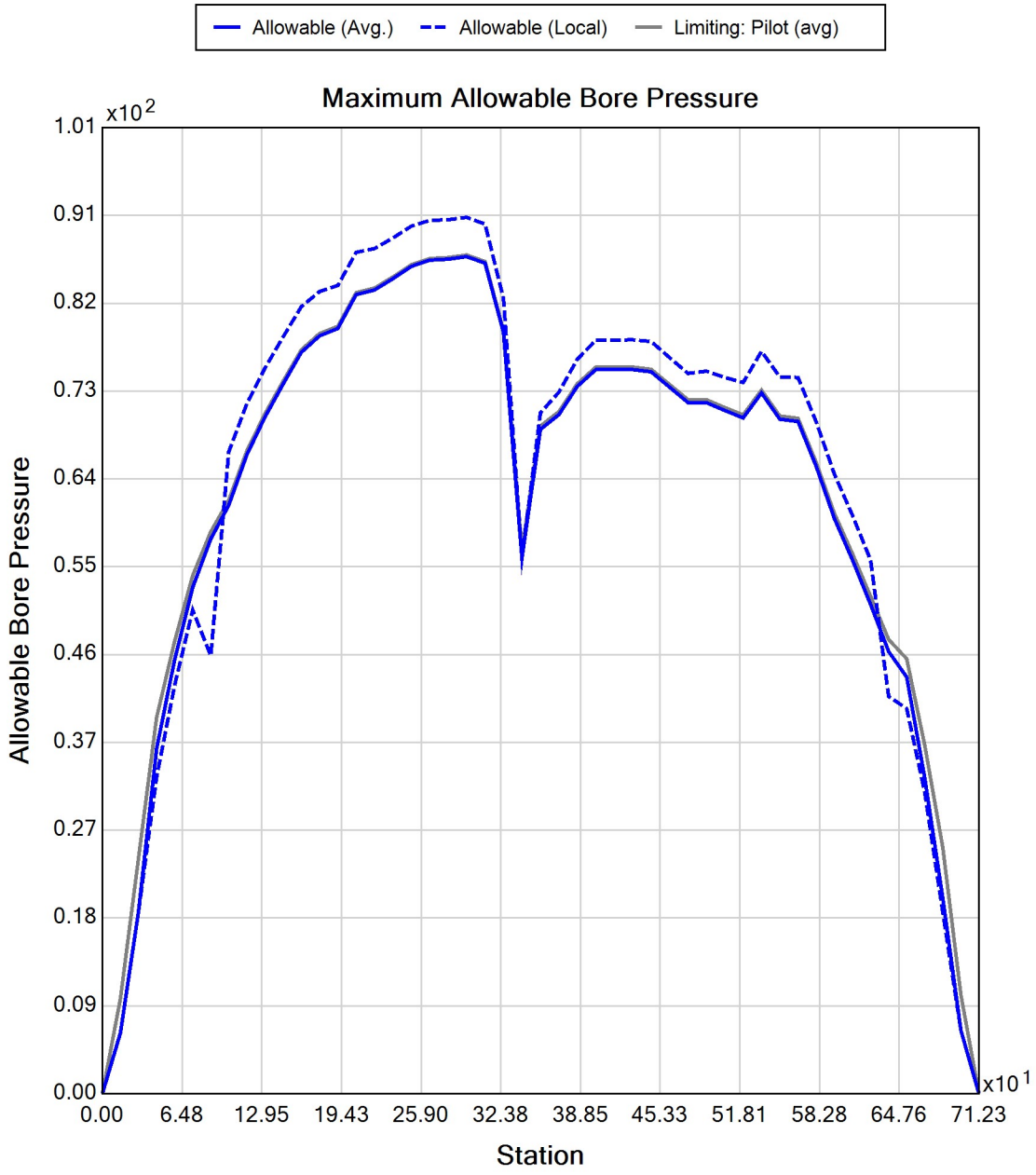


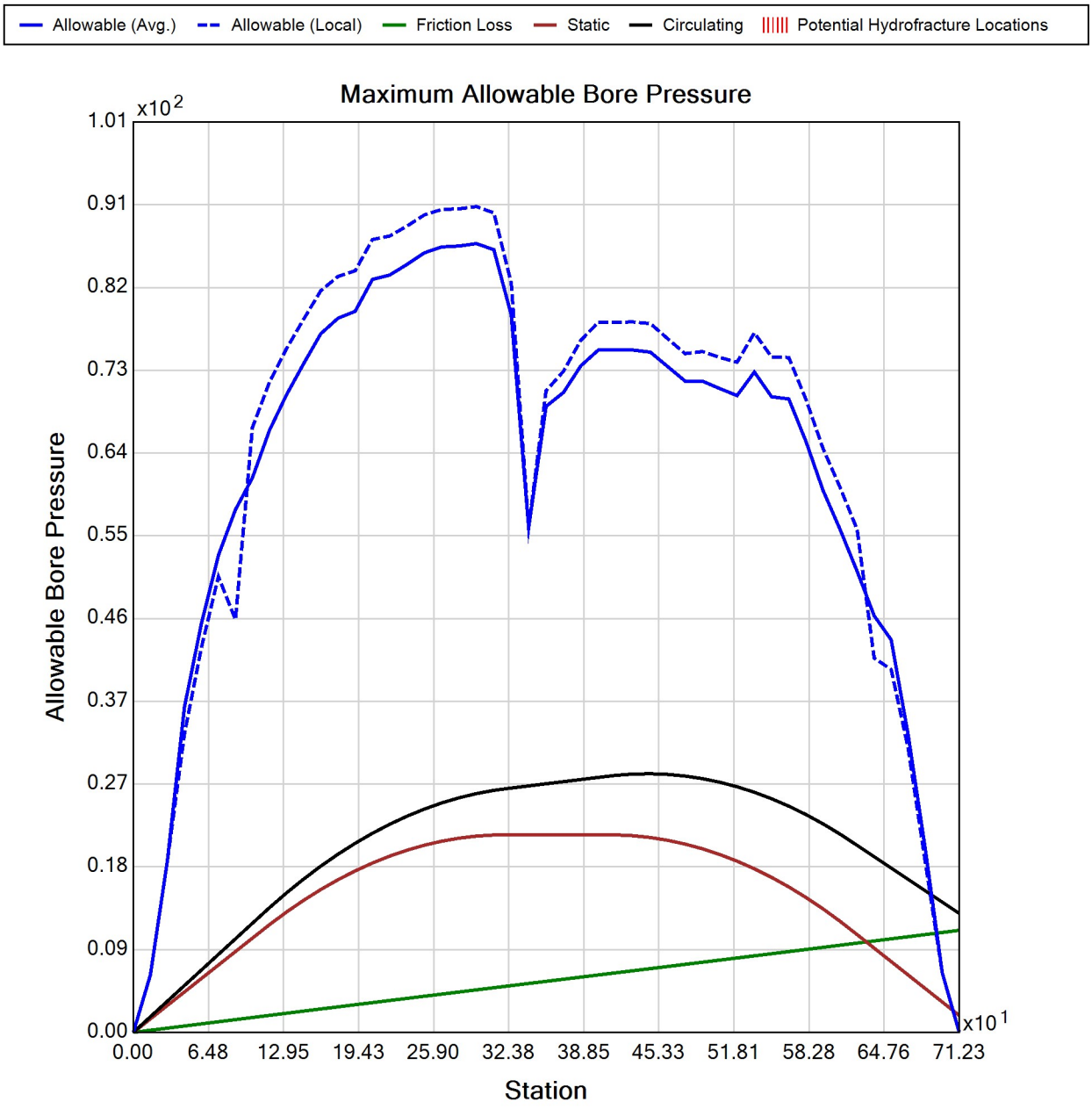












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Input Summary

Start Coordinate	(0.00, 0.00, 327.50) ft
End Coordinate	(709.00, 0.00, 323.00) ft
Project Length	709.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.7	19.7
Water Pressure	8.6	8.5
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	10.2	28.2
Deflection		
Earth Load Deflection	0.623	5.366
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.652	5.395
Compressive Stress [psi]		
Compressive Wall Stress	46.1	126.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	709.0	709.0
Pullback Stress [psi]	405.1	405.1
Pullback Strain	7.046E-3	7.046E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	405.1	410.5
Tensile Strain	7.046E-3	7.238E-3

Net External Pressure = 20.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.652	7.5	11.5	OK
Unconstrained Collapse [psi]	25.6	132.3	5.2	OK
Compressive Wall Stress [psi]	46.1	1150.0	24.9	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	35.5	233.7	6.6	OK
Tensile Stress [psi]	410.5	1200.0	2.9	OK

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Project Summary

General:	CHPE HDD 41 Conduit 2
	P3
	Start Date: 12-10-2021
	End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	AB
	CHA
Description:	HDD 41 10-inch DR 9 Conduit 2

Input Summary

Start Coordinate	(0.00, 0.00, 327.50) ft
End Coordinate	(709.00, 0.00, 323.00) ft
Project Length	709.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

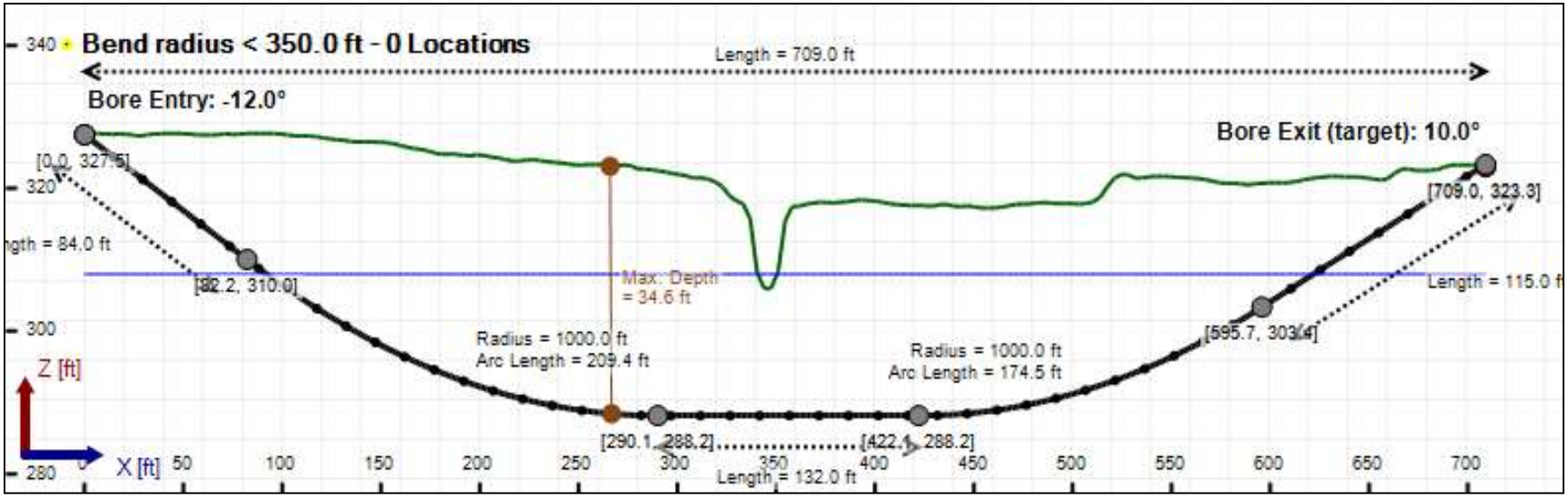
Soil Layer #1 USCS, Sand (S), SP
Depth: 8.50 ft
Unit Weight: 109.5552 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SM
Depth: 7.40 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

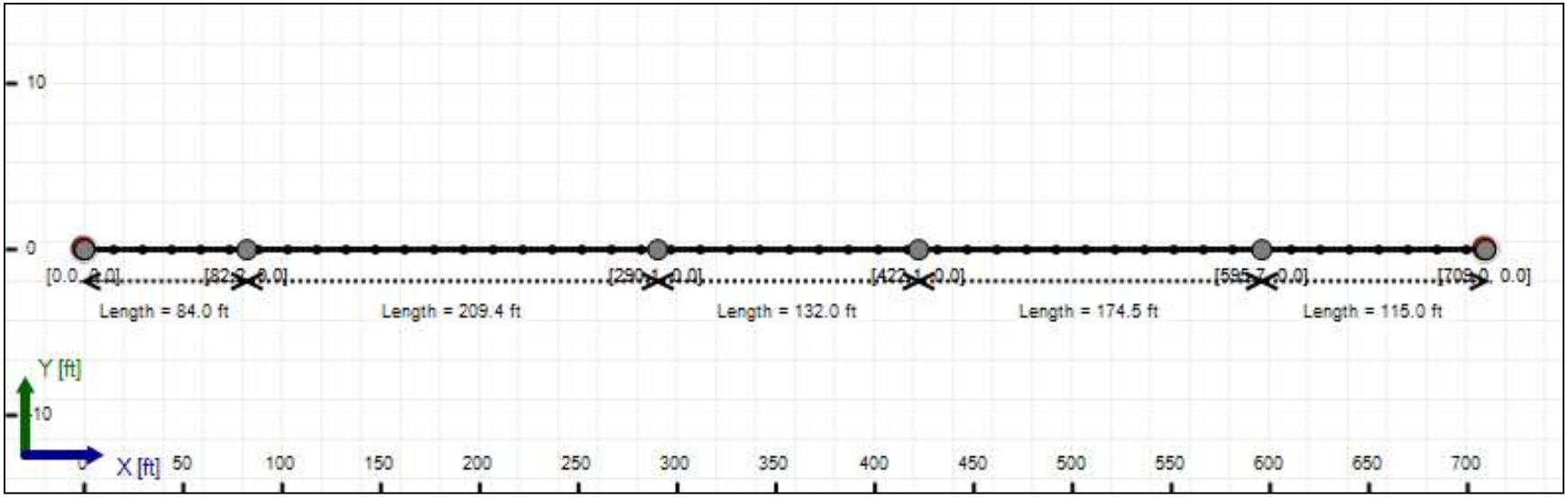
Soil Layer #3 USCS, Silt (M), ML
Depth: 5.10 ft
Unit Weight: 100.0000 (dry), 120.0000 (sat) [lb/ft3]
Phi: 0.00, S.M.: 145.00, Coh: 8.33 [psi]

Soil Layer #4 USCS, Sand (S), SM
Depth: 28.50 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.2	19.7
Water Pressure	8.6	8.5
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.8	28.2
Deflection		
Earth Load Deflection	1.405	5.366
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.538	5.498
Compressive Stress [psi]		
Compressive Wall Stress	57.4	126.8

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	12281.5	12281.5
Pullback Stress [psi]	342.5	342.5
Pullback Strain	5.957E-3	5.957E-3
Bending Stress [psi]	0.0	25.8
Bending Strain	0	4.479E-4
Tensile Stress [psi]	342.5	367.9
Tensile Strain	5.957E-3	6.847E-3

Net External Pressure = 20.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.538	7.5	4.9	OK
Unconstrained Collapse [psi]	25.6	123.3	4.8	OK
Compressive Wall Stress [psi]	57.4	1150.0	20.0	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	35.5	235.4	6.6	OK
Tensile Stress [psi]	367.9	1200.0	3.3	OK

Maximum Allowable Bore Pressure Summary

Ream Number	Initial Diameter	Final Diameter	Estimated Maximum Pressure (Avg.)	Estimated Maximum Pressure (Local)
Pilot Bore	0.00 in	8.00 in	81.482 psi	85.815 psi
1	8.00 in	12.00 in	81.394 psi	85.720 psi
2	12.00 in	16.13 in	81.268 psi	85.584 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

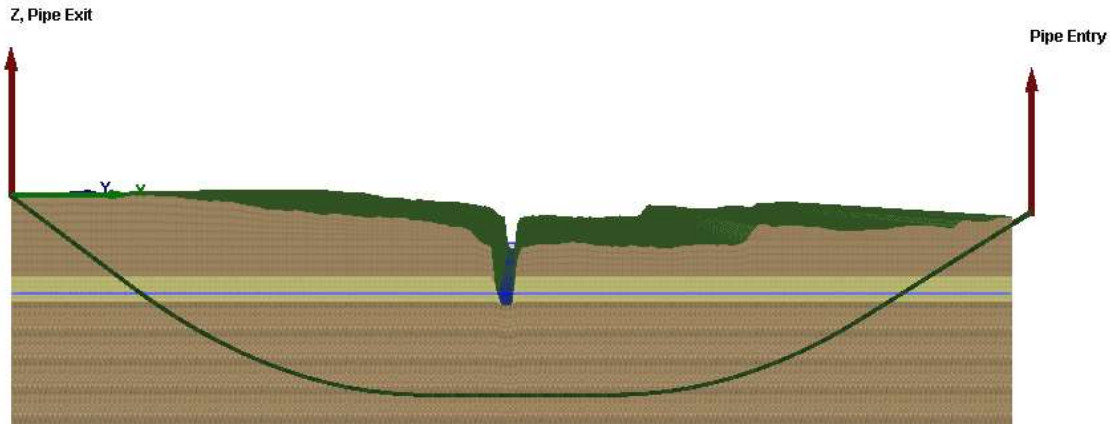
Rheological model: Bingham-Plastic

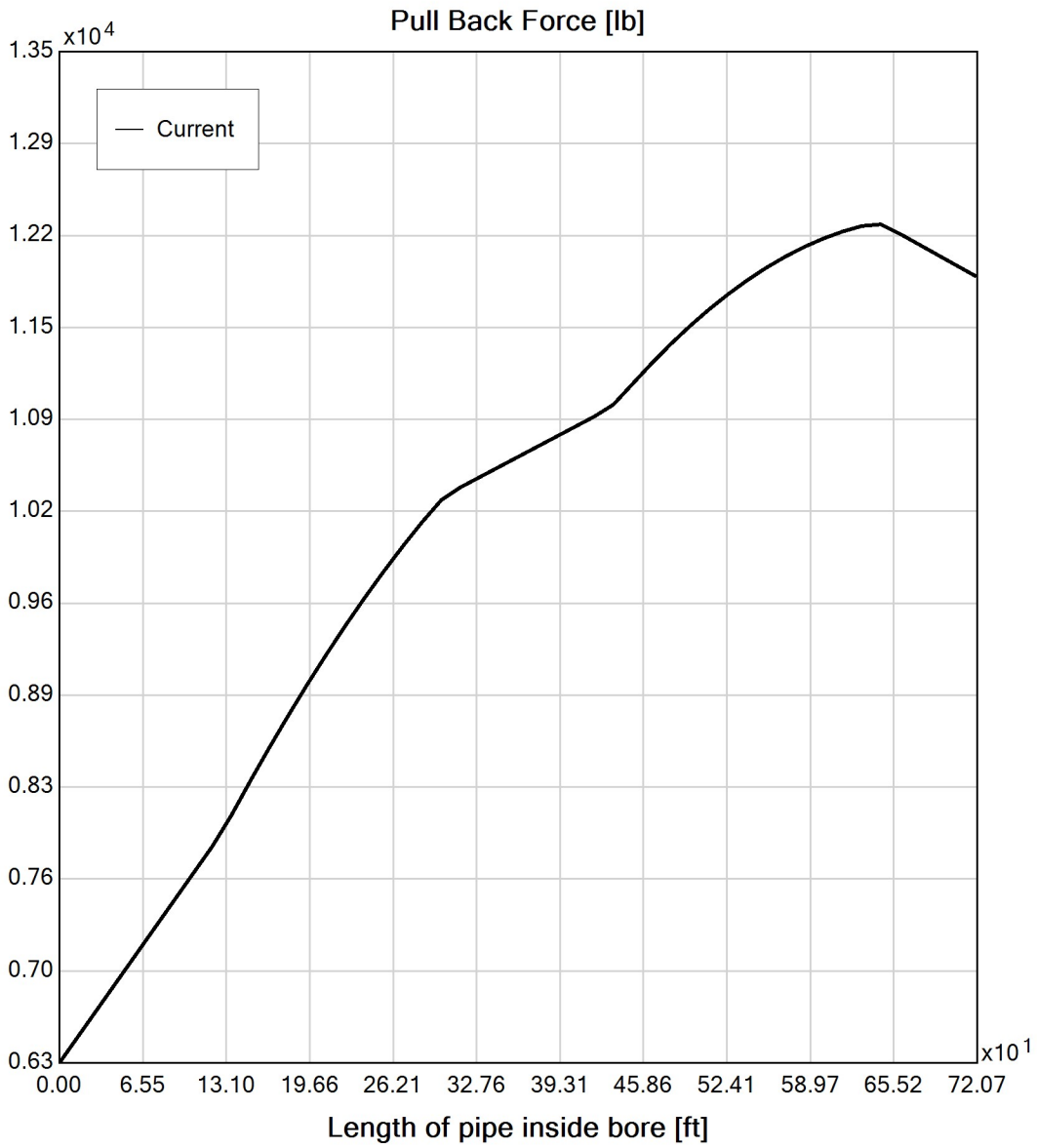
Plastic Viscosity (PV): 25.53

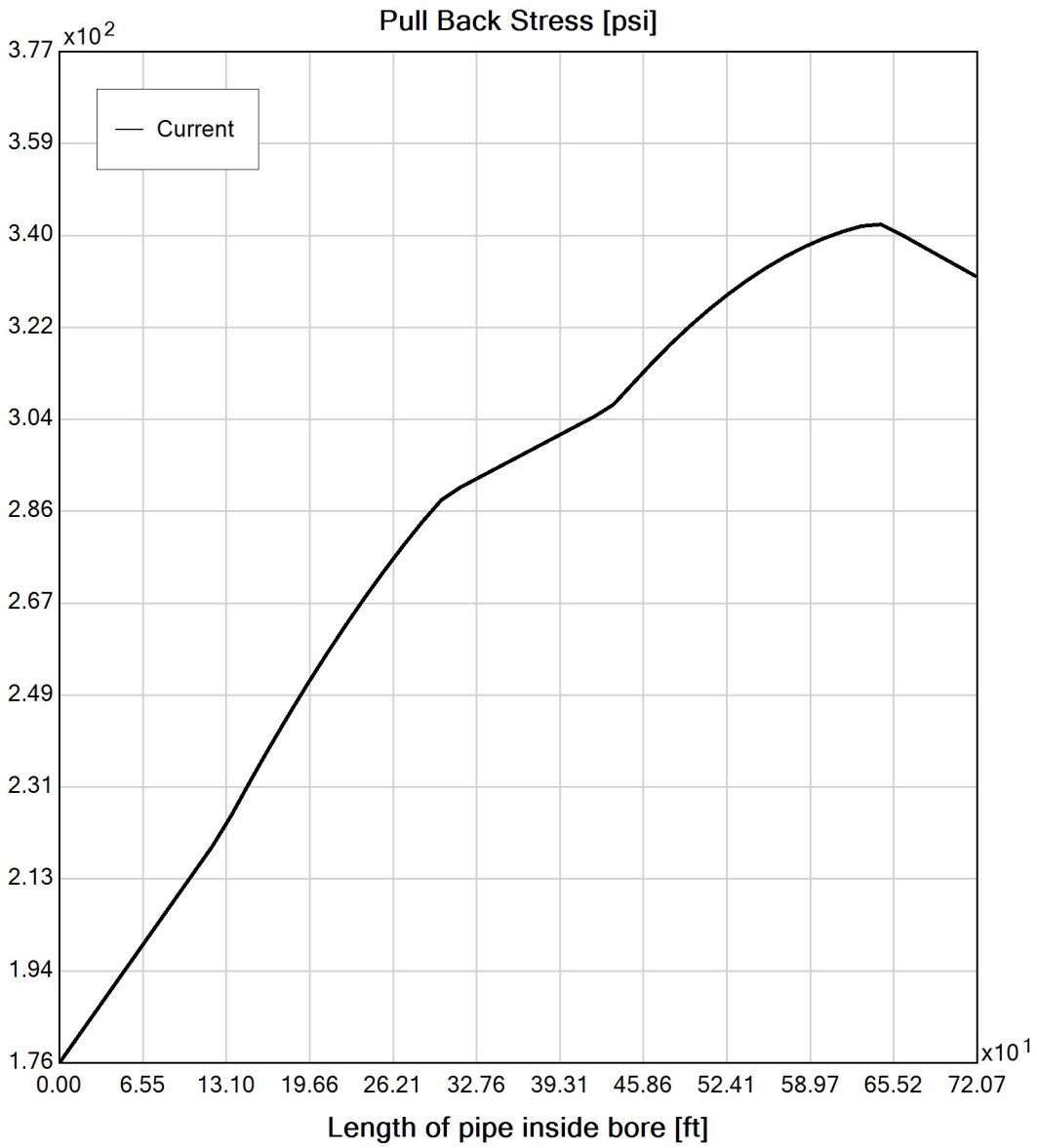
Yield Point (YP): 16.49

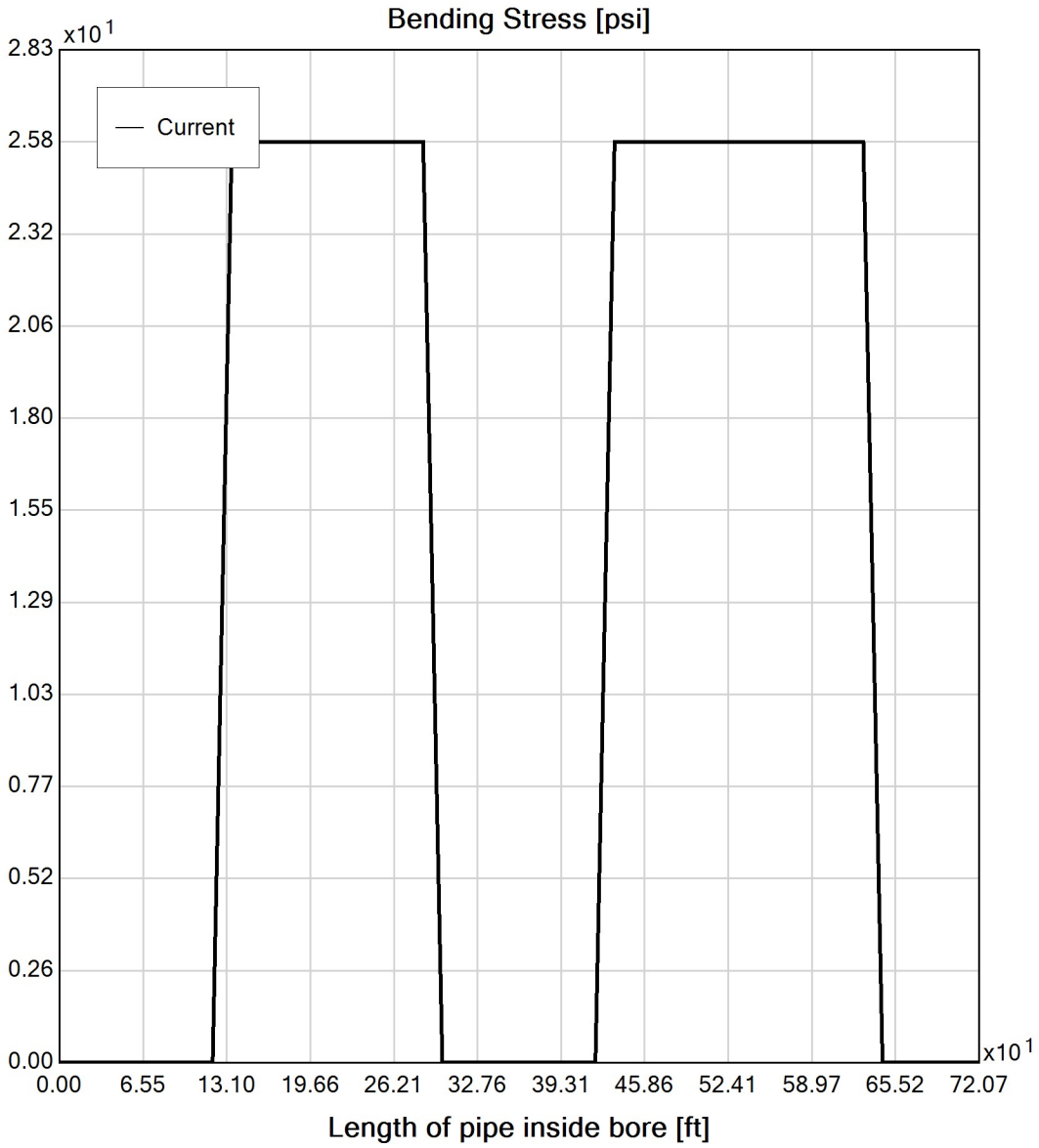
Effective Viscosity (cP): 1202.0

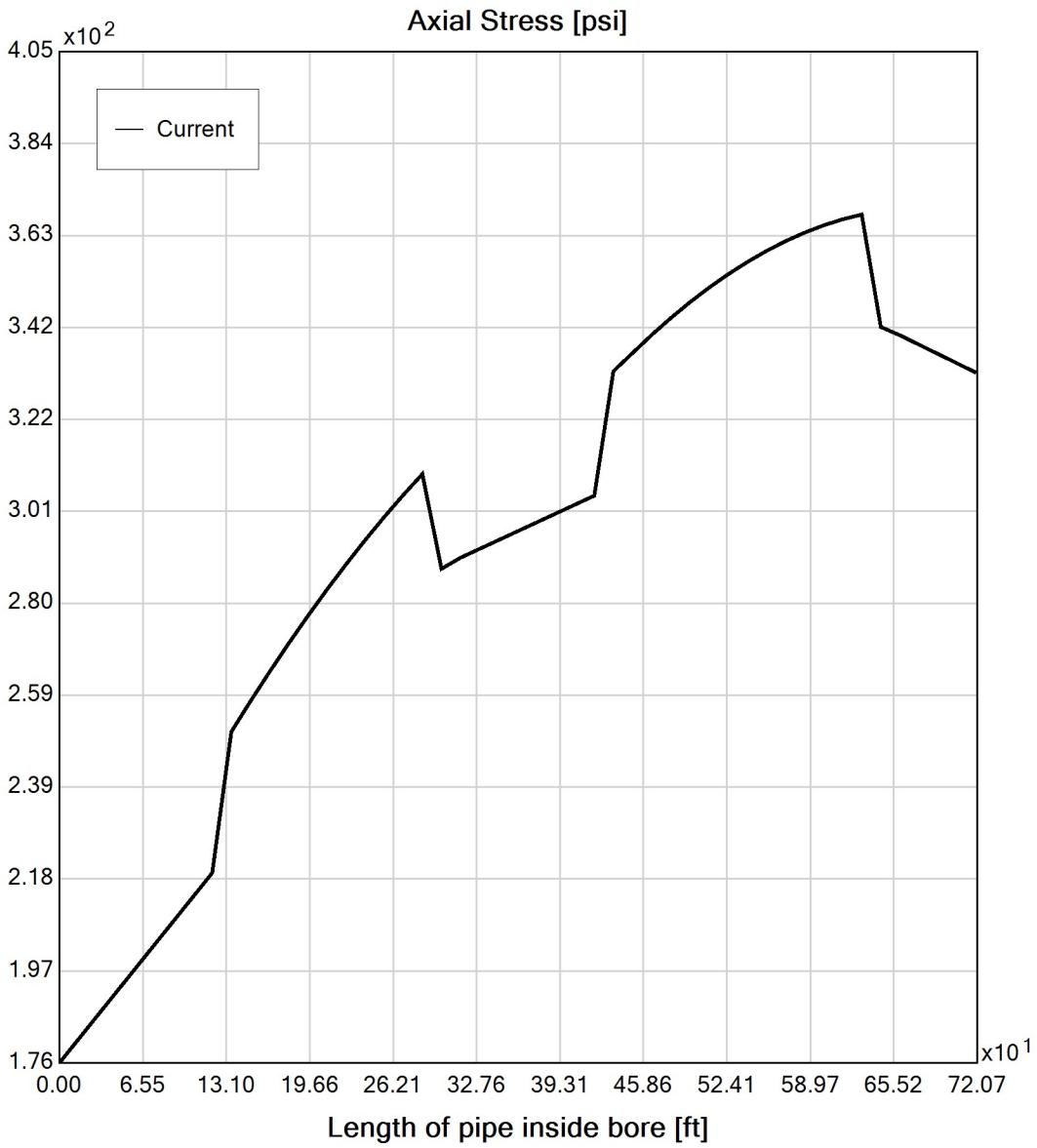
Virtual Site

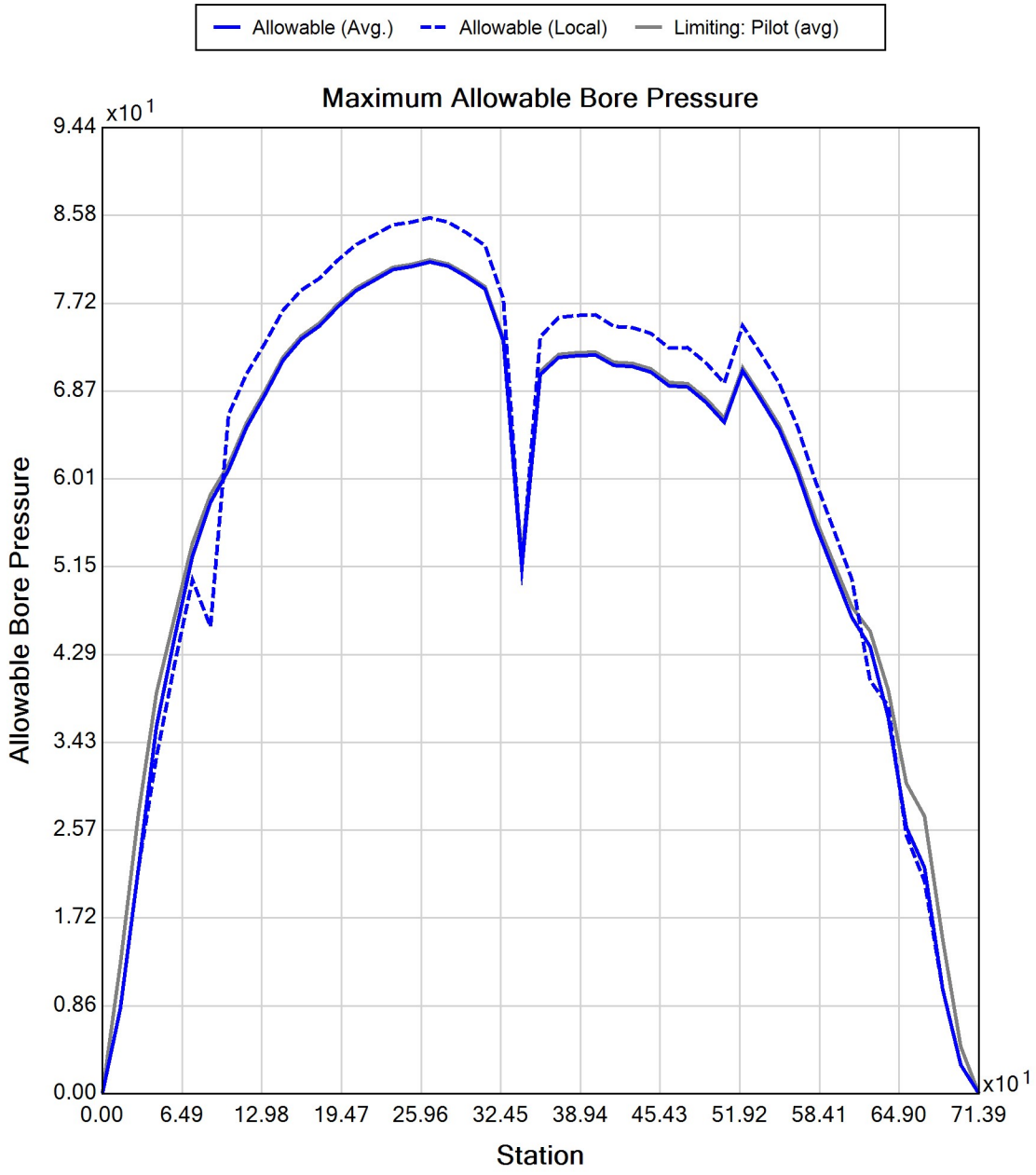


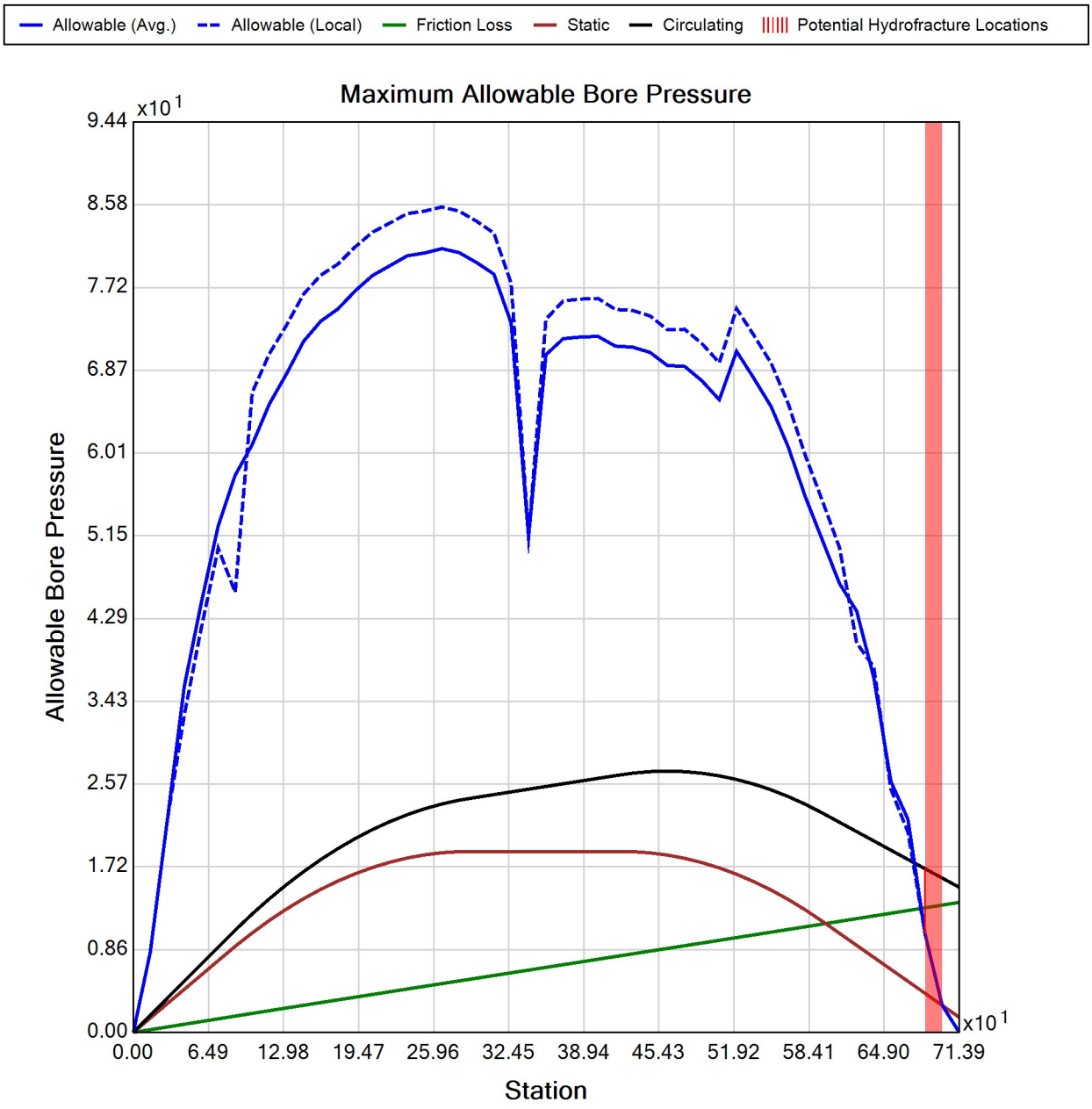












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Input Summary

Start Coordinate	(0.00, 0.00, 326.99) ft
End Coordinate	(709.00, 0.00, 322.00) ft
Project Length	709.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 720.00 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.6	21.1
Water Pressure	10.7	10.6
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	12.3	31.7
Deflection		
Earth Load Deflection	0.623	5.767
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.652	5.796
Compressive Stress [psi]		
Compressive Wall Stress	55.4	142.7

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	724.5	724.5
Pullback Stress [psi]	414.0	414.0
Pullback Strain	7.199E-3	7.199E-3
Bending Stress [psi]	0.0	5.7
Bending Strain	0	9.896E-5
Tensile Stress [psi]	414.0	419.5
Tensile Strain	7.199E-3	7.395E-3

Net External Pressure = 24.2 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.652	7.5	11.5	OK
Unconstrained Collapse [psi]	29.7	132.5	4.5	OK
Compressive Wall Stress [psi]	55.4	1150.0	20.7	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	39.7	233.1	5.9	OK
Tensile Stress [psi]	419.5	1200.0	2.9	OK

Generated Output

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Project Summary

General:	CHPE HDD 42 Conduit 1 Ref: BLANK P3 Start Date: 12-10-2021 End Date: 12-10-2021
Project Owner:	TDI
Project Contractor:	Kiewit
Project Consultant:	CHA/BCE
Designer:	MCS CHA BLANK BLANK, BLANK BLANK BLANK Phone: BLANK Fax: BLANK BLANK
Description:	HDD 42 Conduit 1 10-inch DR 9

Input Summary

Start Coordinate	(0.00, 0.00, 327.46) ft
End Coordinate	(680.00, 0.00, 322.65) ft
Project Length	680.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	10.750 in
Pipe DR	9.0
Pipe Thickness	1.19 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Soil Summary

Number of Layers: 4

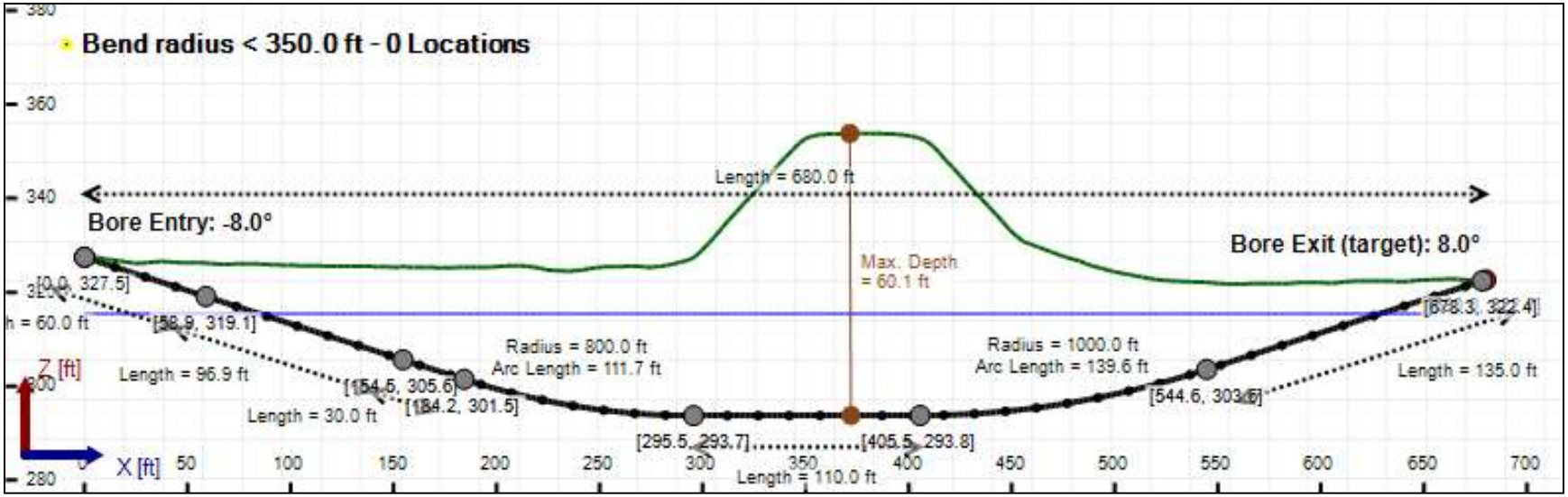
Soil Layer #1 USCS, Sand (S), SM
Depth: 10.10 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #2 USCS, Sand (S), SP
Depth: 10.00 ft
Unit Weight: 105.0000 (dry), 115.0000 (sat) [lb/ft3]
Phi: 30.00, S.M.: 145.00, Coh: 0.00 [psi]

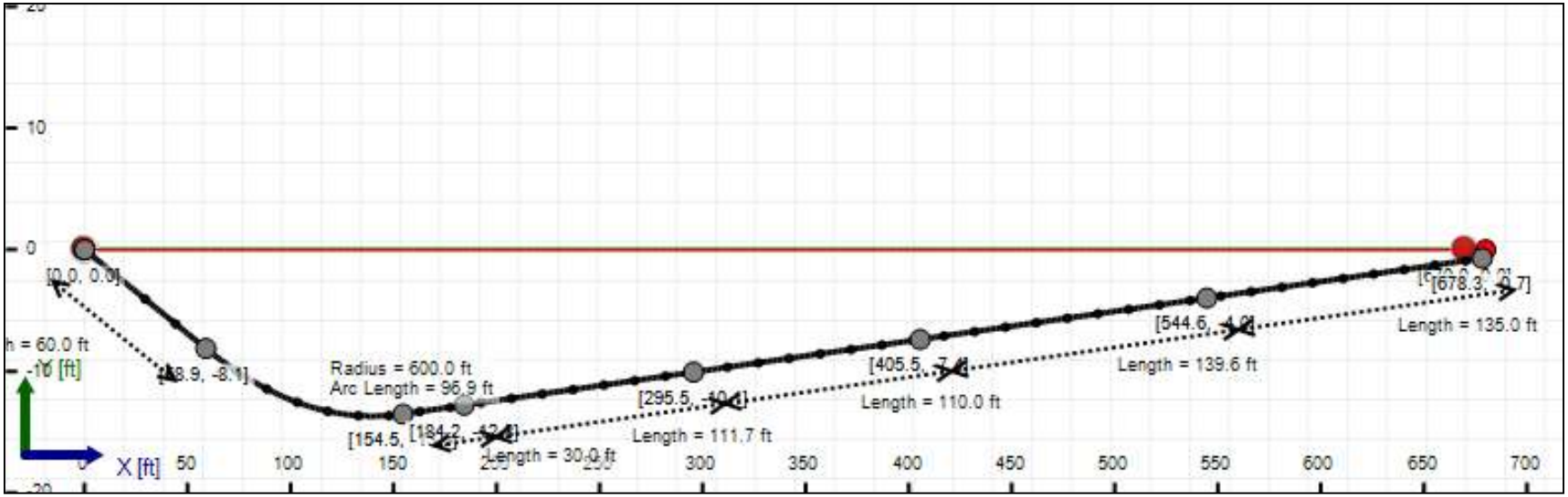
Soil Layer #3 USCS, Sand (S), SM
Depth: 6.50 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Soil Layer #4 USCS, Sand (S), SM
Depth: 30.00 ft
Unit Weight: 110.0000 (dry), 125.0000 (sat) [lb/ft3]
Phi: 34.00, S.M.: 145.00, Coh: 0.00 [psi]

Bore Cross-Section View



Bore Plan View



Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 10" (10.75")
Pipe DR: 9
Pipe Length: 689.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 1.34400002161662 ft
Silo Width: 1.34400002161662 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	4.6	36.9
Water Pressure	9.4	9.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	14.0	46.2
Deflection		
Earth Load Deflection	1.264	10.039
Buoyant Deflection	0.132	0.132
Reissner Effect	0	0
Net Deflection	1.396	10.171
Compressive Stress [psi]		
Compressive Wall Stress	63.1	208.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	11435.9	11435.9
Pullback Stress [psi]	318.9	318.9
Pullback Strain	5.547E-3	5.547E-3
Bending Stress [psi]	0.0	42.9
Bending Strain	0	7.465E-4
Tensile Stress [psi]	318.9	357.6
Tensile Strain	5.547E-3	6.965E-3

Net External Pressure = 14.1 [psi]

Buoyant Deflection = 0.1

Hydrokinetic Force = 567.6 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	1.396	7.5	5.4	OK
Unconstrained Collapse [psi]	21.9	121.9	5.6	OK
Compressive Wall Stress [psi]	63.1	1150.0	18.2	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.065	7.5	115.8	OK
Unconstrained Collapse [psi]	31.9	236.6	7.4	OK
Tensile Stress [psi]	357.6	1200.0	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	120.684 psi	125.054 psi
1	8.00 in	12.00 in	120.659 psi	125.028 psi
2	12.00 in	16.13 in	120.623 psi	124.992 psi

Note: The maximum bore pressures presented in this table are the maximum values along the length of the bore and not the maximum allowable at any point. The estimated maximum pressures should be compared to the estimated circulating pressures along the bore to determine potential locations of inadvertant returns.

Estimated Circulating Pressure Summary

Active	Shear Rate [rpm]	Shear Stress [Fann Degrees]
No	600	37
No	300	32
No	200	29
Yes	100	25
Yes	6	17
No	3	15

Flow Rate (Q): 40.00 US (liquid) gallon/min

Drill Fluid Density: 68.700 lb/ft3

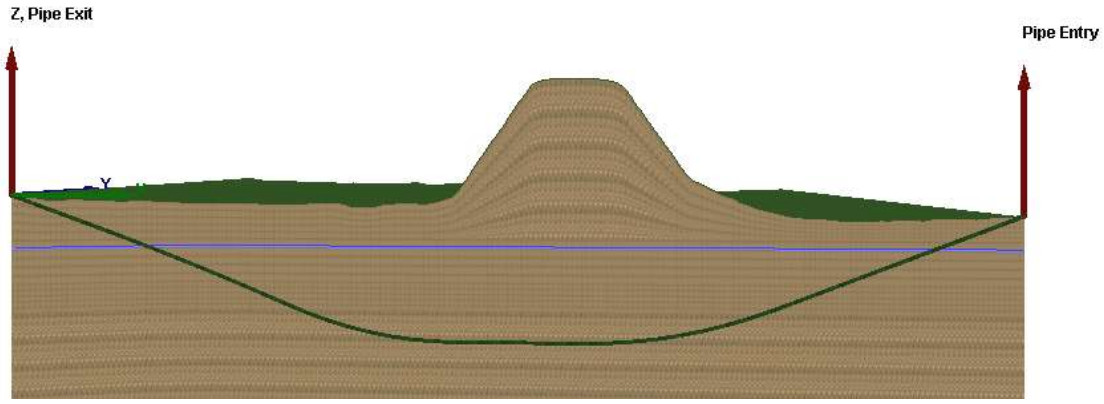
Rheological model: Bingham-Plastic

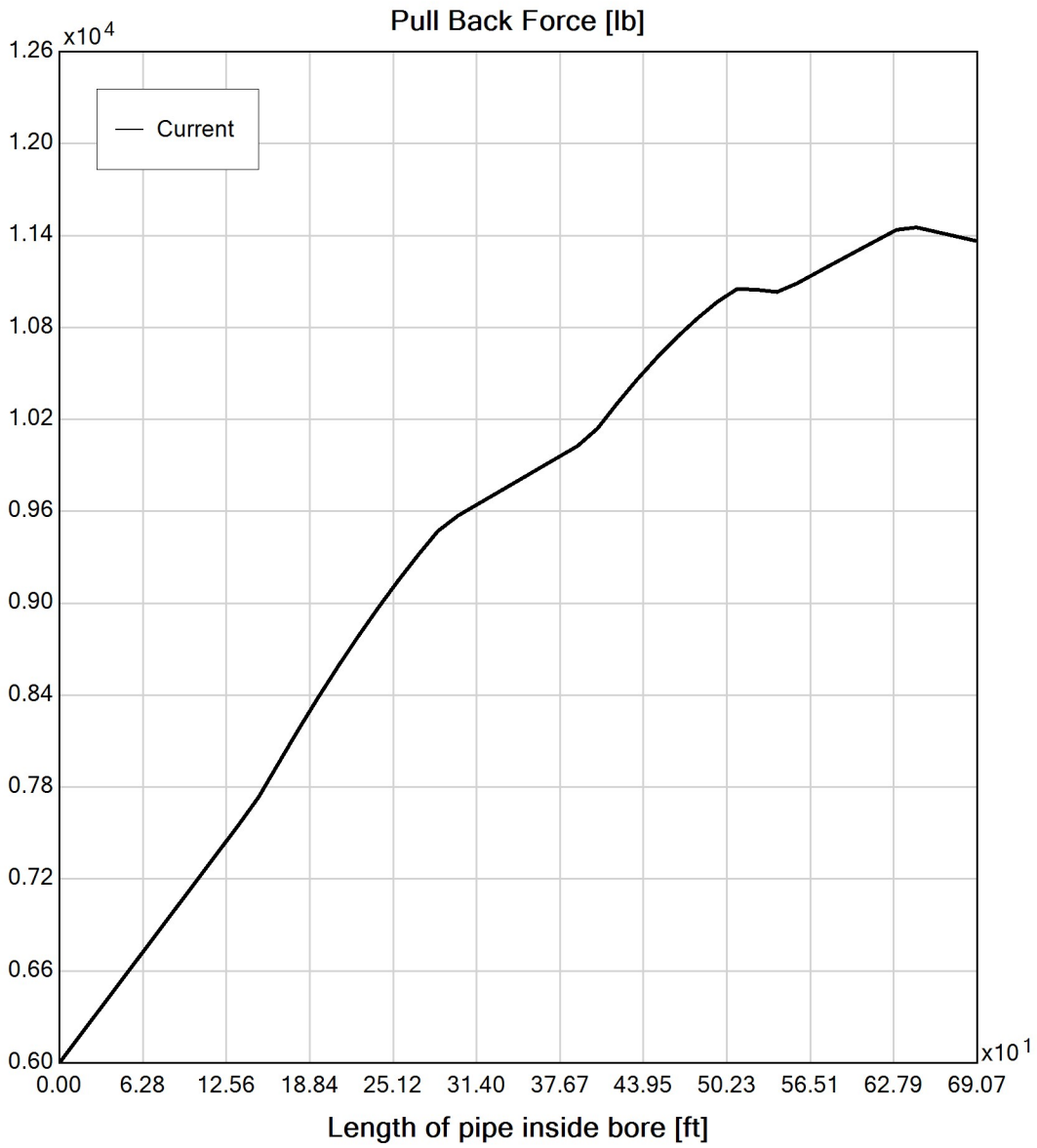
Plastic Viscosity (PV): 25.53

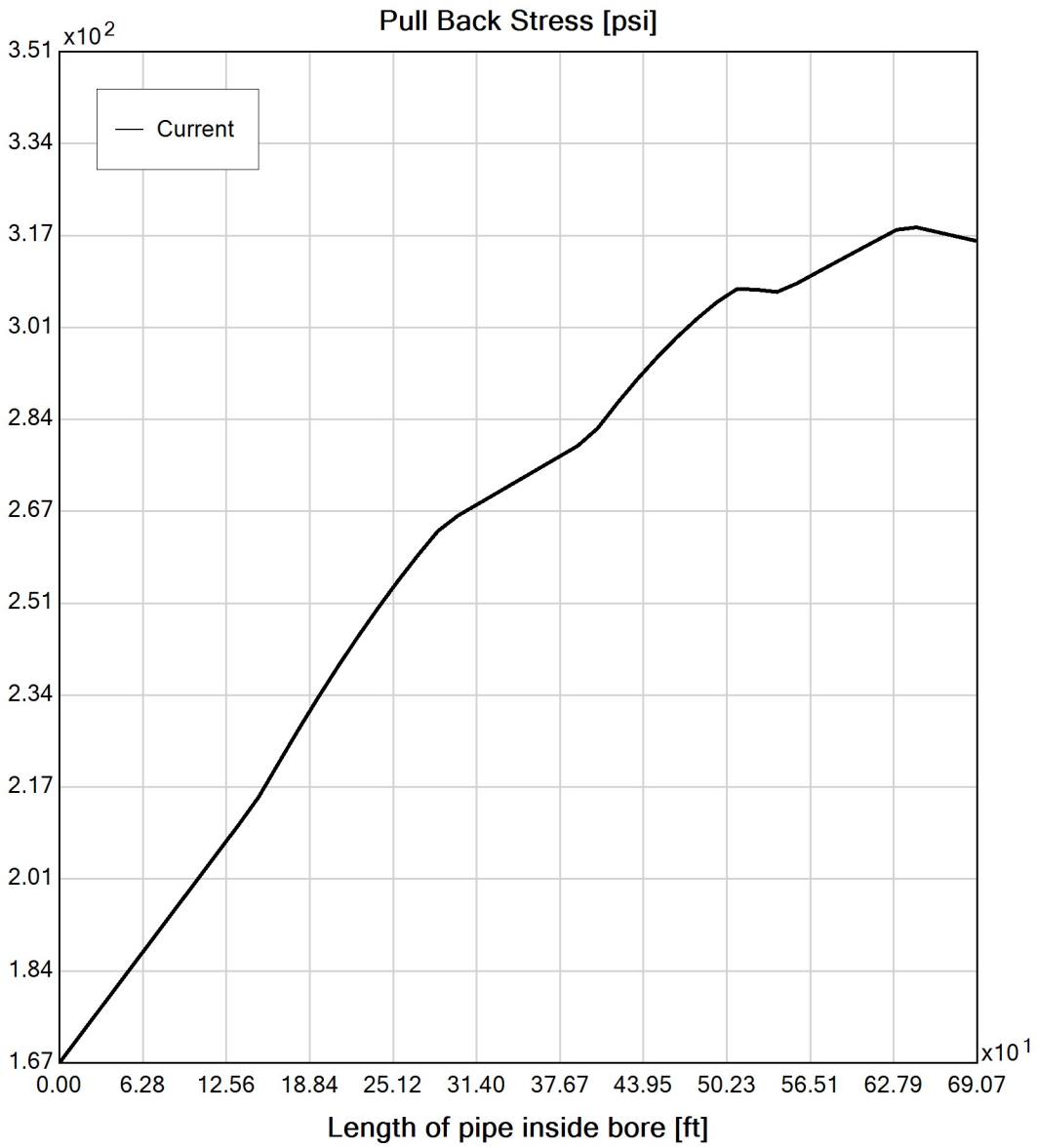
Yield Point (YP): 16.49

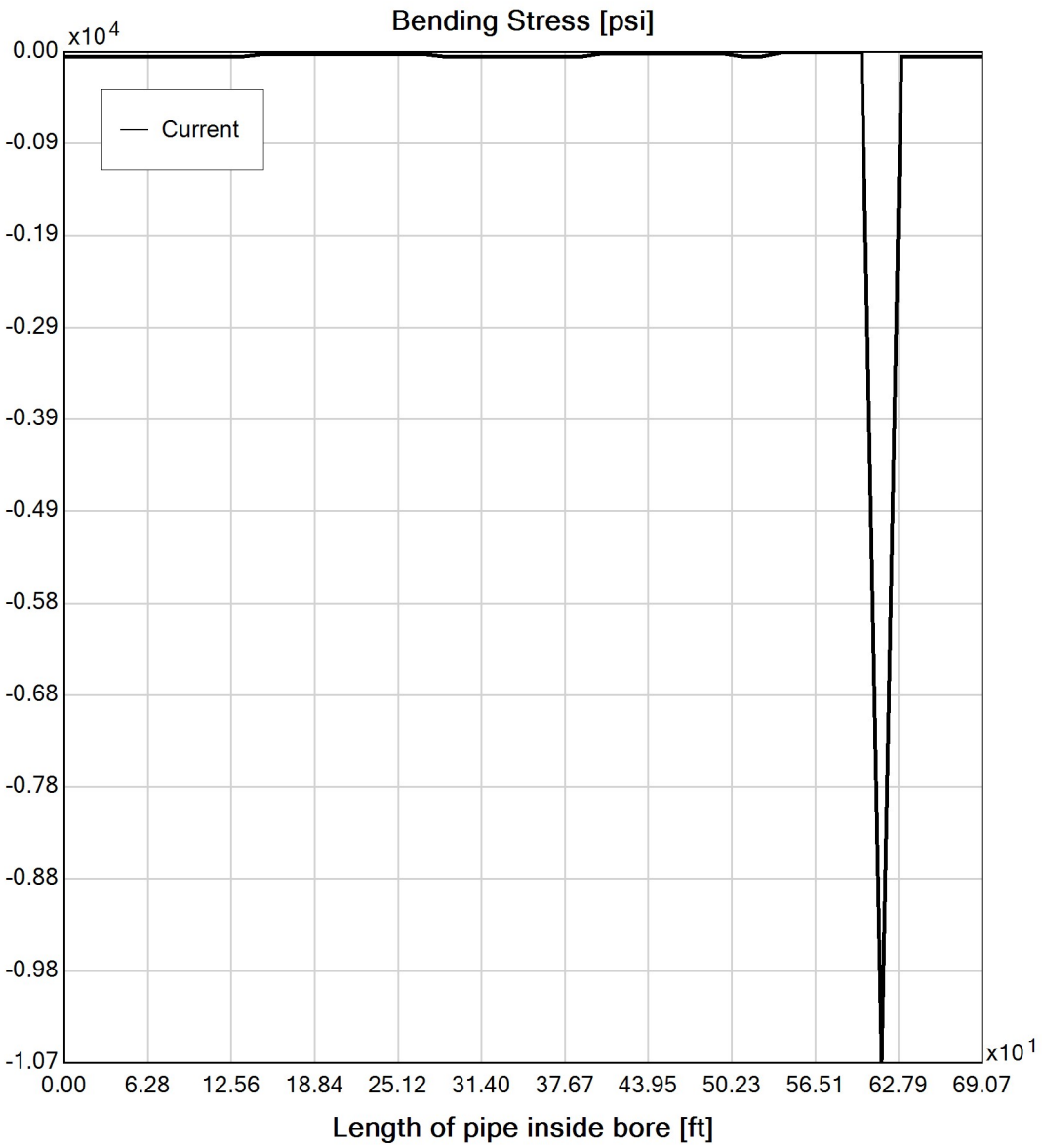
Effective Viscosity (cP): 1202.0

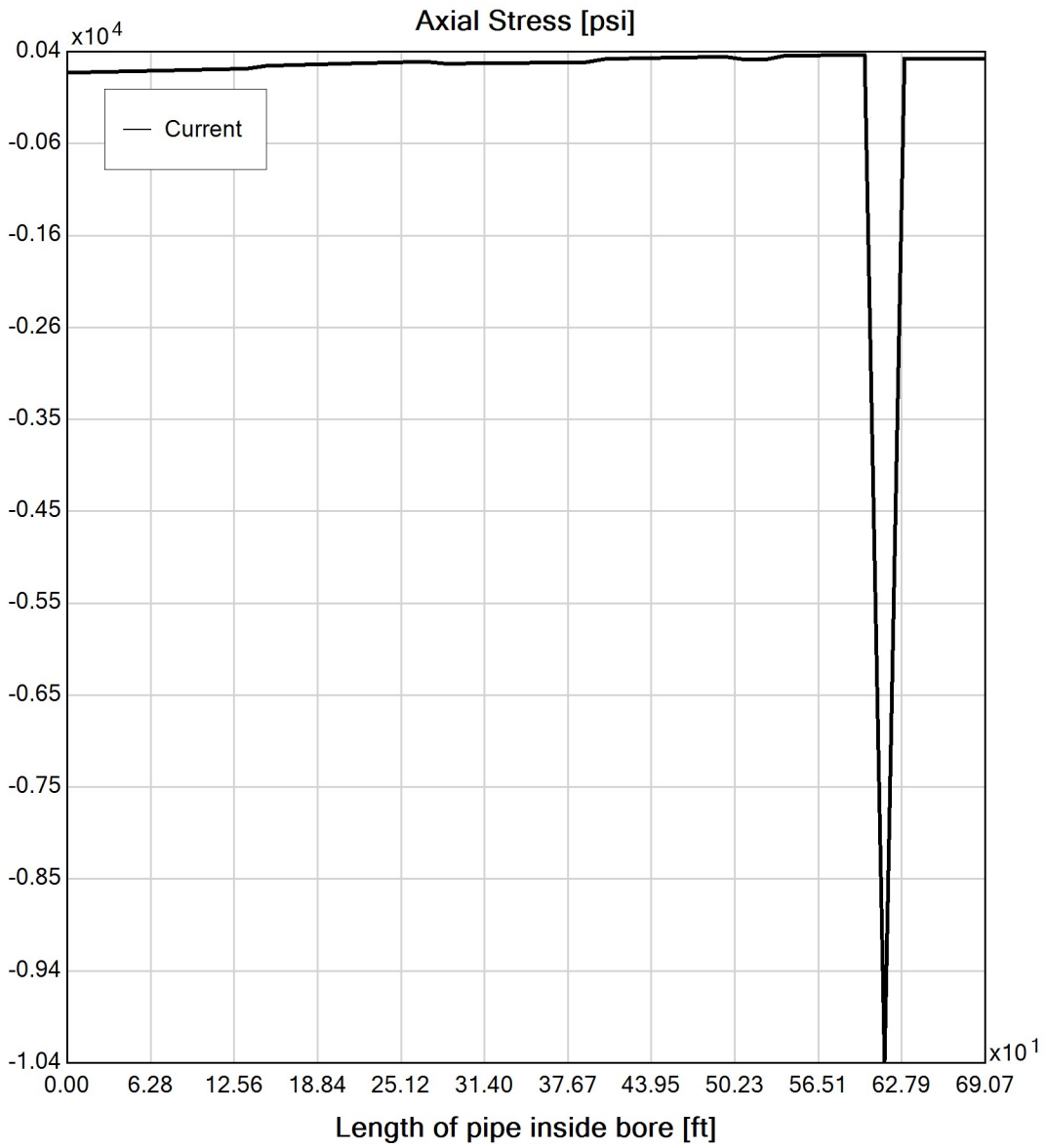
Virtual Site

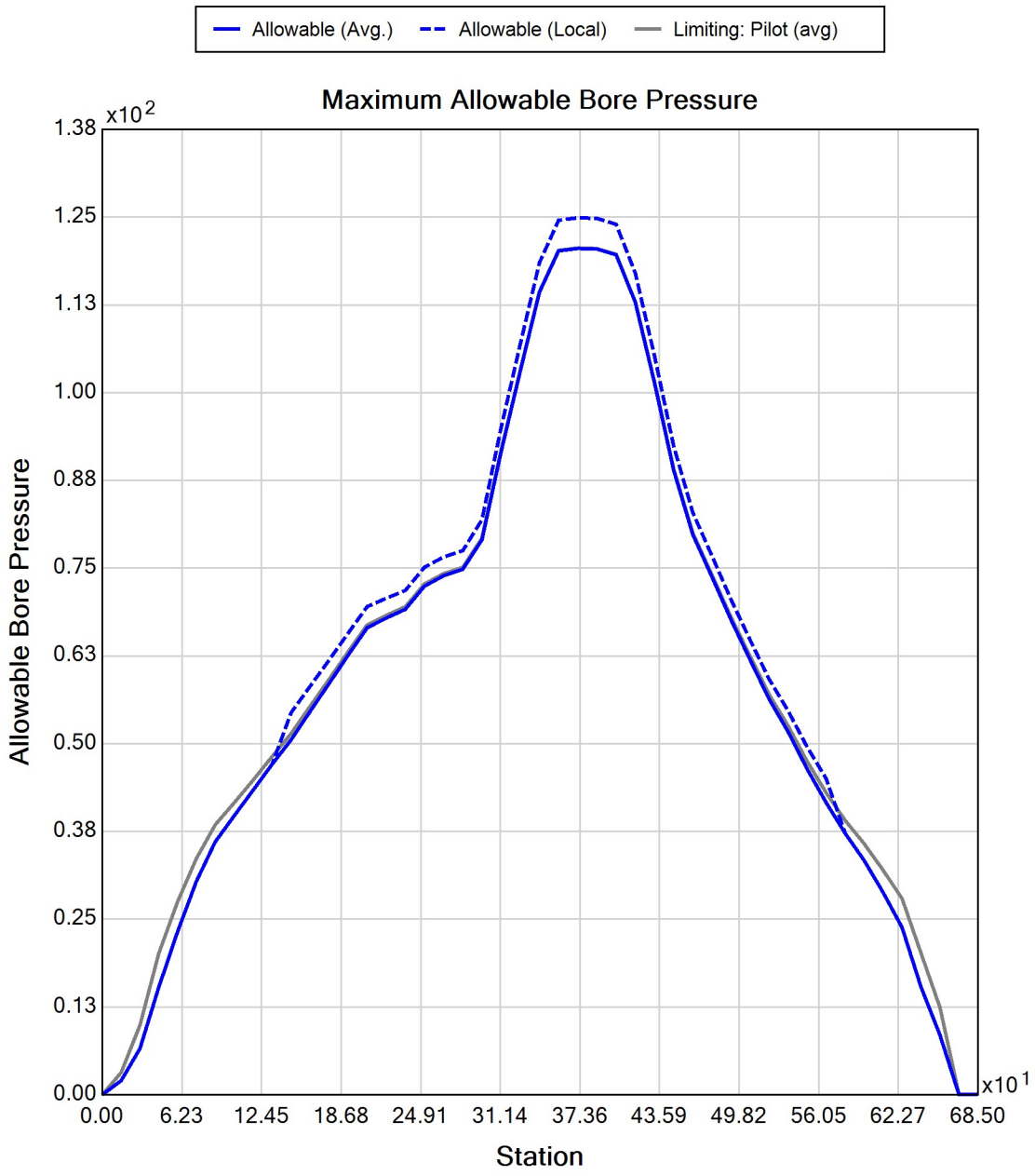


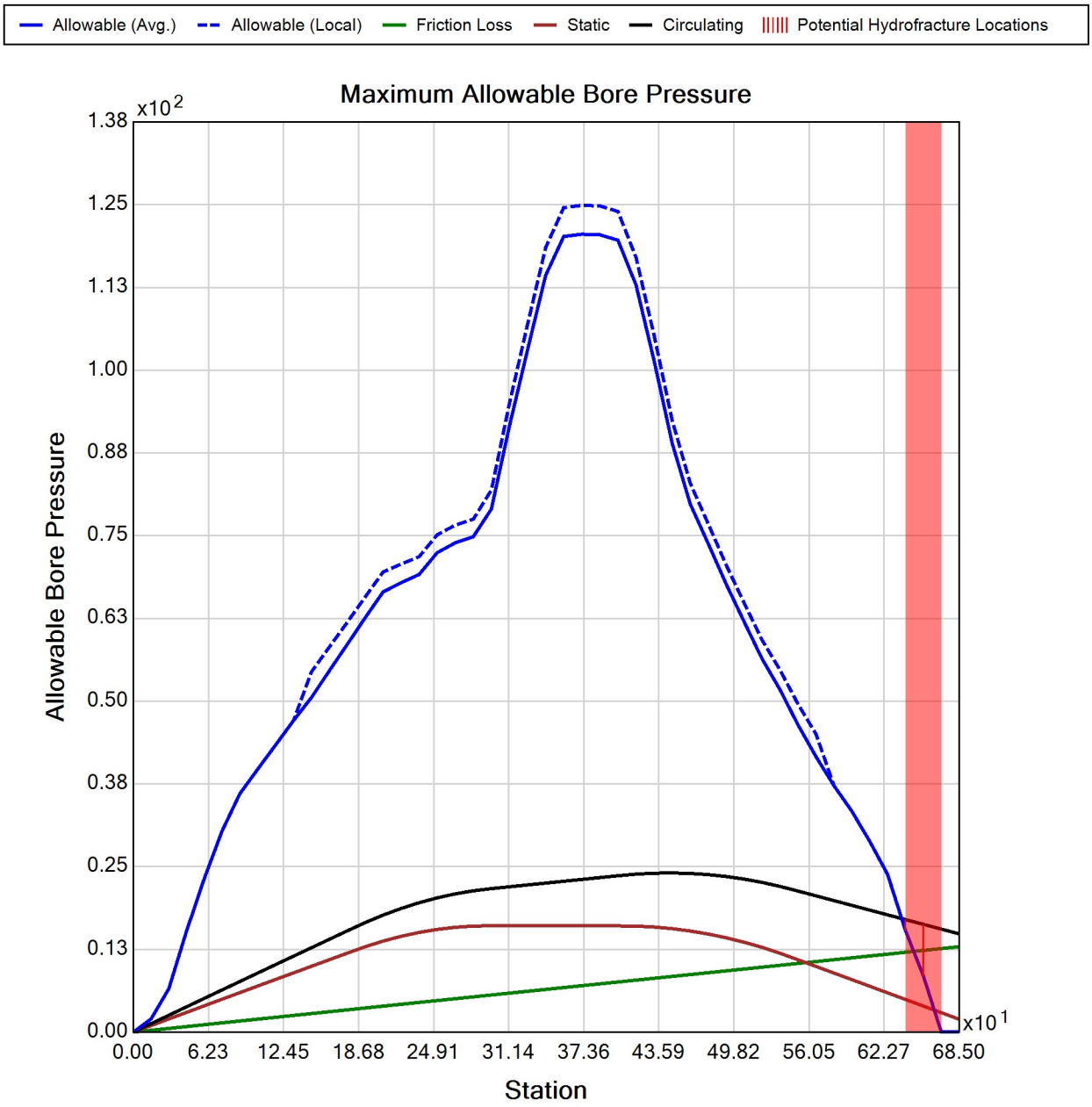












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Input Summary

Start Coordinate	(0.00, 0.00, 327.46) ft
End Coordinate	(680.00, 0.00, 322.65) ft
Project Length	680.00 ft
Pipe Type	HDPE
OD Classification	IPS
Pipe OD	2.375 in
Pipe DR	9.0
Pipe Thickness	0.26 in
Rod Length	15.00 ft
Rod Diameter	3.5 in
Drill Rig Location	(0.00, 0.00, 0.00) ft

Load Verifier Input Summary:

Pipe Application: Electrical Cable
Pipe Type: HDPE
Classification: IPS
Pipe OD: 2" (2.375")
Pipe DR: 9
Pipe Length: 689.99 ft
Internal Pressure: 0 psi
Borehole Diameter: 0.531000018119812 ft
Silo Width: 0.531000018119812 ft
Surface Surcharge: 0 psi
Short Term Modulus: 57500 psi
Long Term Modulus: 28200 psi
Short Term Poisson Ratio: 0.35
Long Term Poisson Ratio: 0.45
Pipe Unit Weight: 59.30500 lb/ft3
Allowable Tensile Stress (Short Term): 1200 psi
Allowable Tensile Stress (Long Term): 1100 psi
Allowable Compressive Stress (Short Term): 1150 psi
Allowable Compressive Stress (Long Term): 1150 psi
Surface-pipe friction coefficient at entrance: 0.5
Surface-pipe friction coefficient in borehole: 0.3
Pipe-soil friction angle: 30
Slurry Unit Weight: 93.64118 lb/ft3
Hydrokinetic Pressure: 10 psi
Ballast Unit Weight: 62.42746 lb/ft3

In-service Load Summary:

Pressure [psi]	Deformed	Collapsed
Earth Pressure	1.8	36.9
Water Pressure	9.4	9.4
Surface Surcharge	0.0	0.0
Internal Pressure	0.0	0.0
Net Pressure	11.2	46.2
Deflection		
Earth Load Deflection	0.564	10.039
Buoyant Deflection	0.029	0.029
Reissner Effect	0	0
Net Deflection	0.593	10.068
Compressive Stress [psi]		
Compressive Wall Stress	50.4	208.1

Installation Load Summary:

Forces/Stresses	@Maximum Force	Absolute Maximum
Pullback Force [lb]	667.8	667.8
Pullback Stress [psi]	381.5	381.5
Pullback Strain	6.636E-3	6.636E-3
Bending Stress [psi]	0.0	9.5
Bending Strain	0	1.649E-4
Tensile Stress [psi]	381.5	386.7
Tensile Strain	6.636E-3	6.891E-3

Net External Pressure = 14.1 [psi]

Buoyant Deflection = 0.0

Hydrokinetic Force = 137.3 lb

In-service Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.593	7.5	12.7	OK
Unconstrained Collapse [psi]	21.9	131.7	6.0	OK
Compressive Wall Stress [psi]	50.4	1150.0	22.8	OK

Installation Analysis

	Calculated	Allowable	Factor of Safety	Check
Deflection [%]	0.014	7.5	524.3	OK
Unconstrained Collapse [psi]	31.9	235.2	7.4	OK
Tensile Stress [psi]	386.7	1200.0	3.1	OK

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