

Rehabbing 48" Pressure Pipe with Robotics and Additive Manufacturing



Manufactured In-place Composite Pipe (MICP)



Agenda

The Water Treatment Plant **Project**

The MICP **Product**

The SippTech **Robots**

The Customer **Outcomes**



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Project

Manufactured In-Place Composite Pipe



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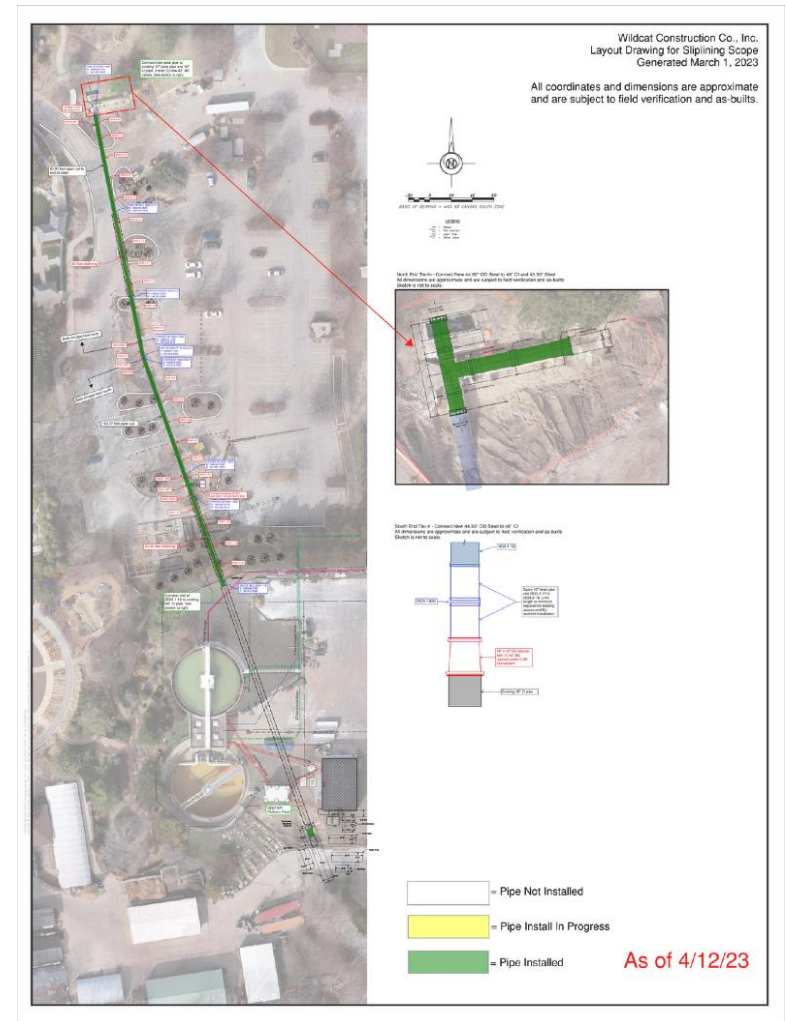
Task At Hand

48" Ductile Iron

200 MAOP

Raw Water

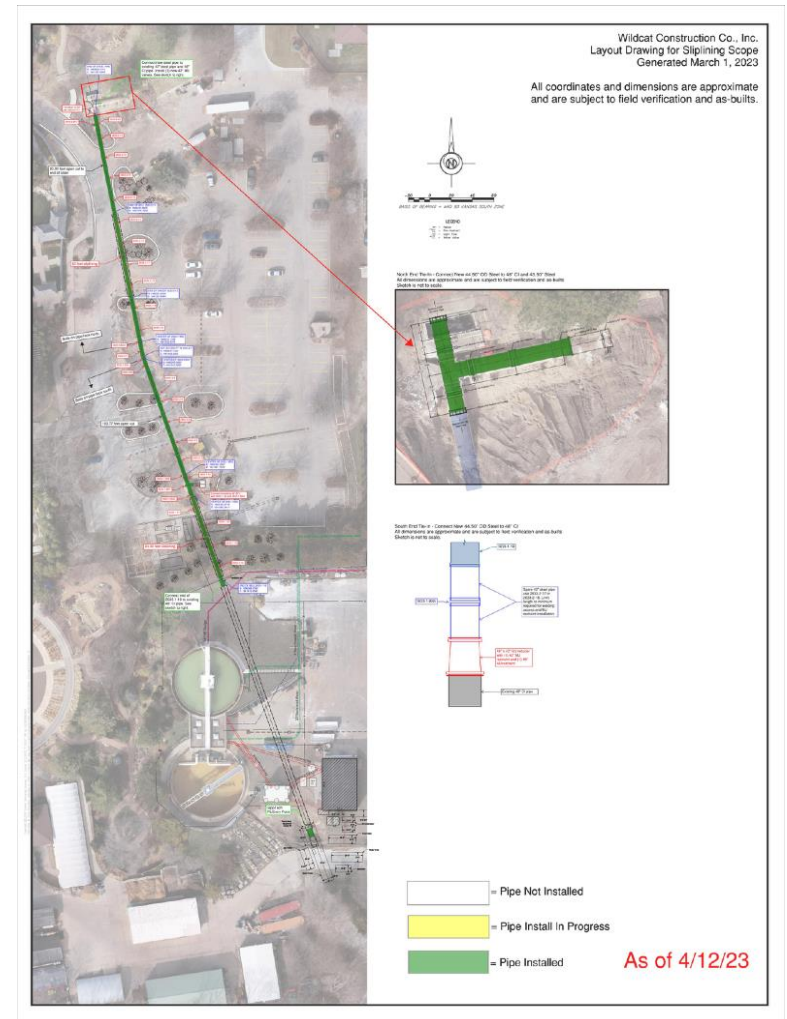
At Water Treatment Plant



Initial Rehab

250' Steel Slip Line

300' Remove & Replace



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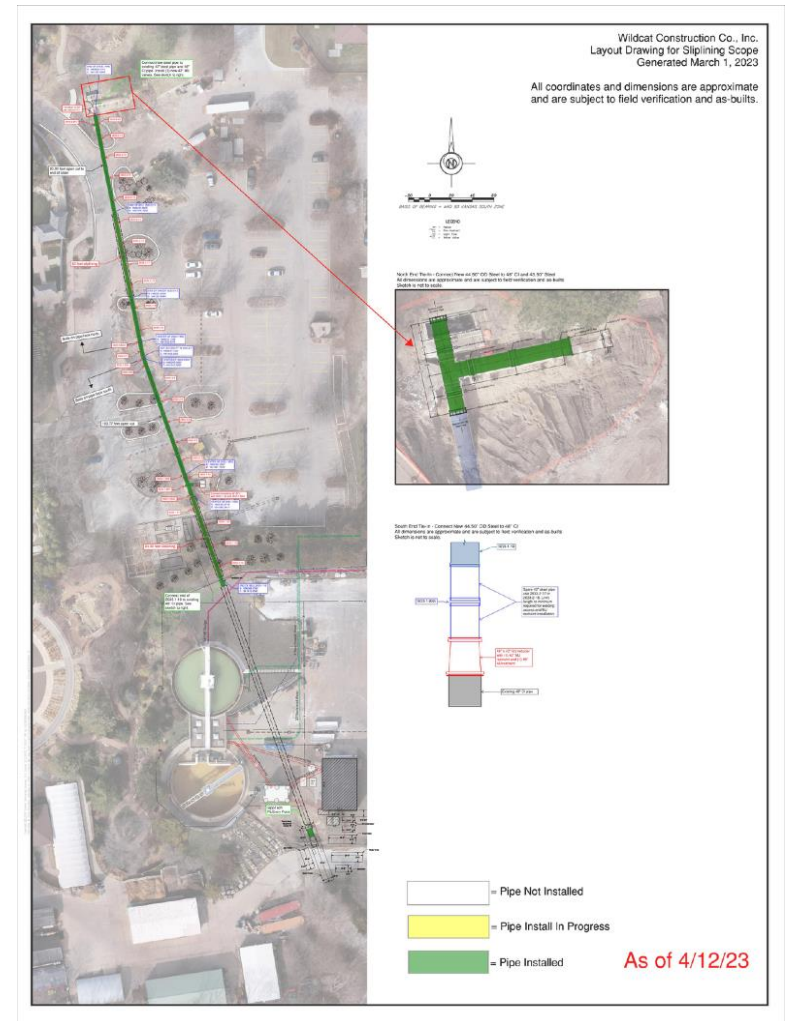
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Challenges

Congestion
Deflections
Pressure



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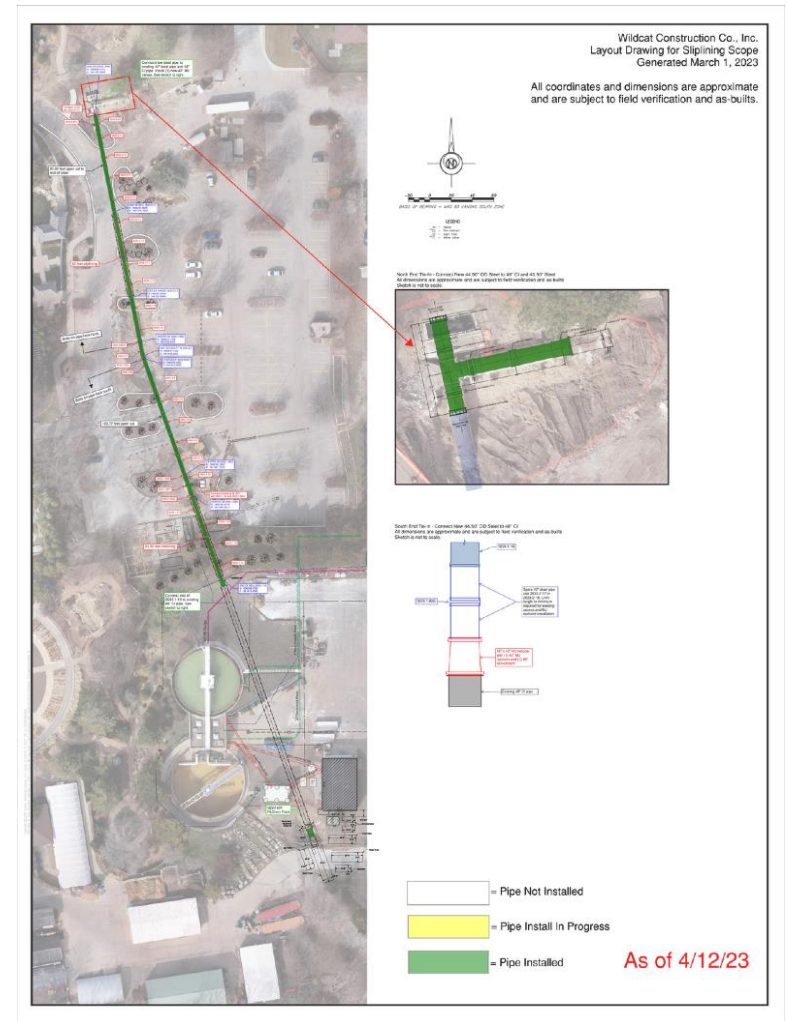
Objectives

Structural

Pressure

Flexible

Trenchless



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Product

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Manufactured In-place Composite Pipe



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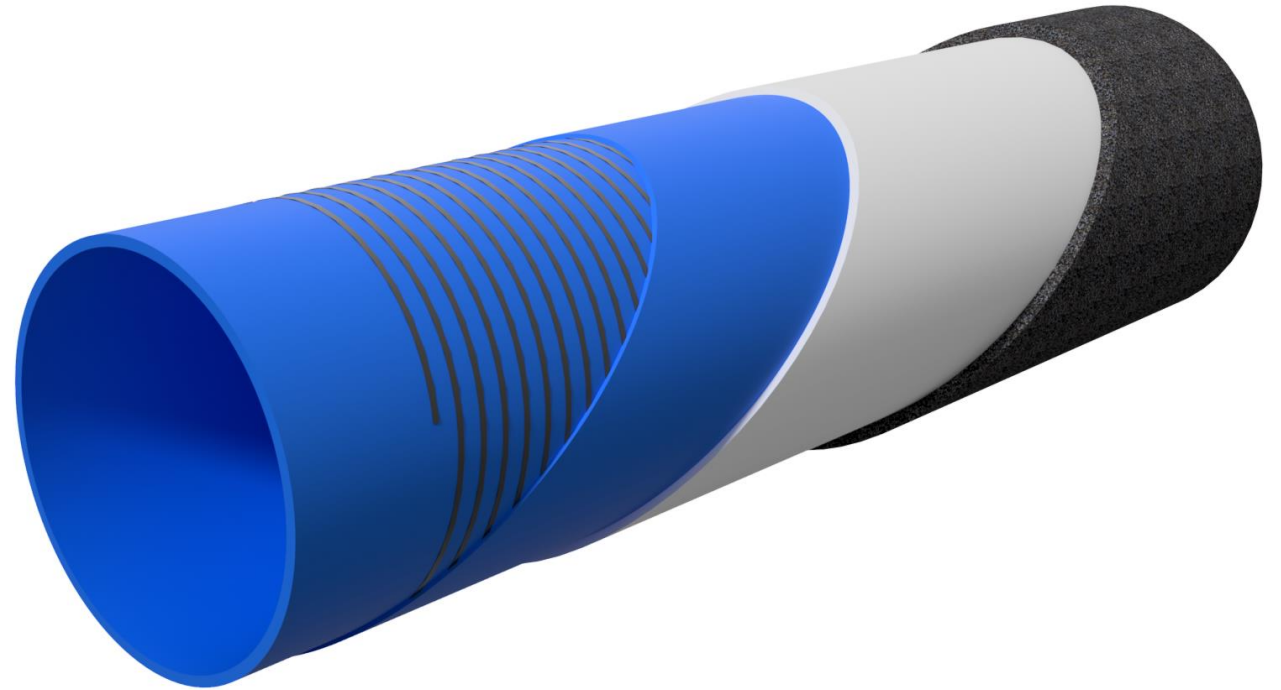
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MICP System

- Foam Polymer
- Carbon Fiber
- Rigid Polymer



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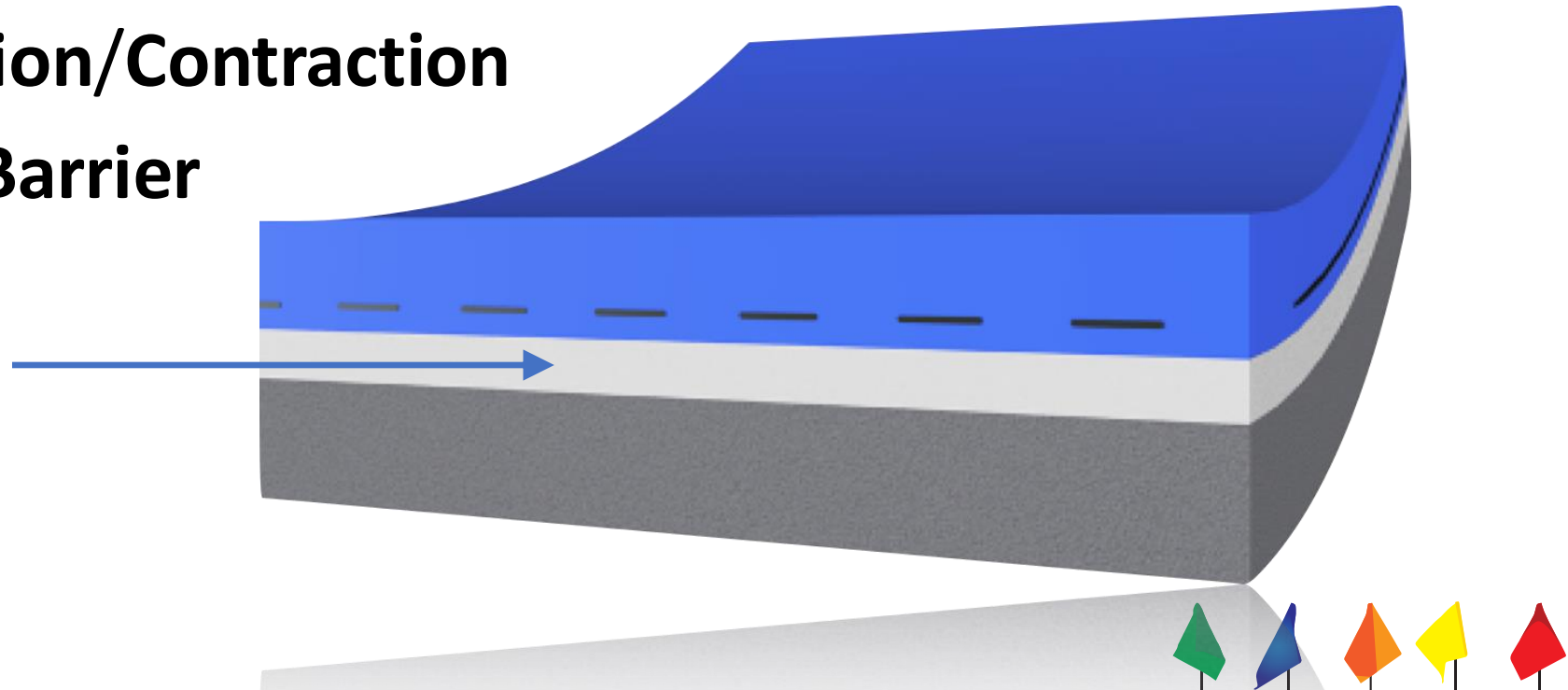
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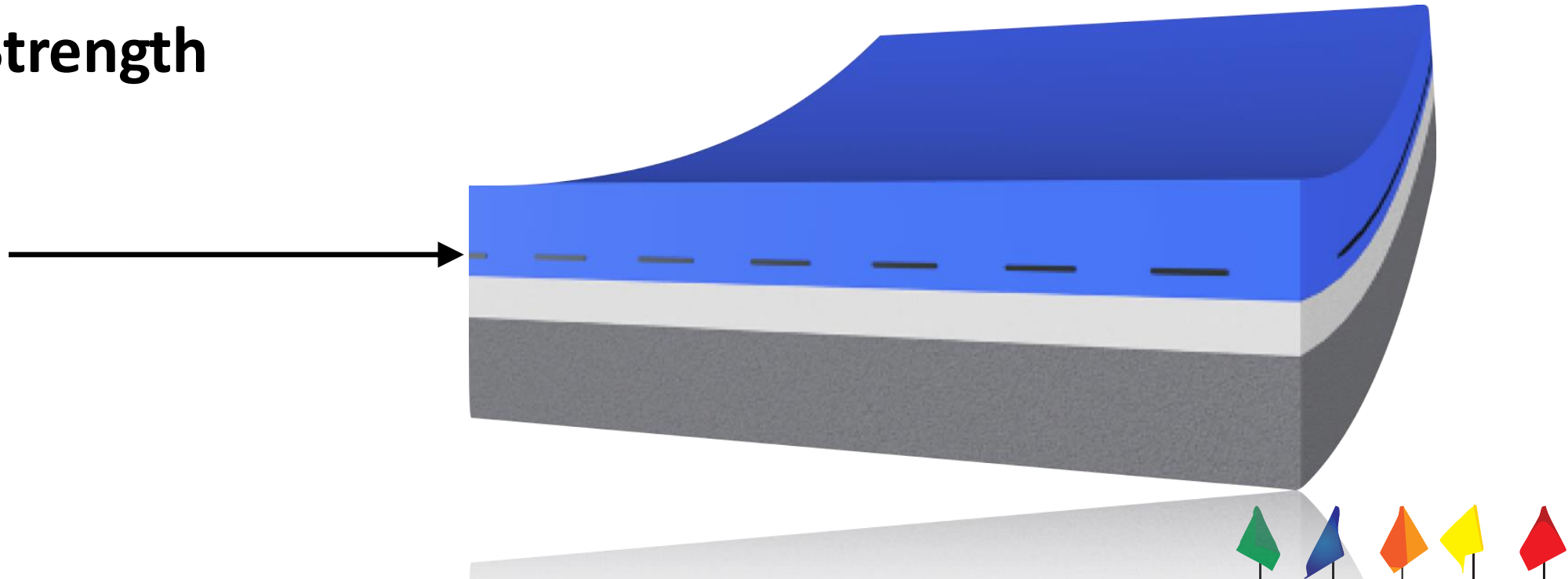
Foam

- Consistent Adherable **Form**
- Thermal **Expansion/Contraction**
- Strain Isolation **Barrier**



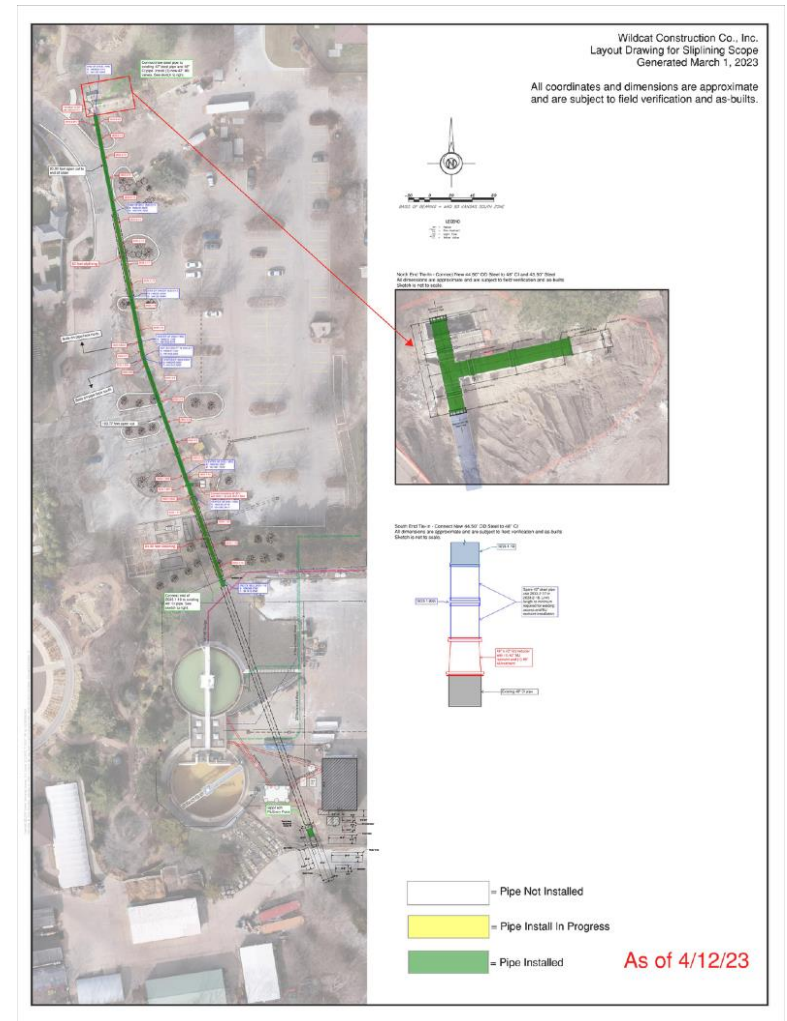
Carbon Fiber

- Composite **Rebar** Reinforcement
- **Hoop Strength**



Objectives

✓ Structural	Foam
✓ Pressure	Carbon Fiber
✓ Flexible	Rigid Cure Time
Trenchless	



Robots

Manufactured In-Place Composite Pipe



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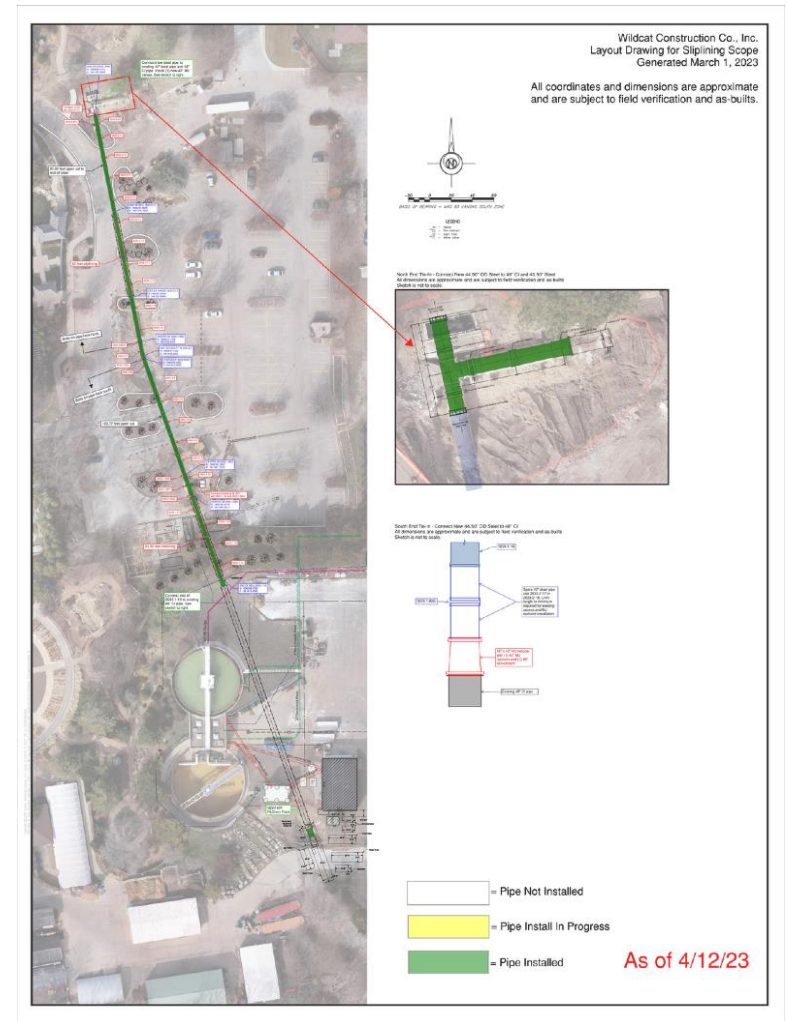
Objectives

Structural

Pressure

Flexible

Trenchless



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Robot Features

1. LiDAR
2. Cannon
3. Columns
4. Tracks
5. Drive Units
6. Vision



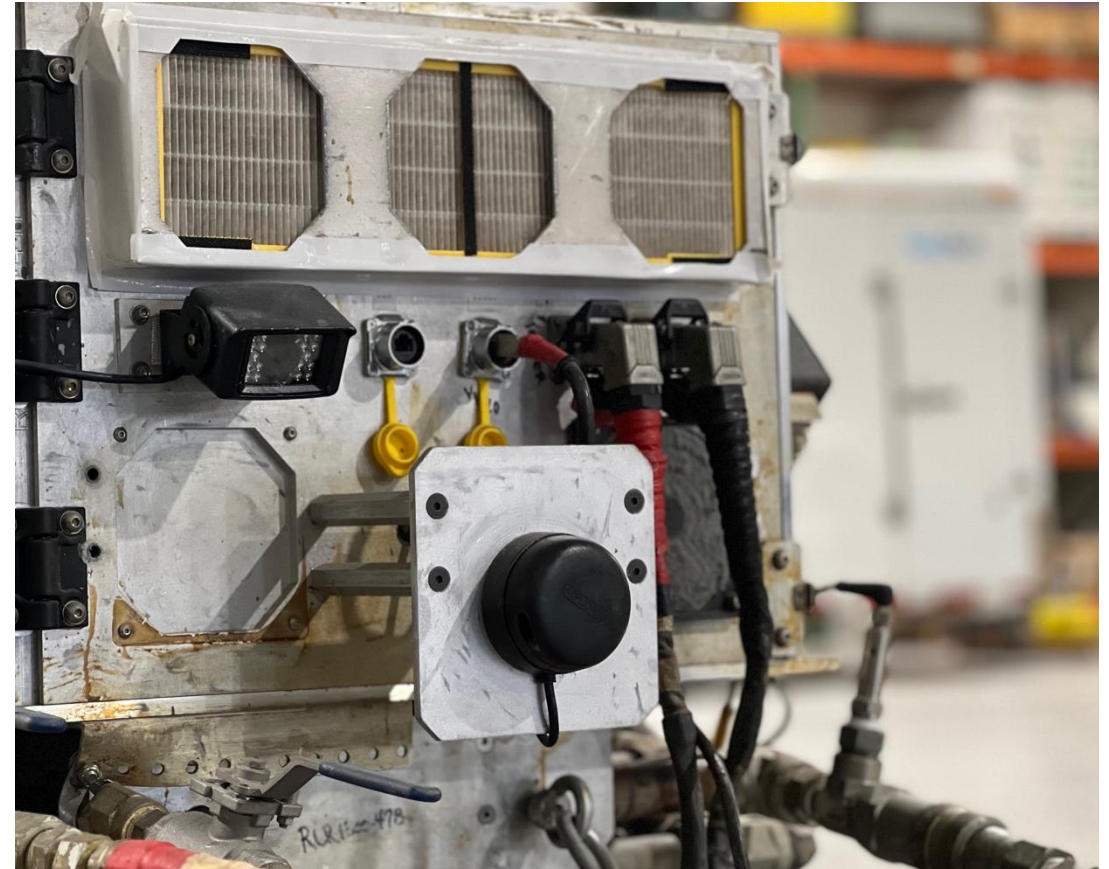
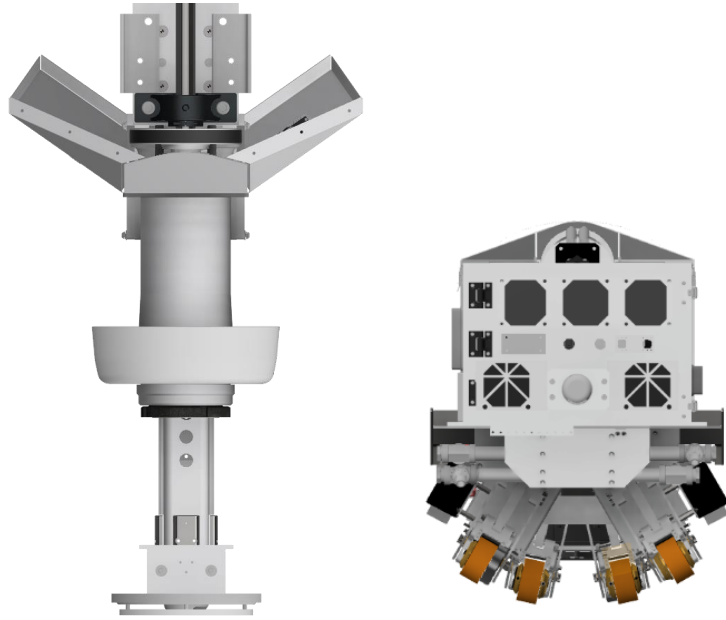
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LiDAR



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Cannon



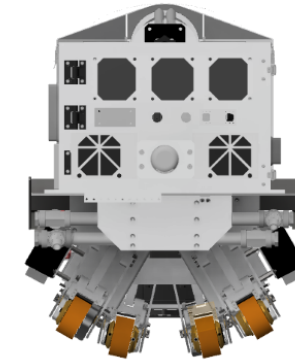
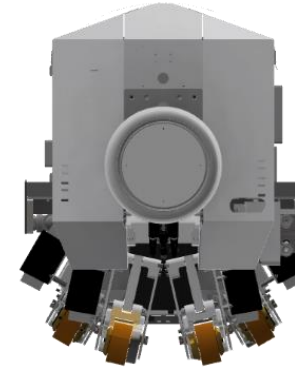
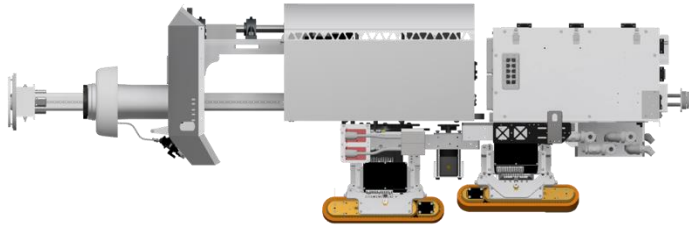
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Columns



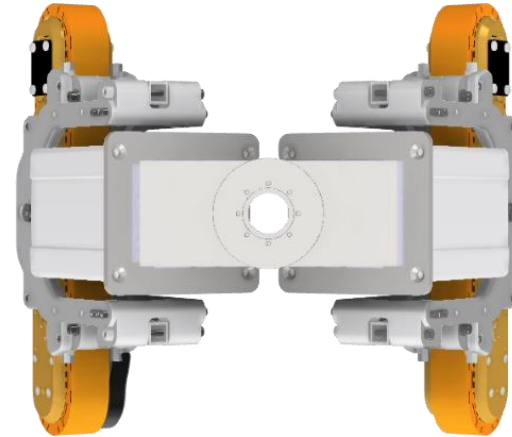
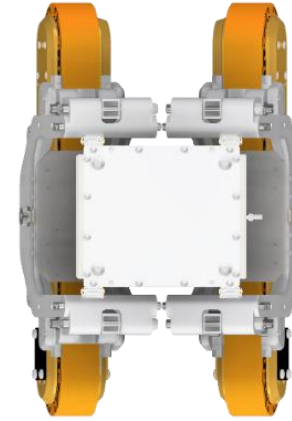
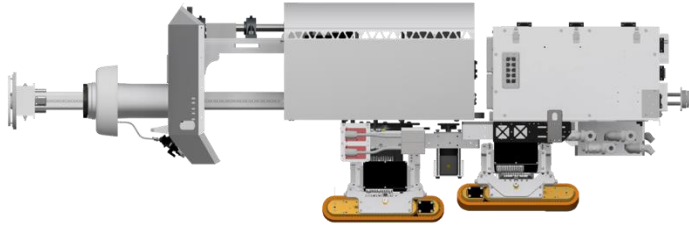
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Tracks



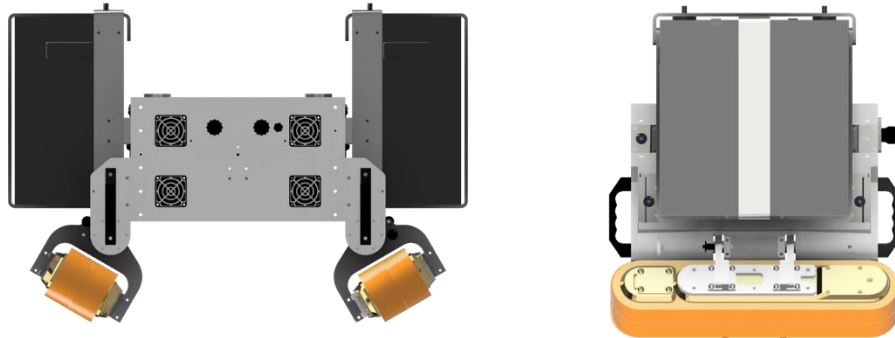
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Umbilical Drive Units



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Vision

Cameras

Data

User Interface



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Outcome

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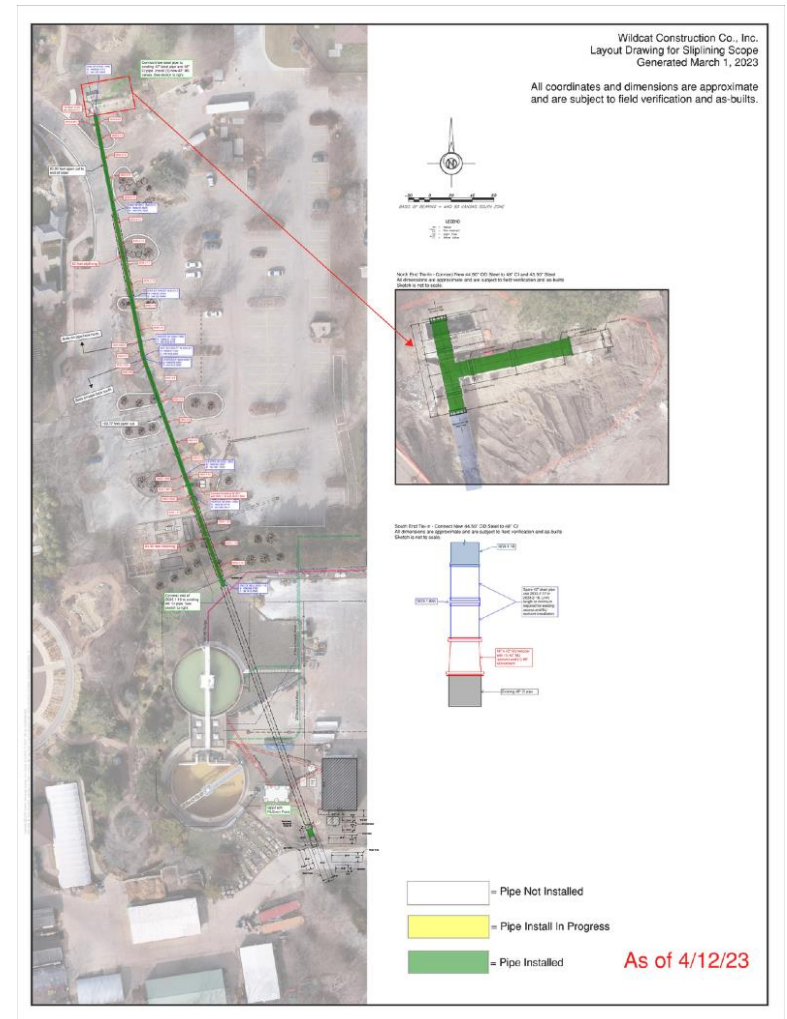
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Objectives

✓ Structural	Class IV
✓ Pressure	200 psi MAOP
✓ Flexible	4.5° Deflections
✓ Trenchless	1600 sqft





INFRASTRUCTURE, PIPE DEFLECTION, AND OTHER
COMPLICATIONS MADE OTHER OPTIONS NOT VIABLE.

240FT



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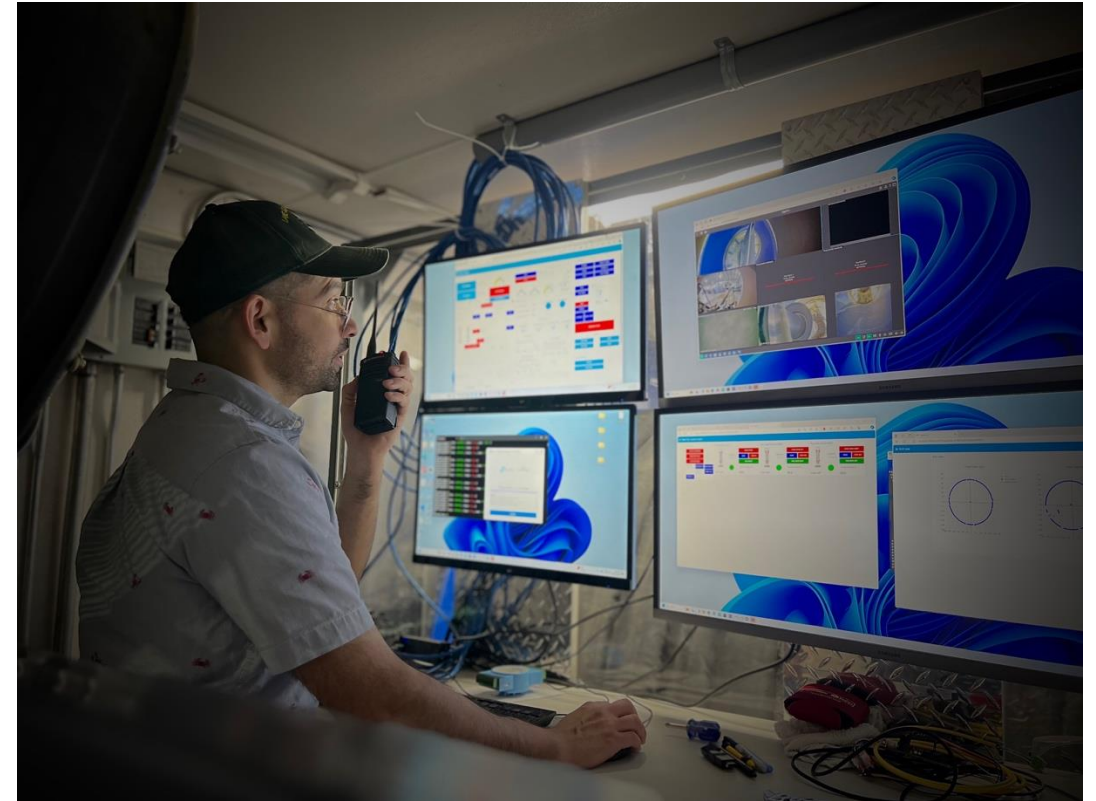


Safe

NSF/ANSI 61

PFAS-free

Corrosion Proof



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