



Information Item

Forcemain Inspection Program



Environment Committee: April 28, 2026

Jeff Schwarz

What Are Forcemains?

Underground Pressure Pipes and:



Access Structures



Flow Control, Clean Out,
and Air Release Valves

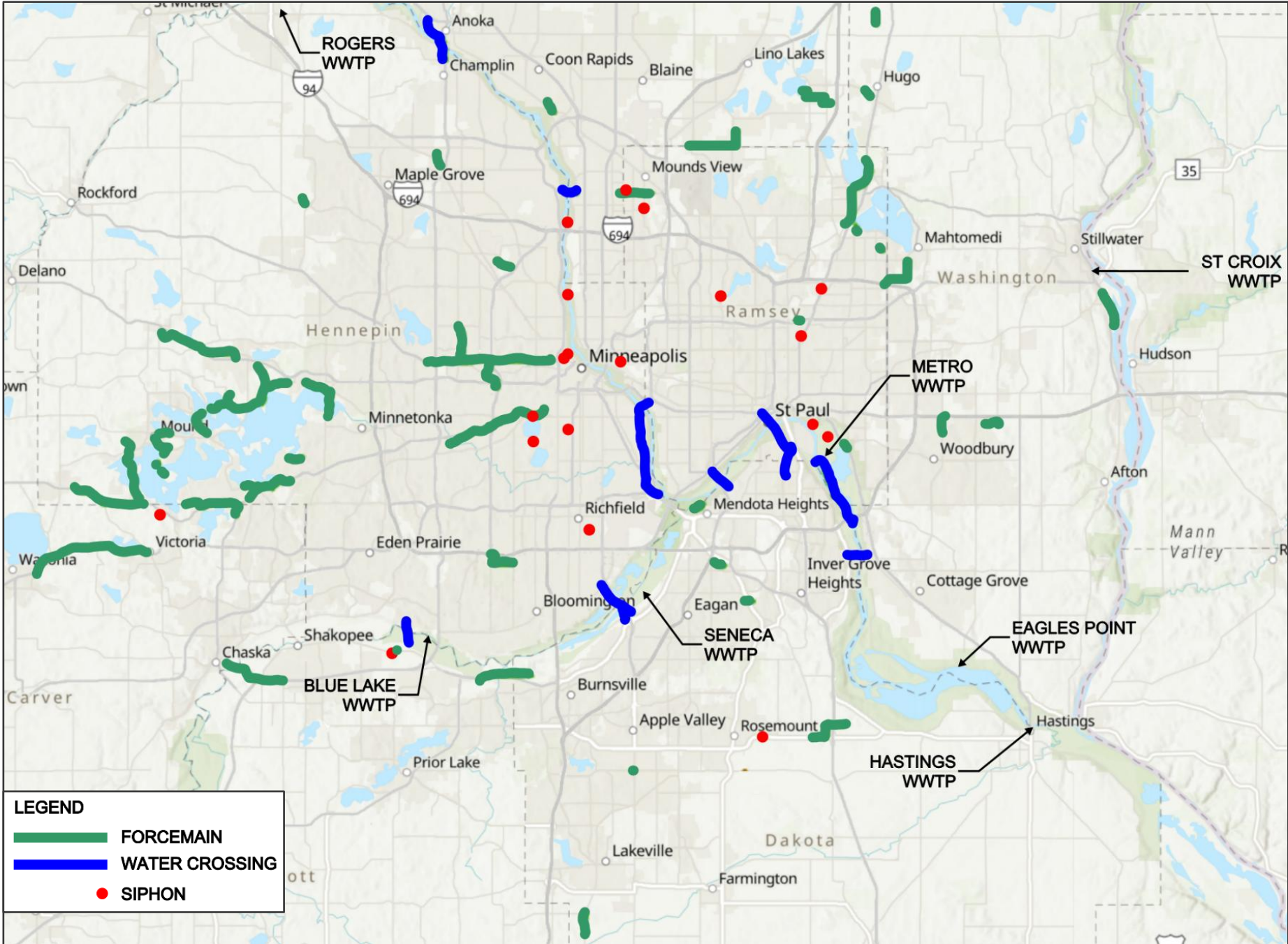


Discharge Maintenance Holes

Forcemain Inventory

Pipe Material	Feet of Pipe	Miles of Pipe
Cast Iron Pipe (CIP)	41,807	7.92
Ductile Iron Pipe (DIP)	225,812	42.77
Fiber-Reinforced Polymer Matrix (FRPM)	207	0.04
High Density Polyethylene (HDPE)	105,131	19.91
Prestressed Concrete Cylinder Pipe (PCCP)	46,909	8.88
Polyvinyl Chloride (PVC)	250,110	47.37
Reinforced Concrete Pipe (RCP)	5,099	0.97
Steel	67,405	12.77
Total	742,480	140.62

Forcemain Locations



Forcemain Inspection History

***Based on available records, 96 miles (~66%) of forcemain (FM) have not been inspected in the past 10 years.**

Year	Miles Inspected	New or Rehabbed	% of FMs
Pre-2010 Inspection	0.52	-	0.40%
2010	0.32	2.51	2.17%
2011	0.28	0.64	0.70%
2012	0.17	1.97	1.64%
2013	0.03	11.69	9.00%
2014	-	1.08	0.83%
2015	-	9.43	7.24%
2016	0.52	0.56	0.83%
2017	0.29	0.82	0.85%
2018	-	0.39	0.30%
2019	-	0.02	0.02%
2020	-	0.02	0.02%

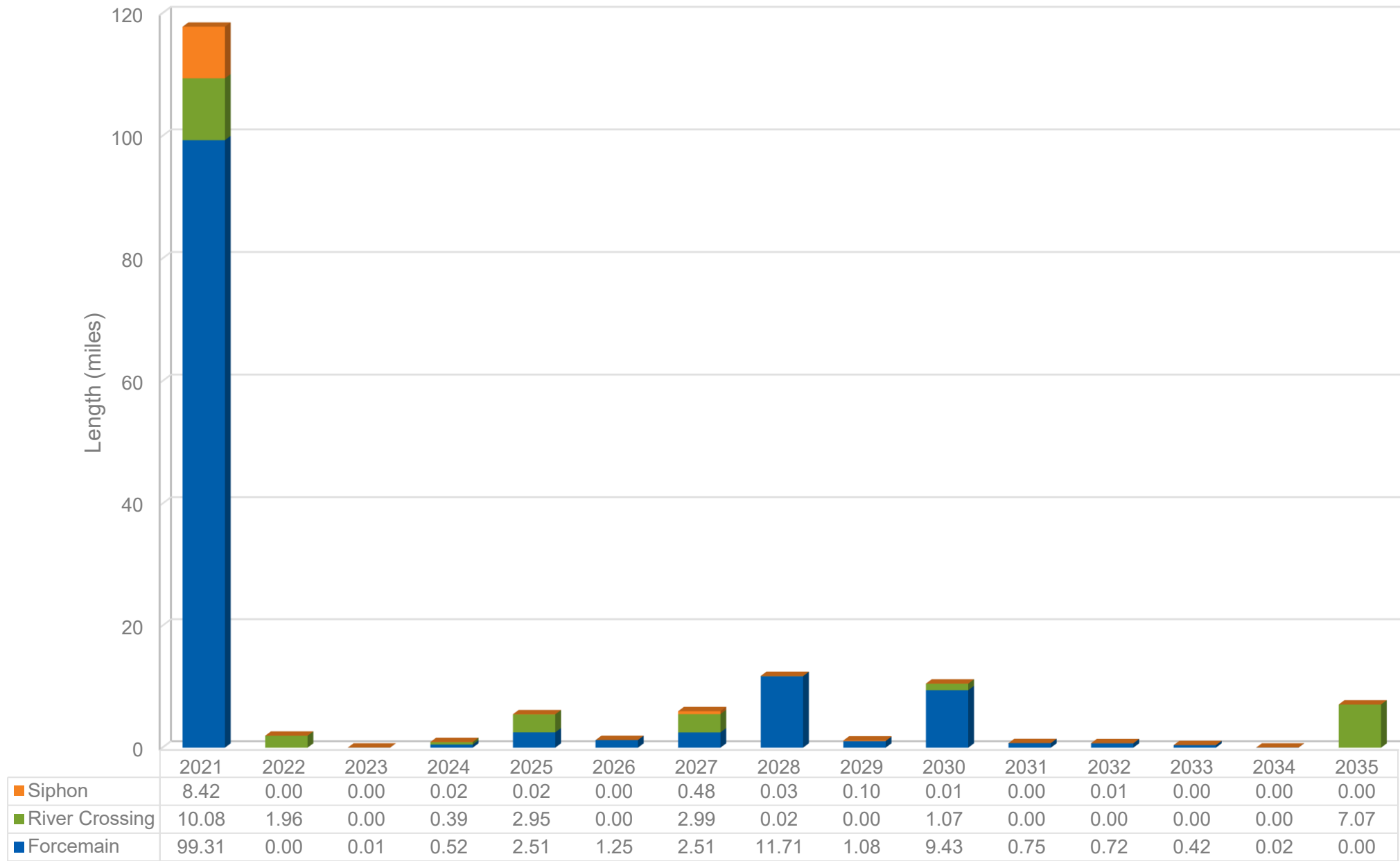
Current Ratings

Condition Rating	Miles of Pipe		
	Forcemain	River Crossing	Siphon
New/Rehab Prior to 2010	29.11	6.70	0.32
1	0.71	0.51	0.03
2	0.62	4.27	-
3	0.45	2.00	0.35
4	0.03	5.21	0.02
5	-	1.51	-
No Rating	99.31	6.33	8.38

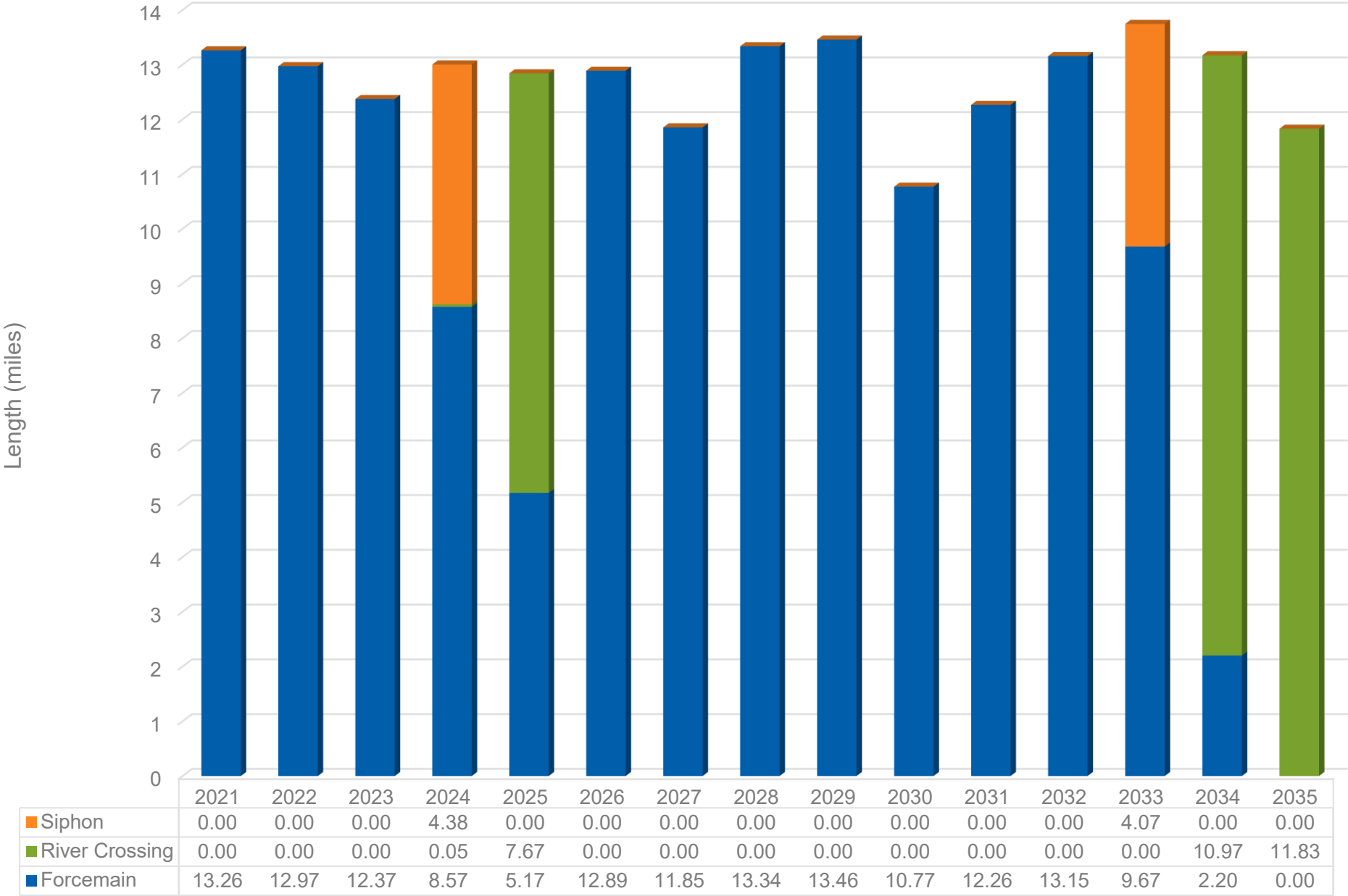
Best Practices for Recurrence Interval

Condition Rating	Recurrence Interval	
	Concrete, DIP Pipe	Corrosion Resistant Pipe (RPMP/HDPE/CIPP/PVC)
1	10	15
2	10	15
3	10	15
4	5	5
5	Rehabilitate/Replace	Rehabilitate/Replace

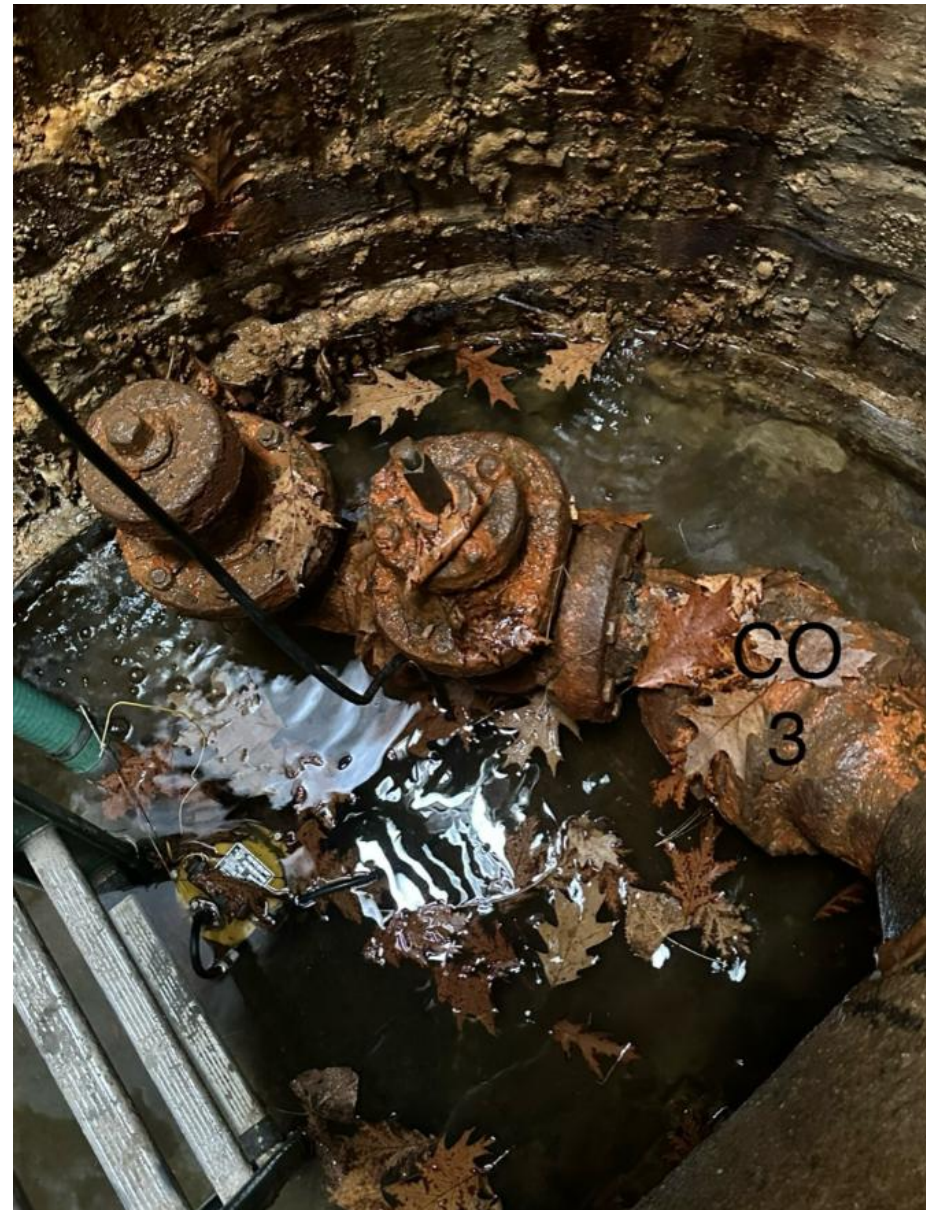
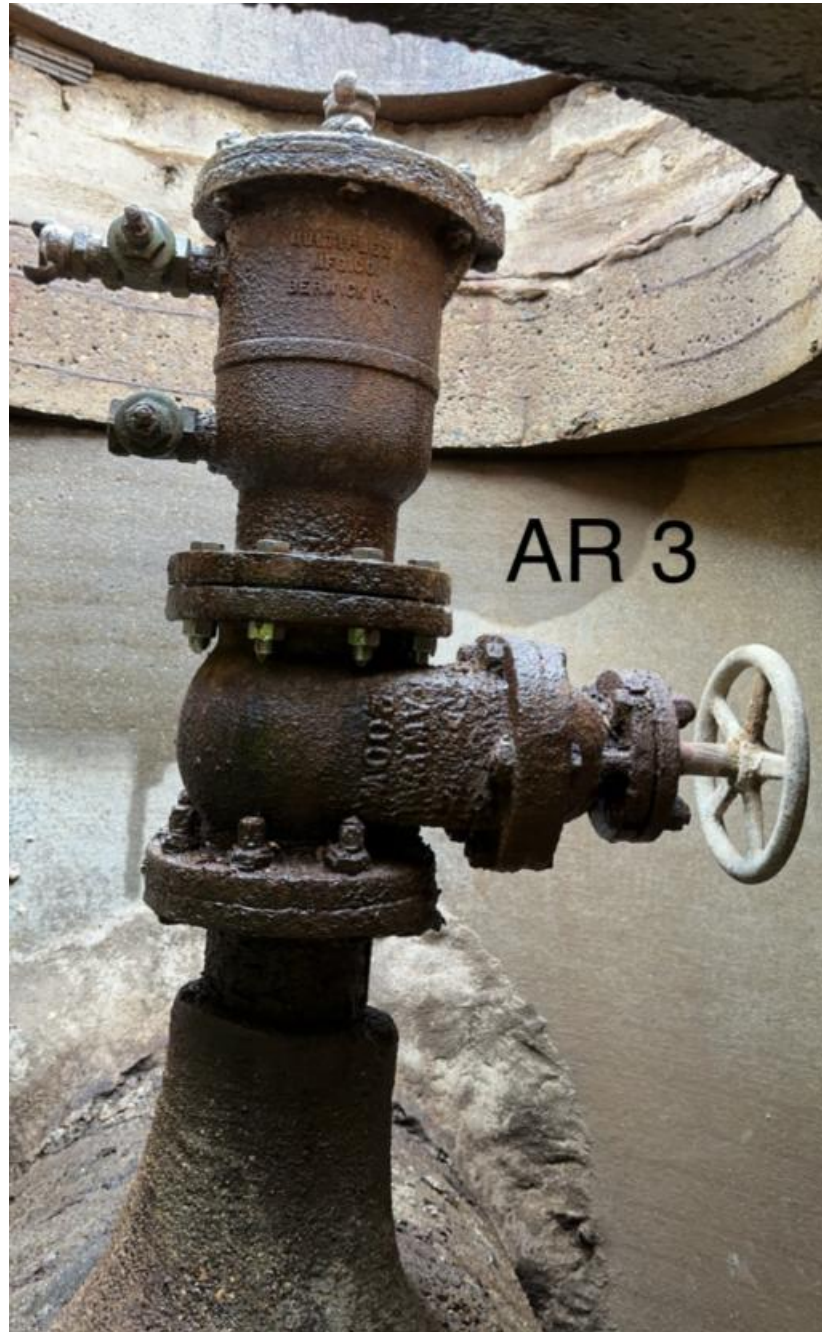
Inspection Plan: Based on Current Ratings



Inspection Plan: Distributed Workload



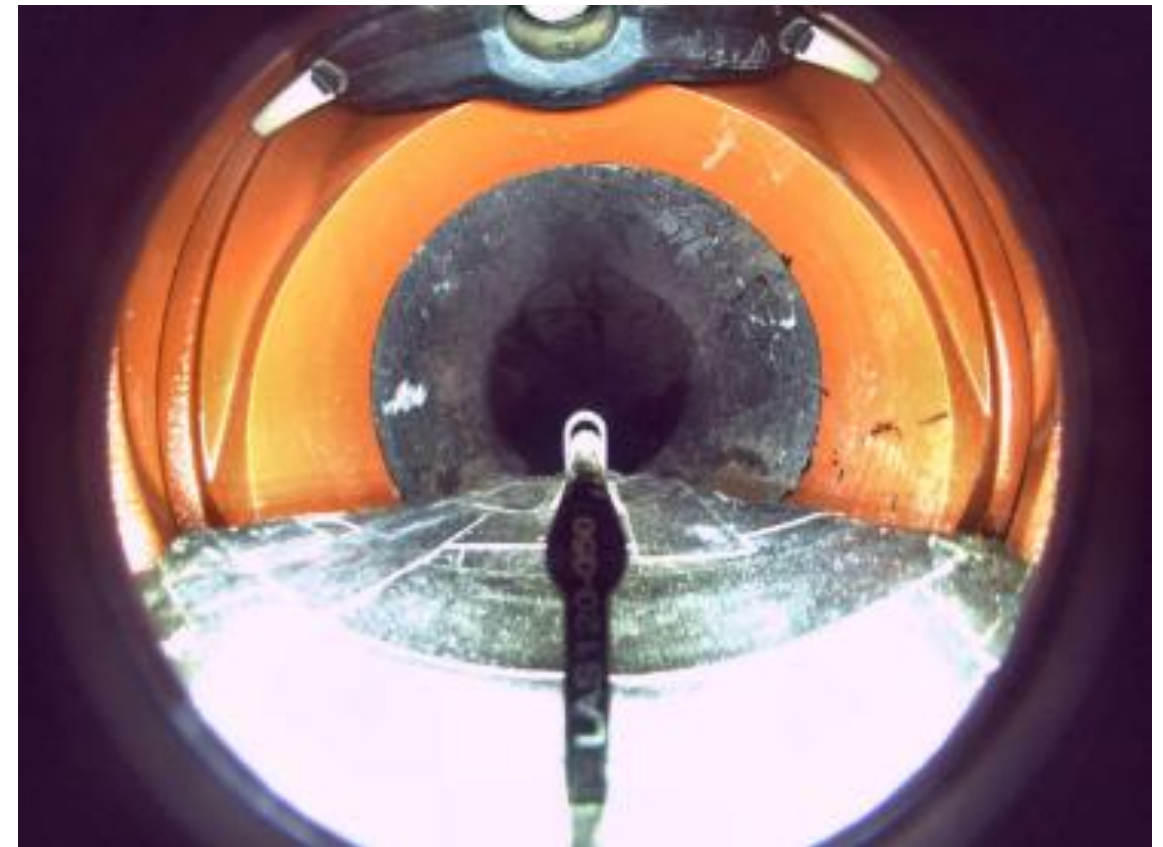
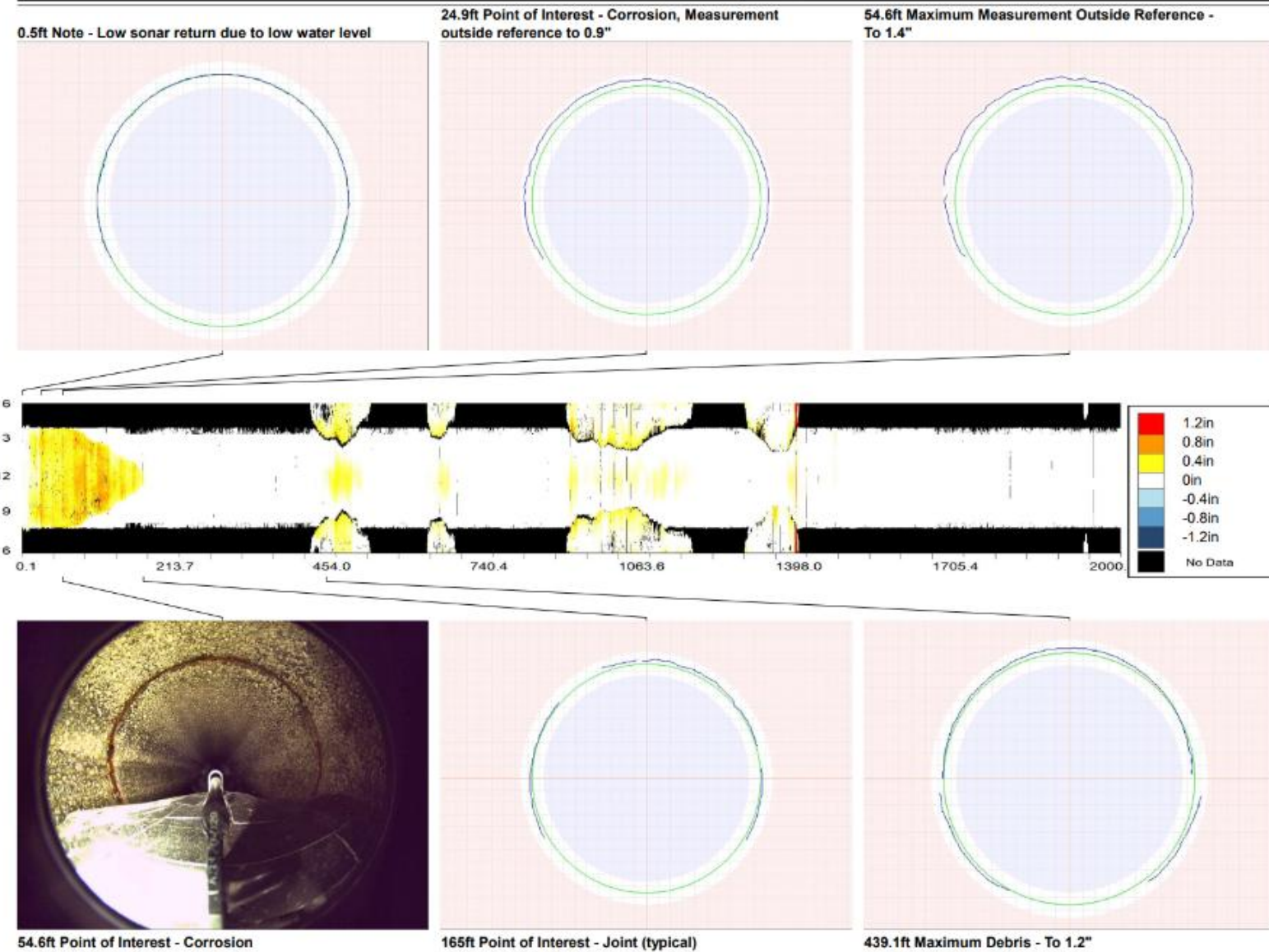
FM 7114 Accessing



FM 7114

Laser/Sonar/CCTV Inspection Results

Observation Report



FM 7114 Electromagnetic Inspection Tools

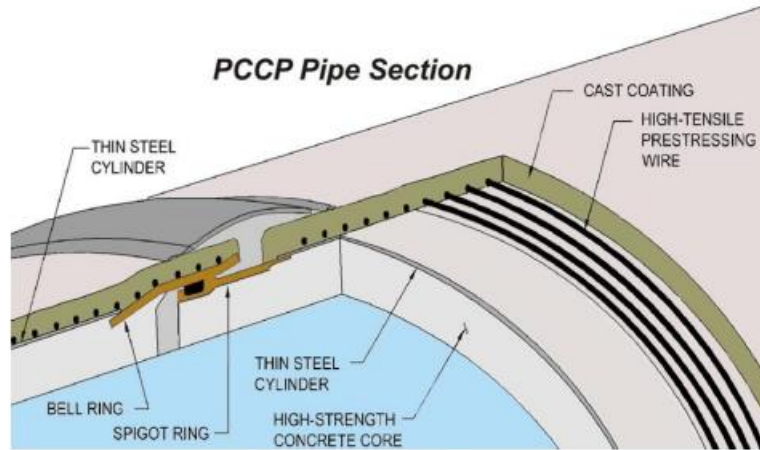


Figure 1.2: Cross-Sectional View of LCP



Figure 3.1 LPR 31-i Monitoring Location



FM 7114

Electromagnetic Inspection Results

Table 2.1: Inspection Summary				
Date	Pipeline	Start Station ¹	End Station ¹	Distance
May 7, 2025	24-inch Golden Valley/New Hope Force Main	0+37	98+45	1.86 miles

¹ Station numbers are approximated from plan and profile drawings due to the unavailability of pipe laying schedules. Mileage includes two (2) PVC and a DIP pipe sections, totaling ~0.2 miles that were inspected but not analyzed.

Table 2.2: Summary of Inspected Pipes				
Pipeline	Diameter (inches)	Number of Inspected PCCP Pipes	Pipes with Broken Wire Wraps	Anomalous Pipes
Golden Valley/New Hope Force Main	24	580	30	4

Anomalous Pipes are pipes identified with electromagnetic signals that are different from a typical distress signal.

Table 2.3: Summary of Pipes with Broken Wire Wraps					
Pipeline	Diameter (inches)	PCCP Length (feet)	Pipes with fewer than 25 Broken Wire Wraps	Pipes with 25 to 50 Broken Wire Wraps	Pipes with more than 50 Broken Wire Wraps
Golden Valley/New Hope Force Main	24	8,710	26	4	0

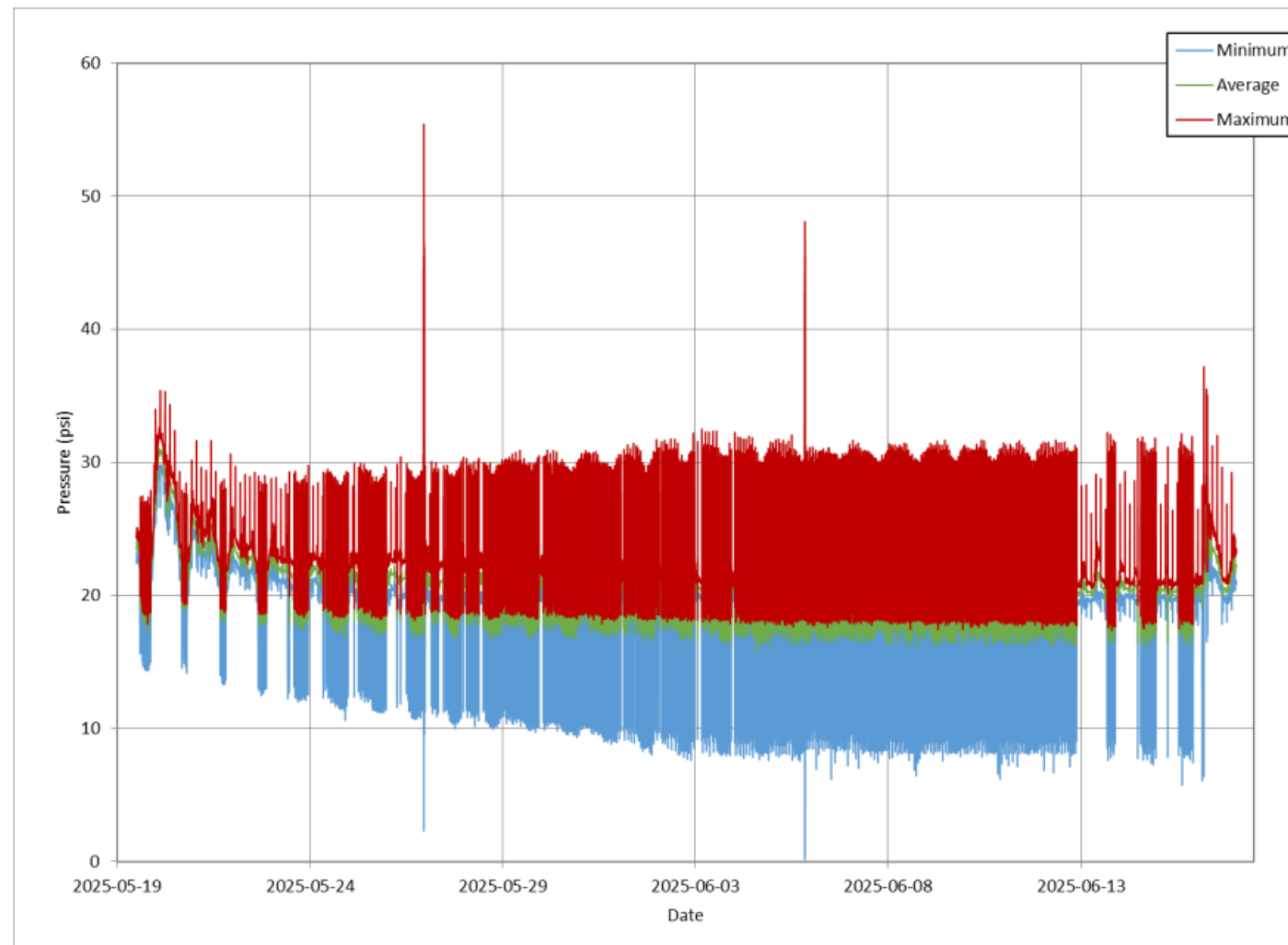


Figure 3.2: Pressure Recordings for 24-inch Golden Valley Force Main

FM 7114

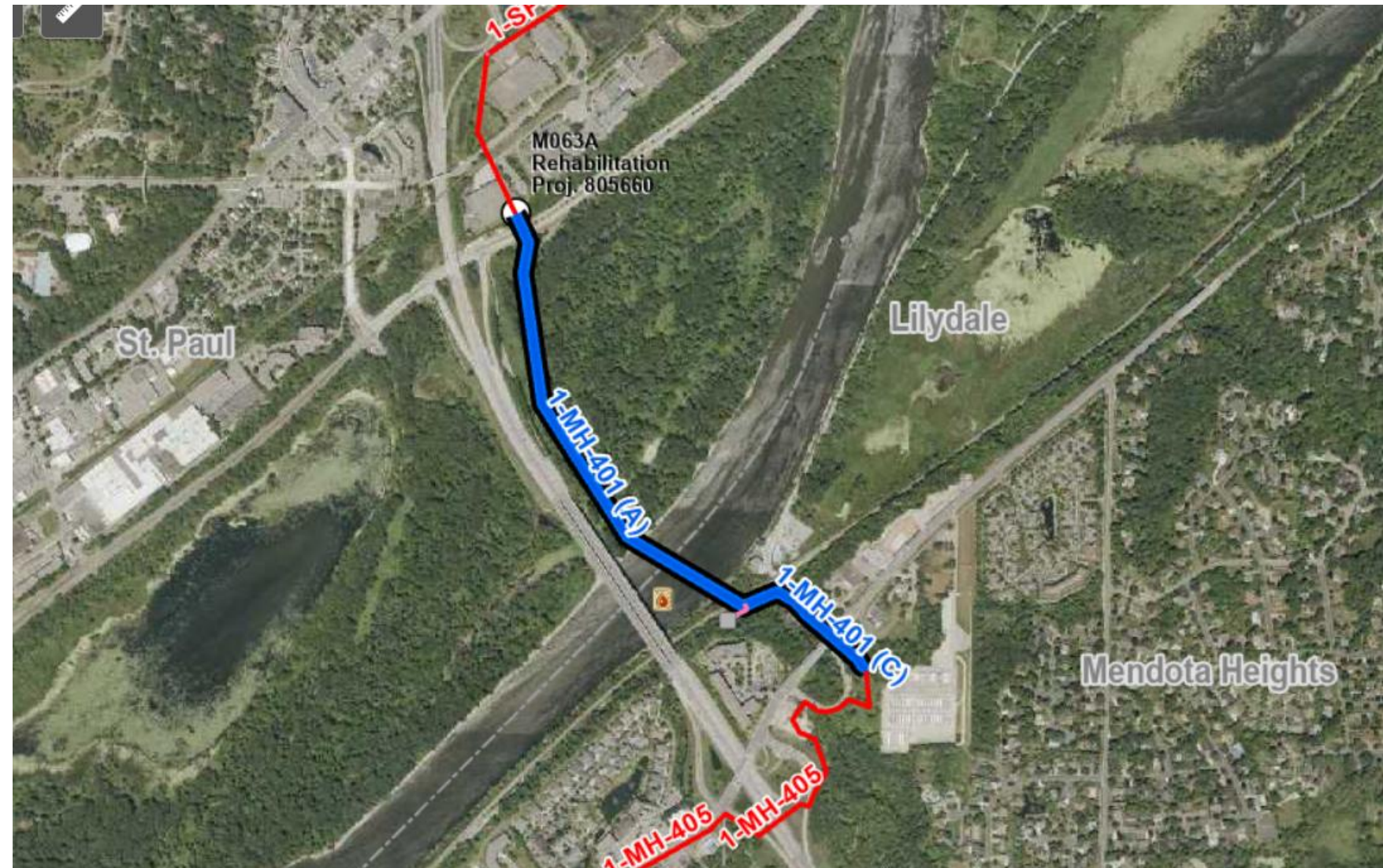
Lessons Learned

- Laser/sonar/CCTV multi-instrument could not TV invert, but laser, sonar, and cleaning CCTV combined were effective.
- Electromagnetic inspection could do the whole pipe, including severe bends, but is only good for PCCP
- Tethered equipment has limitations free floating equipment does not
- Need to take weather into account to avoid pipe freezing

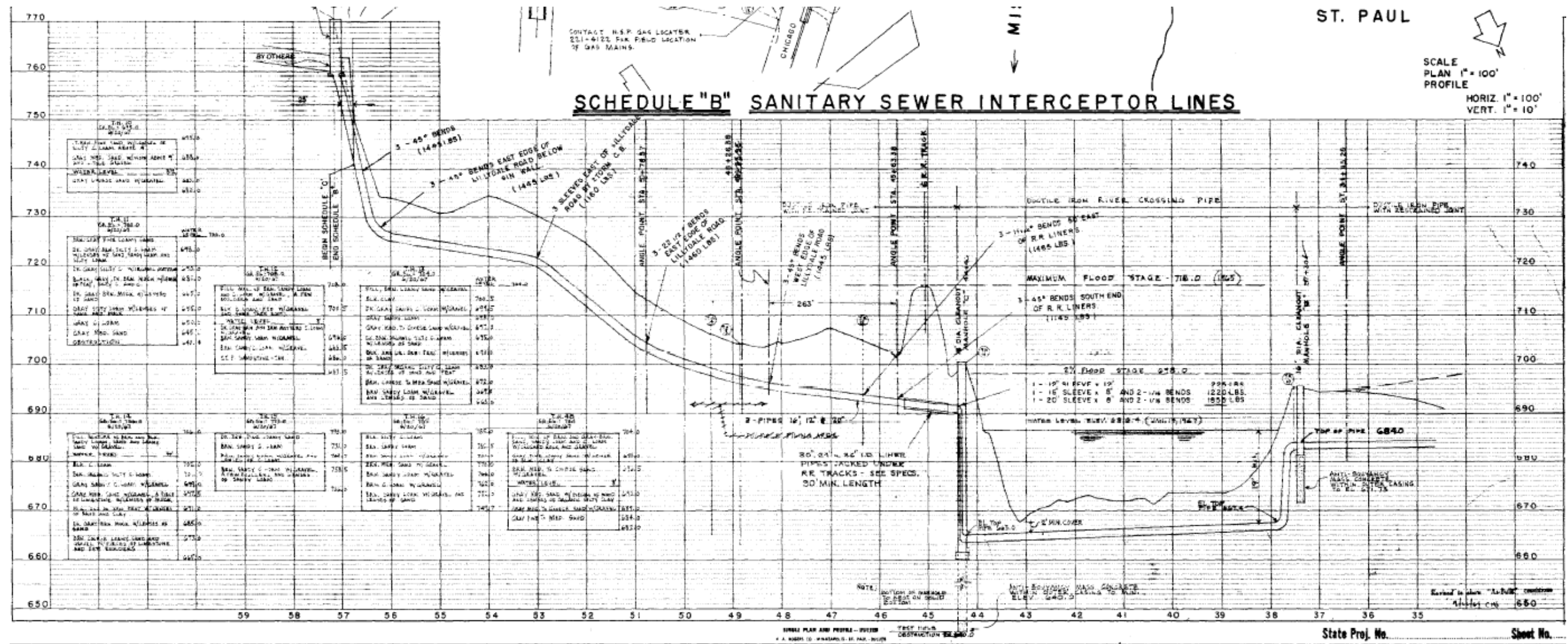
Project 805506

Phase 1 Inspections

- FM 7114
- 1-MH-401 Siphon



1-MH-401 Siphon South Profile



HEADHOUSE

VAULT C

VAULT B

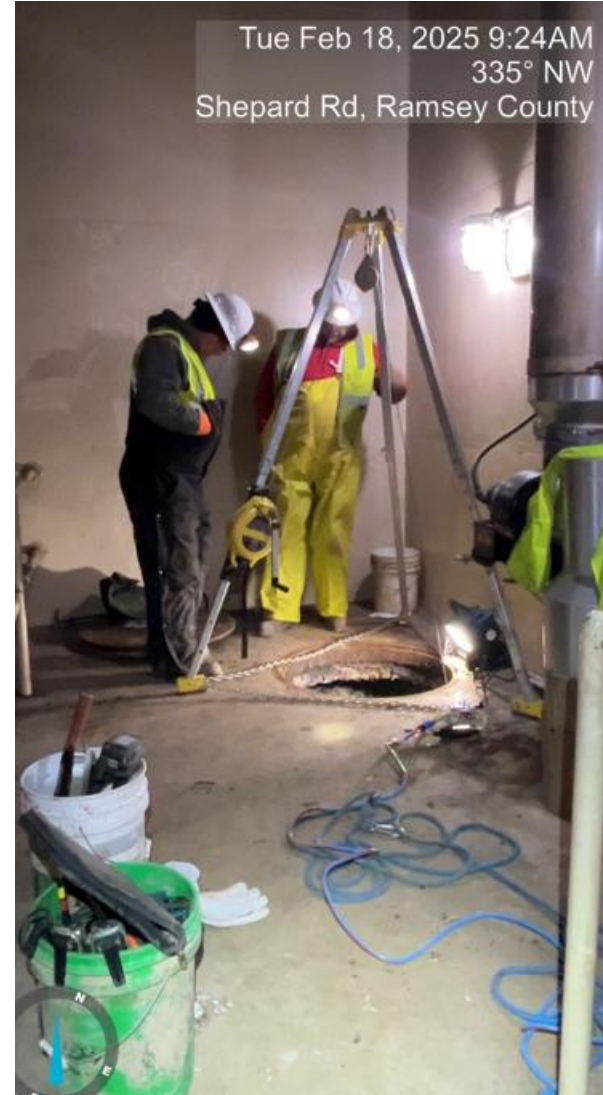
1-MH-

Metropolitan Council

1-MH-401 Siphon Pipe Failure



1-MH-401 Siphon Pipers Inspection



1-MH-401 Siphon Pipers Inspection Results

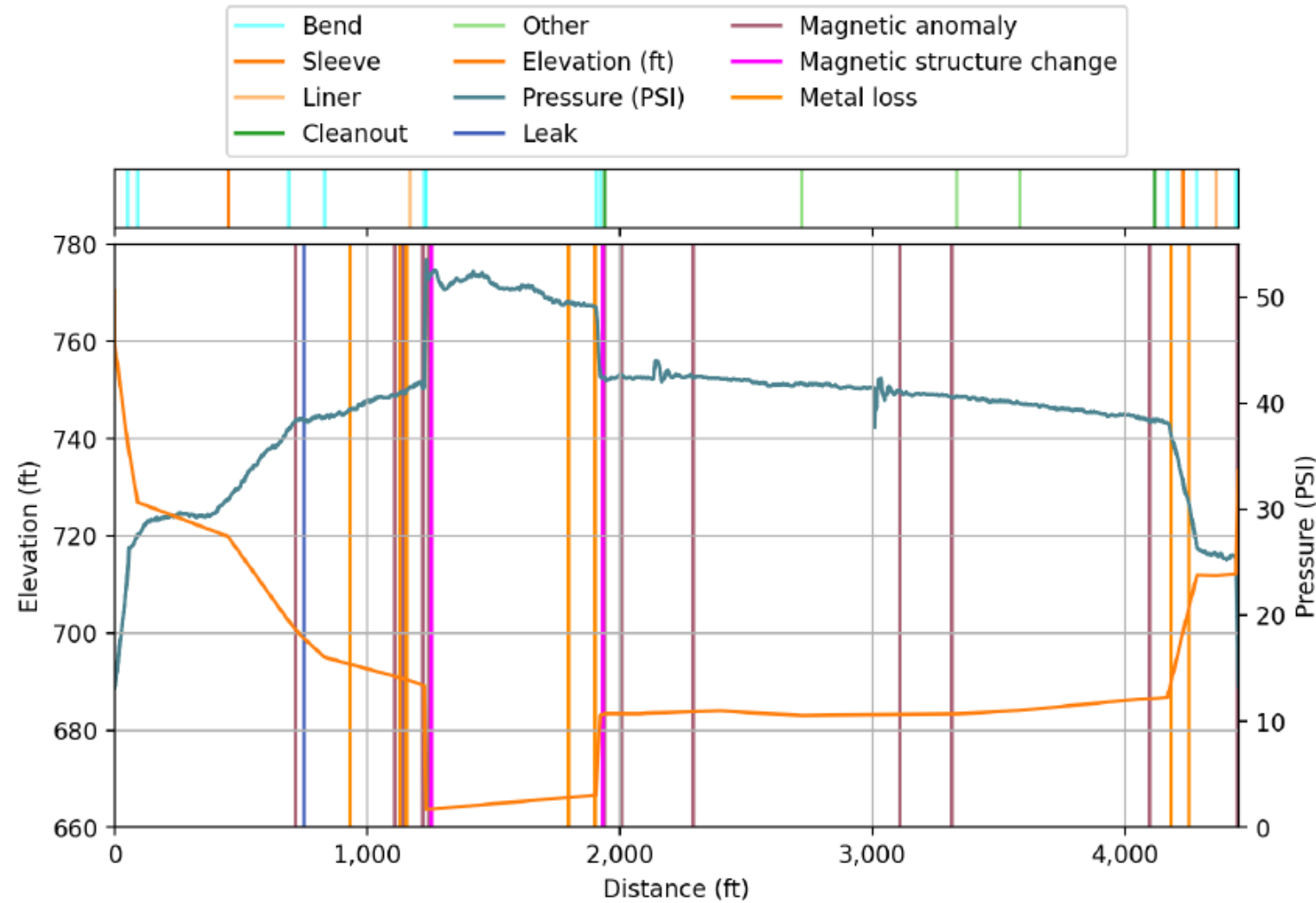


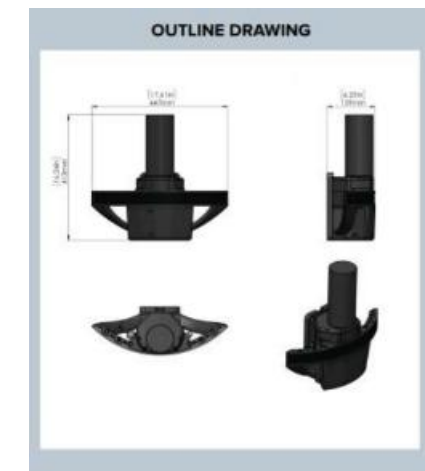
Figure 1: The pipeline elevation profile and the measured pressure during the Pipers® inspection with identified features overlaid. Pipeline features indicated in the provided information are marked above the elevation profile with vertical lines.

1-MH-401 Siphon Pipers Inspection Results

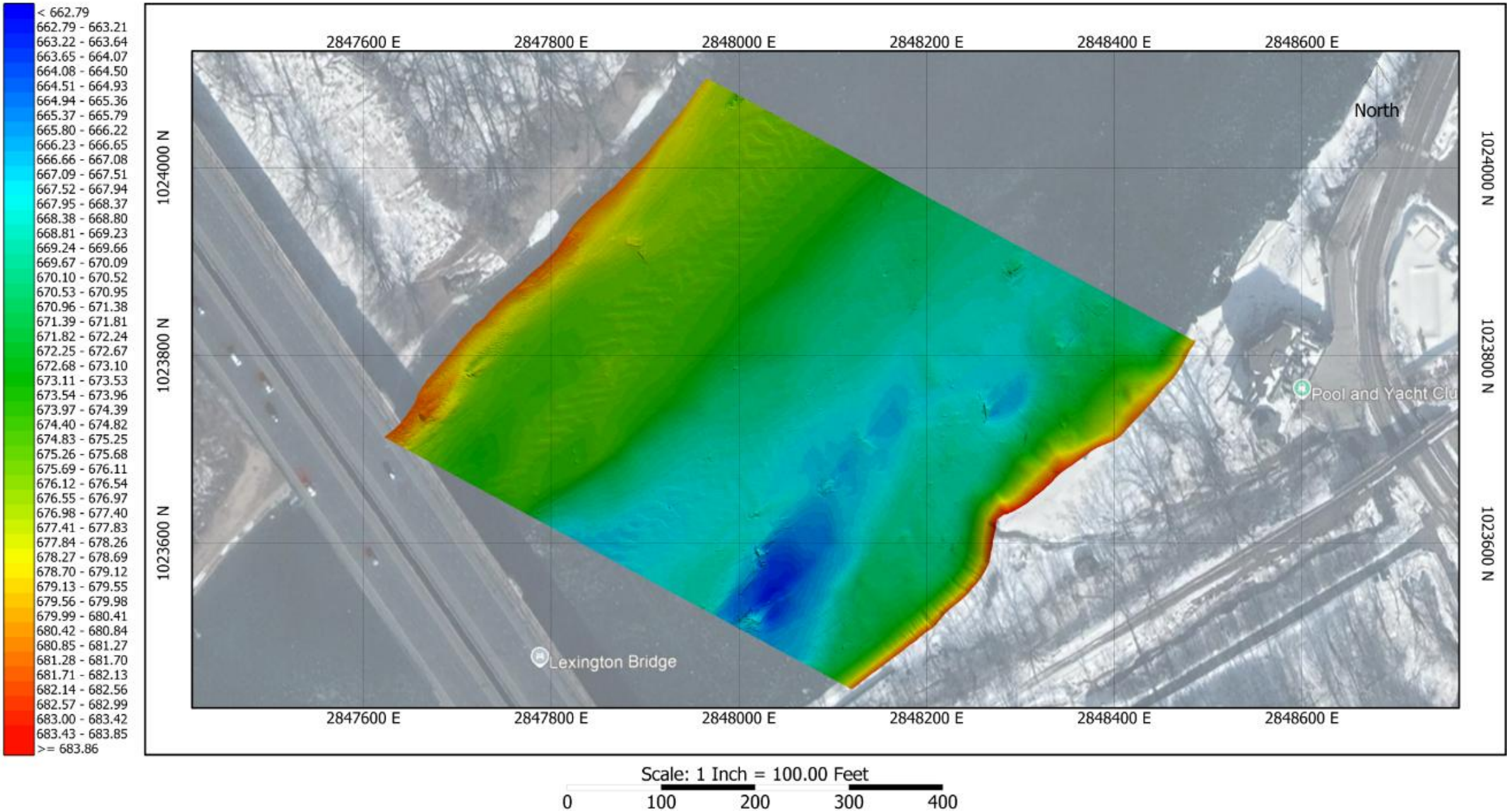


1-MH-401 Siphon Bathymetric Survey

- Positioning Systems
- Multibeam Echosounder
- Sound Velocity Profiler
- Sub Bottom Profiler



1-MH-401 Siphon Bathymetric Survey



1-MH-401 Siphon Bathymetric Survey

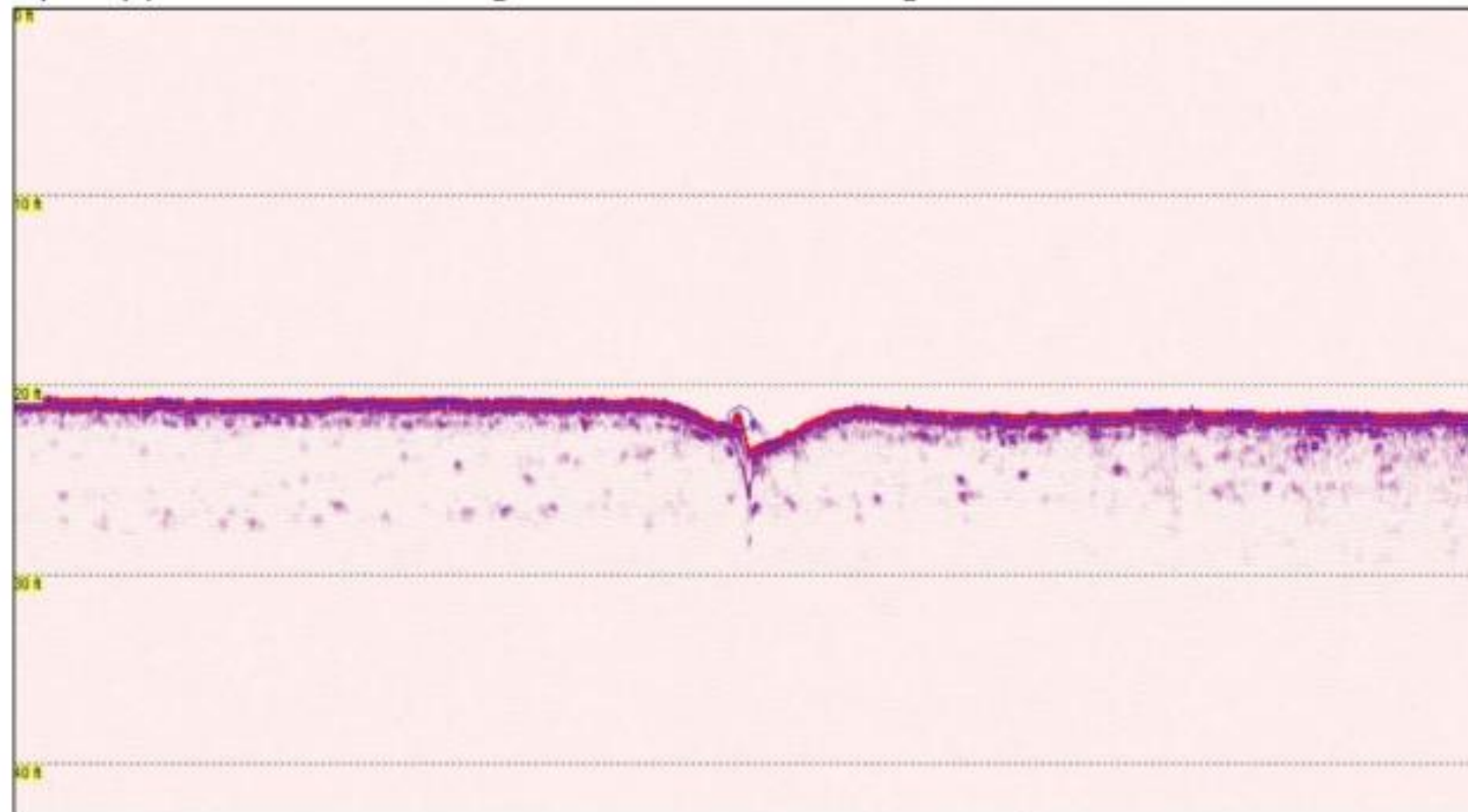


Figure 9. pipeline exposure depicted on SBP profile

1-MH-401 Siphon Lessons Learned

- Locations of utilities crossing our DIP forcemains need to be identified.
- Existing corrosion protection systems need to be monitored and maintained. Program currently under development. (Future Information Item?).
- Insertion and retrieval of Pipers tool is easy compared to other technologies.
- Cost of this technology is a fraction of the other technologies used, but it is only good for DIP

Future Inspections

- Project 805521 Forcemain Inspection Phase 2 will use the Pipers technology to inspect 10 DIP forcemains. Bid in 2026 and inspect in 2027.
- Project TBD Forcemain Inspection Phase 3 will use all technologies discussed to inspect the remaining 14 forcemain systems. Bid in 2027 and inspect in 2027 and 2028.
- This inspection schedule puts us far ahead of the schedule projected in the Program Manual.



Thank you

Jeff Schwarz, P.E.,
Minneapolis Area Program Manager
Jeffrey.schwarz@metc.state.mn.us
651-325-6378

