

14 Mile Road Condition Assessment

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Issues and Challenges

- *Aging Infrastructure*
- *Large Installed Capital Base*
- *Too much capacity*
- *Maintain balance between*
 - Efficiency - lowest life cycle costs
 - Level of Service – water is “always on”



Program Objectives



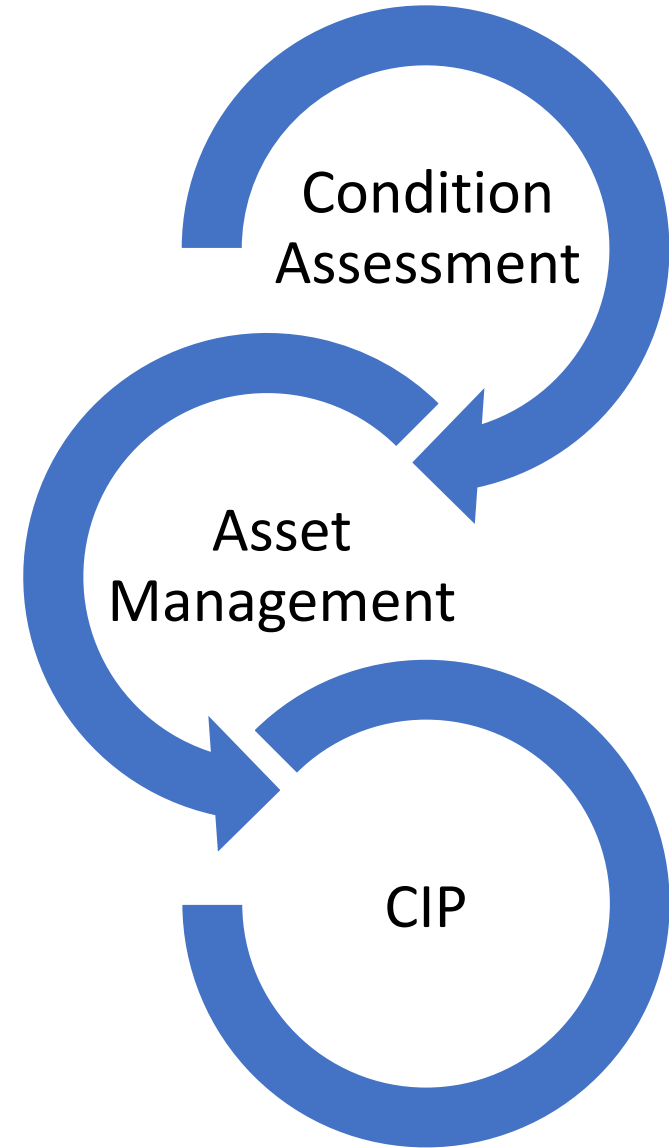
Risk Management



Budget Optimization



Best-In-Class System Management



AGENDA

- **Inspection Overview**
 - Background
 - Preparation
 - Inspection
- **Results Overview**
 - Acoustic Data
 - Electromagnetic Data
 - Structural Evaluation
- **Conclusions**
 - Conclusions
 - Recommendations



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Inspection Overview

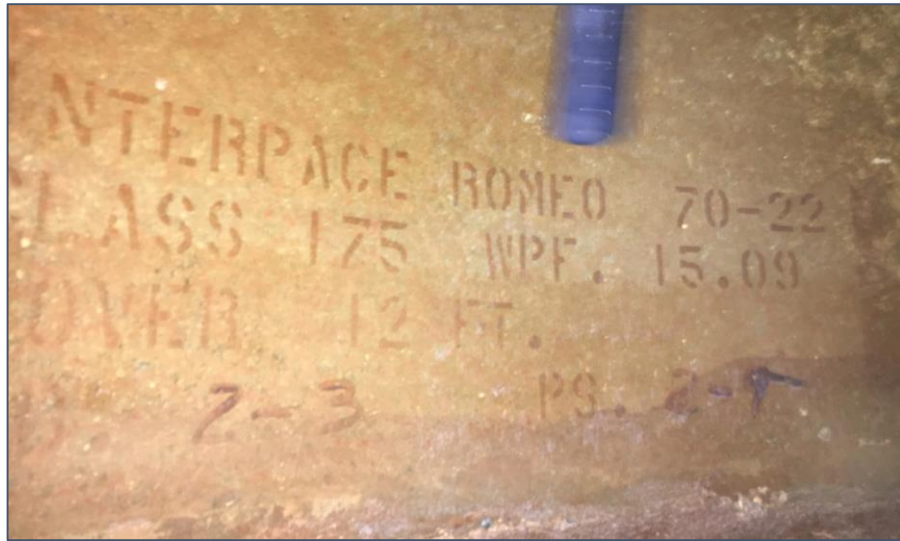
14 Mile Road



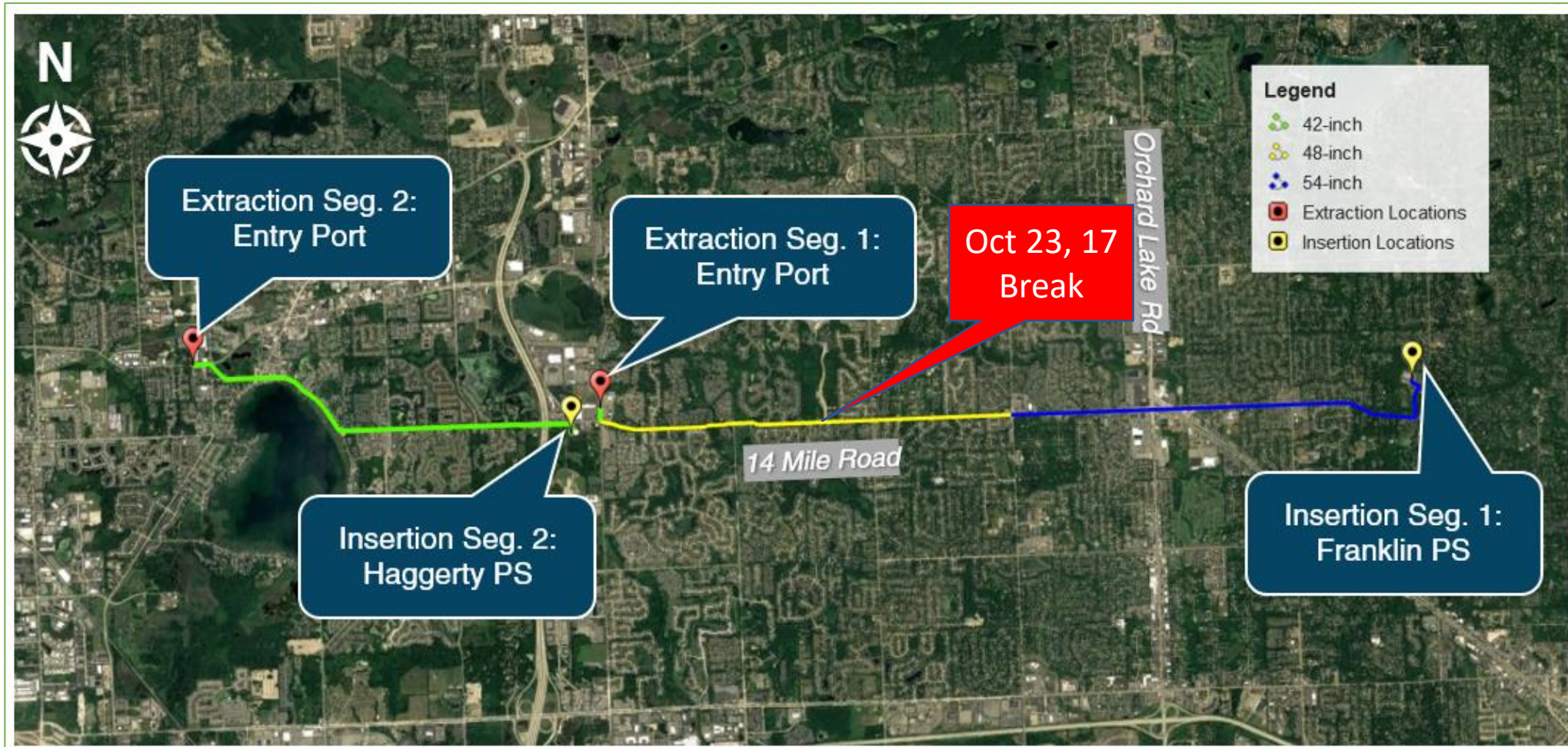
BACKGROUND

- **October 2017 Break (WS-196)**

- Impacted 300,000 customers
- Likely a power trip which initiated event
- Evidence of hydrogen embrittlement



INSPECTION



Results Overview

14 Mile Road





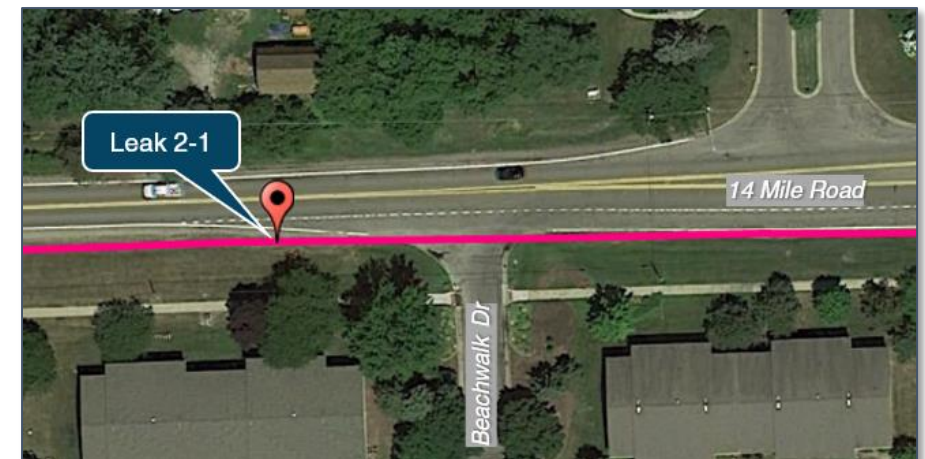
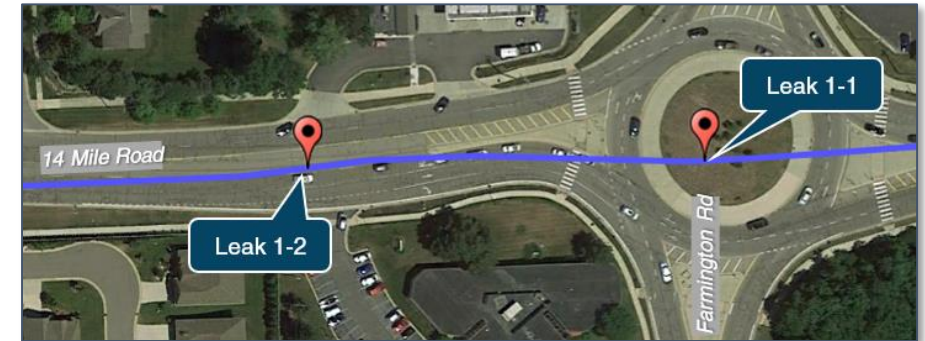
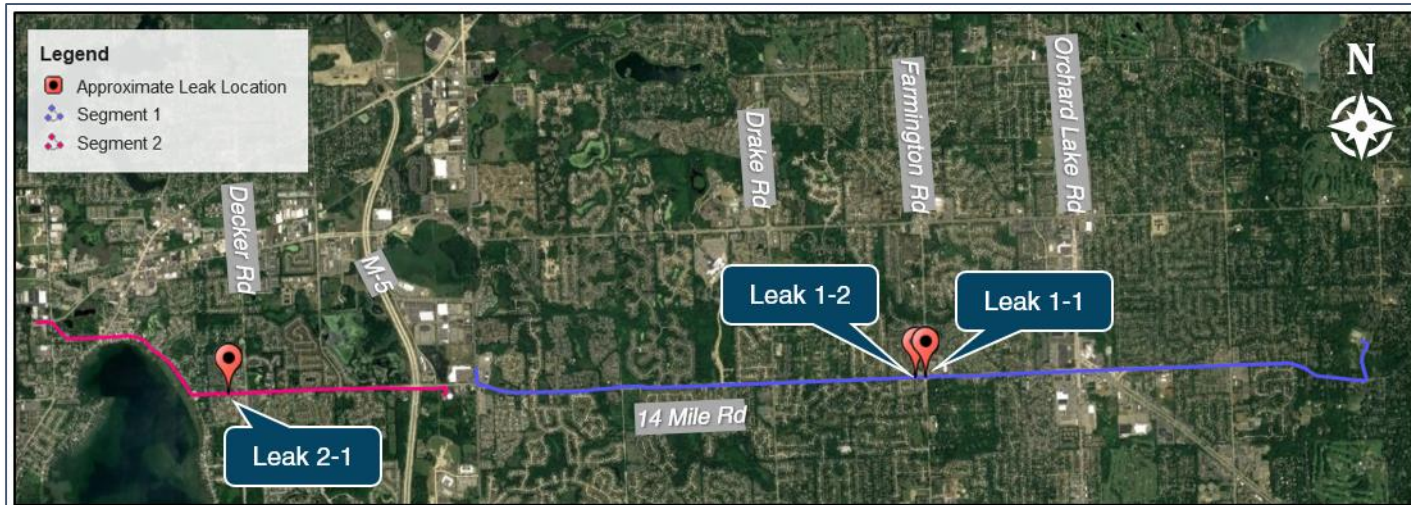
Acoustic Monitoring

- 1) *Rolls along bottom of main*
- 2) *Has a “sonar” function to detect air voids*
- 3) *“Listens” to detect leaks*

ACOUSTIC RESULTS

Critical Findings of SmartBall Inspection				
Acoustic Event	Leak Type	Size of Leak	Distance from Nearest Tracking Location	Suspected Source of Leak
Segment 1				
1-1	Feature-Related	Small	17.2 feet U/S of 54" BFV (Station 153+08.50)	24-inch valve on outlet serving FT-09 (Station 152+92.10)
1-2	Feature-Related	Small	329.2 feet D/S of 54" BFV (Station 0+16.10)	Entrance MH (Station 0+16.10)
Segment 2				
2-1	Feature-Related	Small	296.8 feet D/S of 30" GV (Station 128+25.39)	Blow-off (Station 0+30)

All addressed



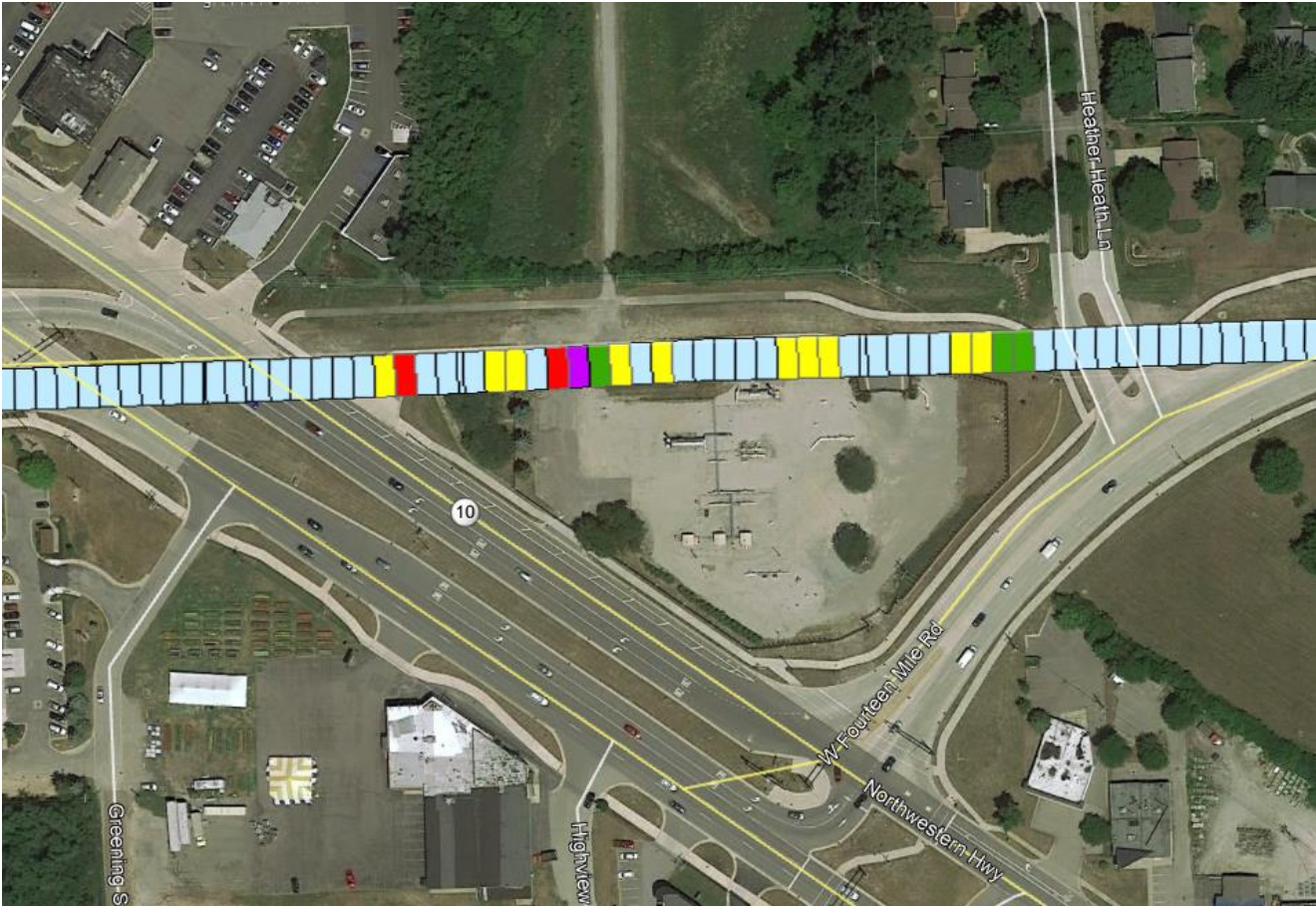
Electromagnetic Frequency (EMF)

- 1) *Neutrally buoyant, free floats through pipe*
- 2) *Emits EMF waves*
- 3) *Records EMF waves*
- 4) *Used to interpret number of wire breaks*



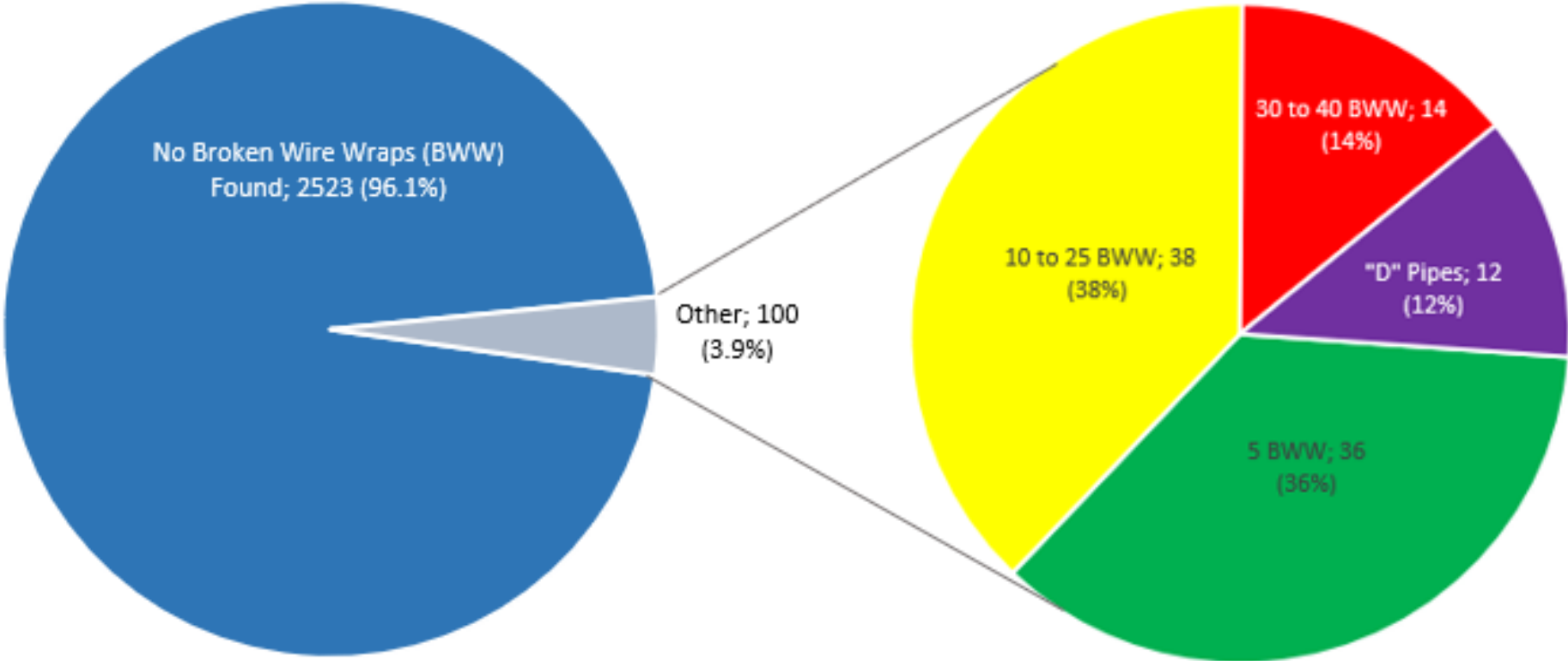
- **GIS Pipe List**

- Shows individual pipes and wire break count
 - Light blue – no wire breaks detected
 - Green – 5 wire breaks reported
 - Yellow – 10 to 25 wire breaks reported
 - Red – 30+ wire breaks reported
 - Purple – Distressed pipe “D”



ELECTROMAGNETIC RESULTS

Segments 1 & 2: All Contracts



NOTE:

1) "D" Pipes refer to distress reported across entire length of the pipe. Due to the complexity of the analysis for these types of pipes, the Broken Wire Wraps (BWW) quantification is not available.

Conclusions

14 Mile Road



- **Inspection**

- Total of 3 leaks detected and repaired
- Total of 100 pipes detected with distress, ranging from 5 – 40 BWW, 12 pipes with Distress across length of pipe

- **Structural Analysis**

- AWWA C301 was satisfied for all five (5) of the pipe classes analyzed
- AWWA C304 was satisfied for WS-167 and WS-332 Class A
- AWWA C304 indicated that Serviceability Limiting Criteria was not satisfied for WS-196 Classes A and B, and WS-332 Class B
- FEA evaluation indicated:
 - For Operating Pressure:
 - 8 pipes exceeded the yield limit
 - 0 pipes exceeded the strength limit
 - For Operating plus Surge Pressure:
 - 21 pipes exceeded the yield limit
 - 11 pipes exceeded the strength limit

• Recommendations

- Repair or replace 21 pipes which were found to exceed the yield limit at surge + operating pressure
- Install AFO monitoring system to monitor prestressing wires
- If replacements are made, provide forensics of pipe for updated analysis
- Install continuous high-frequency pressure monitoring

Lessons Learned From the Pilot

- 96+ % of Pilot piping has no sign of wire breaks
- Very labor intensive for staff and member partner staff to prep and conduct acoustic and EMF assessments
- Uncertainty remains in interpretation of risk and probability of failure
- GLWA and Member Partners have developed emergency connection protocols
- Due to uncertainty, recommendation is to wait for completion of Haggerty loop prior to repairing or replacing pipe

Going Forward

- Recommend installing permanent Acoustic Fiber Optic monitoring
- Haggerty Loop project is progressing on schedule
 - Bid – Spring 2021
 - Start of Construction – July 2021
 - Completion – July 2023
- Recommend addressing distressed pipes after completion of Haggerty Loop to mitigate risk to Member Partners



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