PROVEN TECHNOLOGIES, NEW WAYS OF THINKING

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City of Arlington

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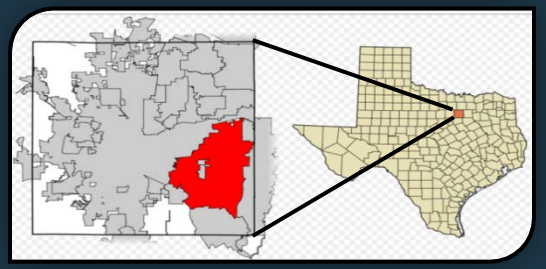
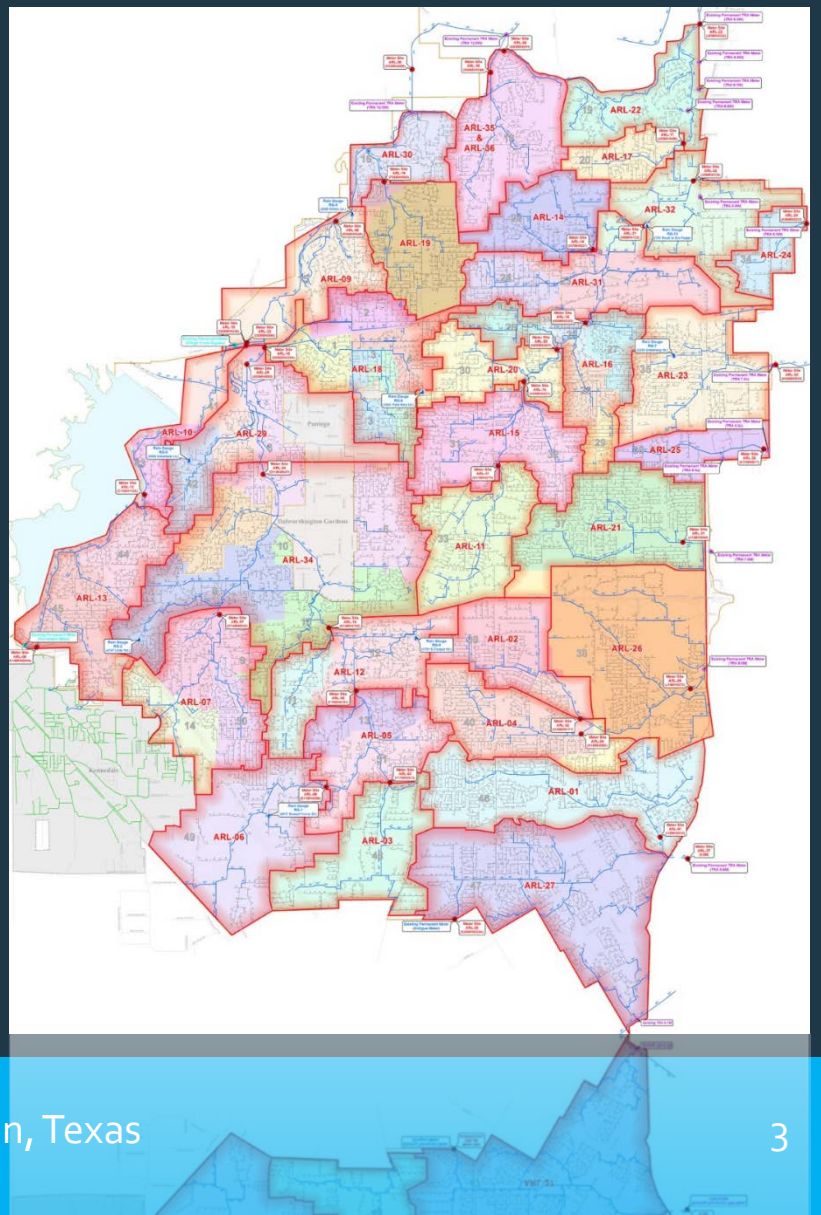
THE CITY OF ARLINGTON

- Centered in the Dallas/ Fort Worth metropolitan area
- Population over 370,000 (50th Largest in USA)
- City of Arlington is home to The University of Texas at Arlington, General Motors, D R Horton, The Original Six Flags, The Texas Rangers and The Dallas Cowboys



ARLINGTON WATER UTILITIES

- Daily Water Demands 35 MGD to 115 MGD
- Rated Water Production Capacity of 172.5 MGD
- 1,425 Miles of Public Water Main
  - 6-inch to 54-inch in diameter
- 1,222 miles of Sanitary Collection System
  - 6-inch to 72-inch in diameter
- Average Pipe Age 29 Years



Rethinking Renewal Prioritization

- Age rarely correlates with condition (Water Research Foundation)
- 70% to 90% of replaced pipelines have remaining life (US EPA)
- "New" technology may be proven technology
- Failure of large mains cause biggest impact

Rethinking Renewal Prioritization

- Move beyond age, material and failure focus
- Assess actual pipe condition
- Savings from focused pipe replacement fund transition to proactive replacement

Goals

- Maximizing useful life of assets
- Efficient spending of replacement dollars
- Avoid major unplanned repairs
- Make better design decisions for new mains

CONCRETE WATER MAIN CONDITION ASSESSMENT PROGRAM

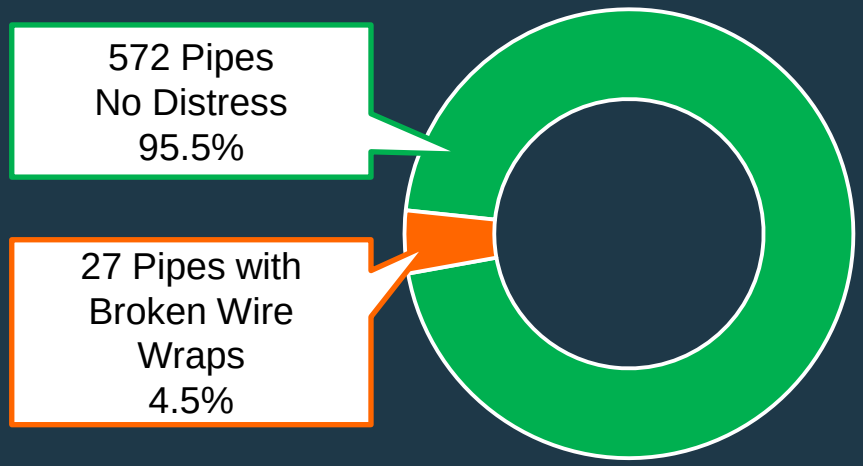
Case Study

Green Oaks Water Transmission Main 2016 Condition Assessment

- 2.6 miles, 42", 48" & 54", Prestressed Concrete Cylinder Pipe (C301), 1982
- Estimated Replacement Cost $10,500,000
- Assessment Cost $286,500

Green Oaks Water Transmission Main 2016 Condition Assessment

- Assessment Results
  - 599 pipe segments
  - 27 segments with wire breaks (4.5%)
  - 6 segments with 25+ wire breaks (1.0%)
  - Cost avoidance of $7,000,000



LARGE DIAMETER SANITARY SEWER CONDITION ASSESSMENT PROGRAM

City of Arlington and
University of Texas at Arlington
Collaboration

66-Inch Sanitary Sewer Failure

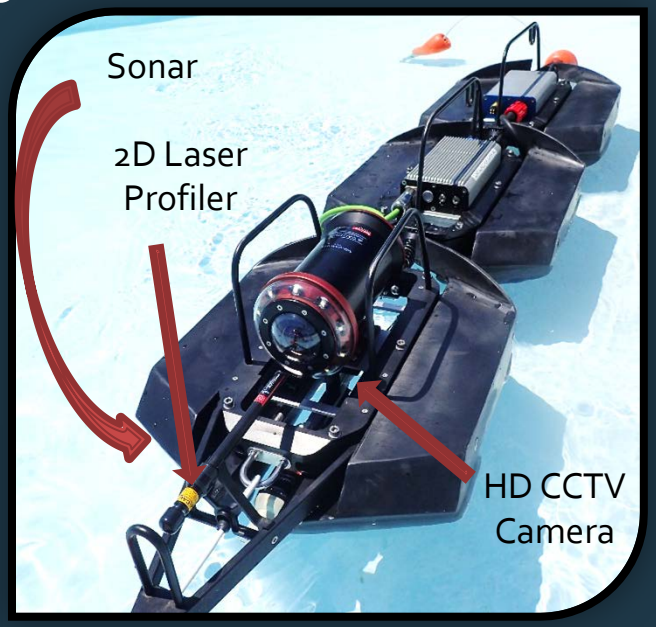
- Installed in 1983
- 66-inch RCP Sanitary Sewer
- Repair Cost $138,000

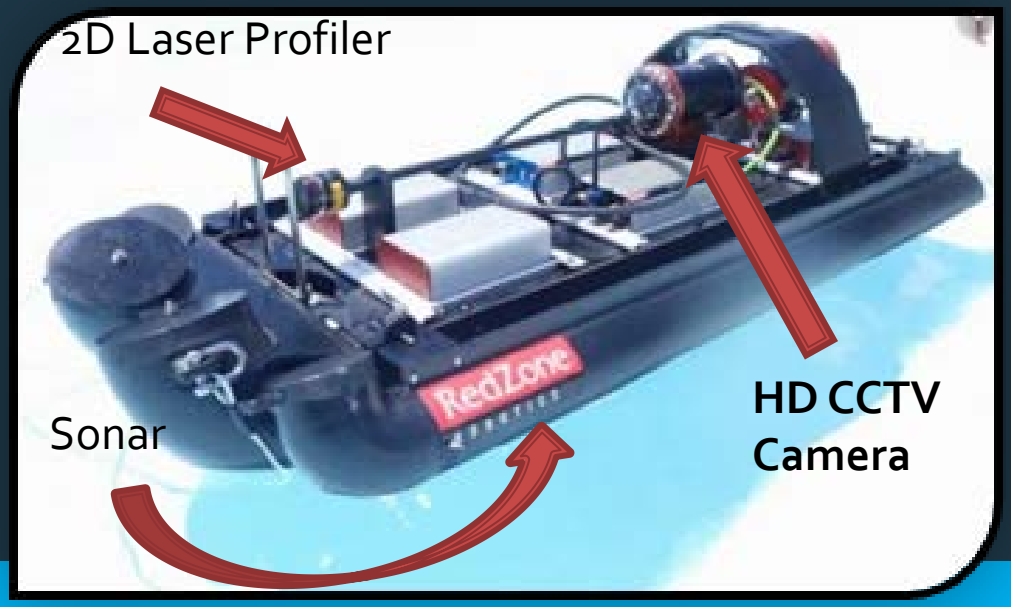
Inspection Project Scope

- Inspect 48 miles of 24-inch to 72-inch Sanitary Sewer Main
- AWU / UTA partnership
  - Pre-Inspection Research
  - HD CCTV, Sonar and Laser Inspection
  - Laboratory Materials Testing (Planned)
  - Data Analysis and Report Summarizing Findings
  - CIP Development/Risk Based Assessment

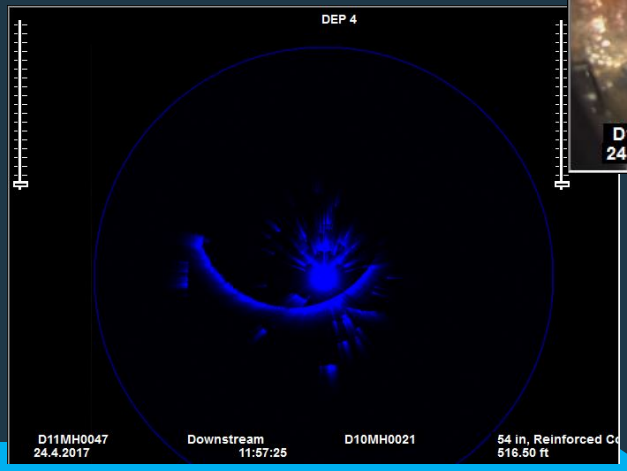
MSI Inspection Equipment

- Multi-Sensor Inspection Platforms
- HD CCTV Camera
- Laser Ring Profiler
- Sonar

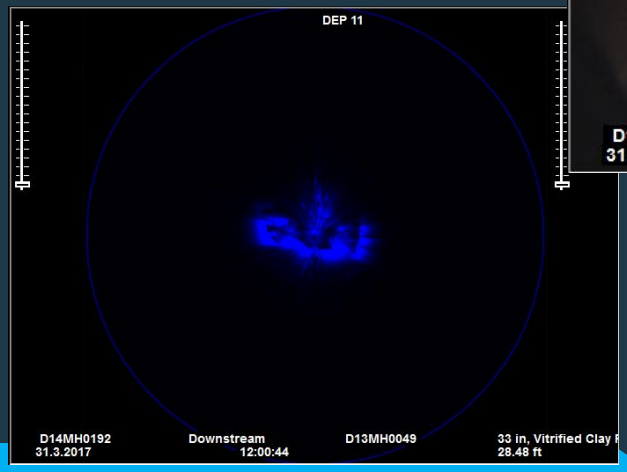




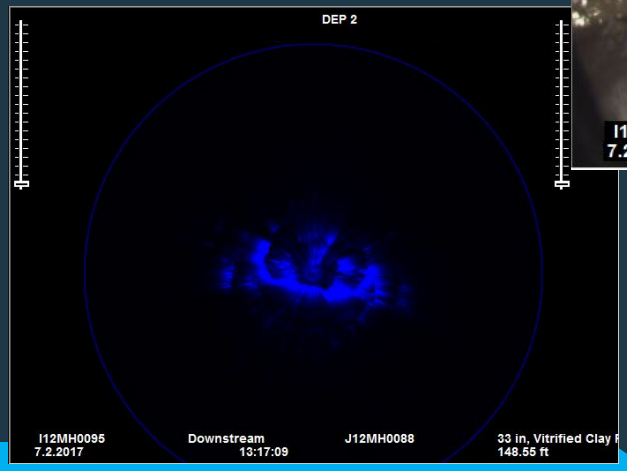
Collected Data (Good Condition)



Collected Data (Bad Condition)

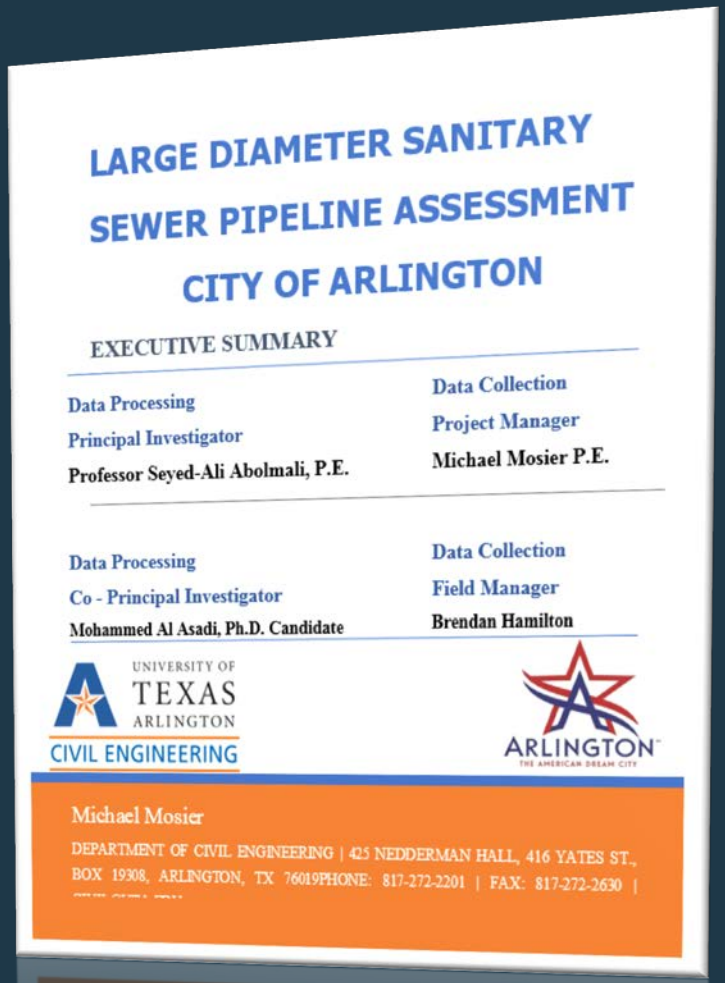


Collected Data (Bad Condition)



UTA Research Enhancements

- Validated life cycle analysis
- Core sample confirmation
- Customized output
- Partnering with a nationally recognized pipe research institution



Results We Can Act On

Pipe Critical Defect Summary

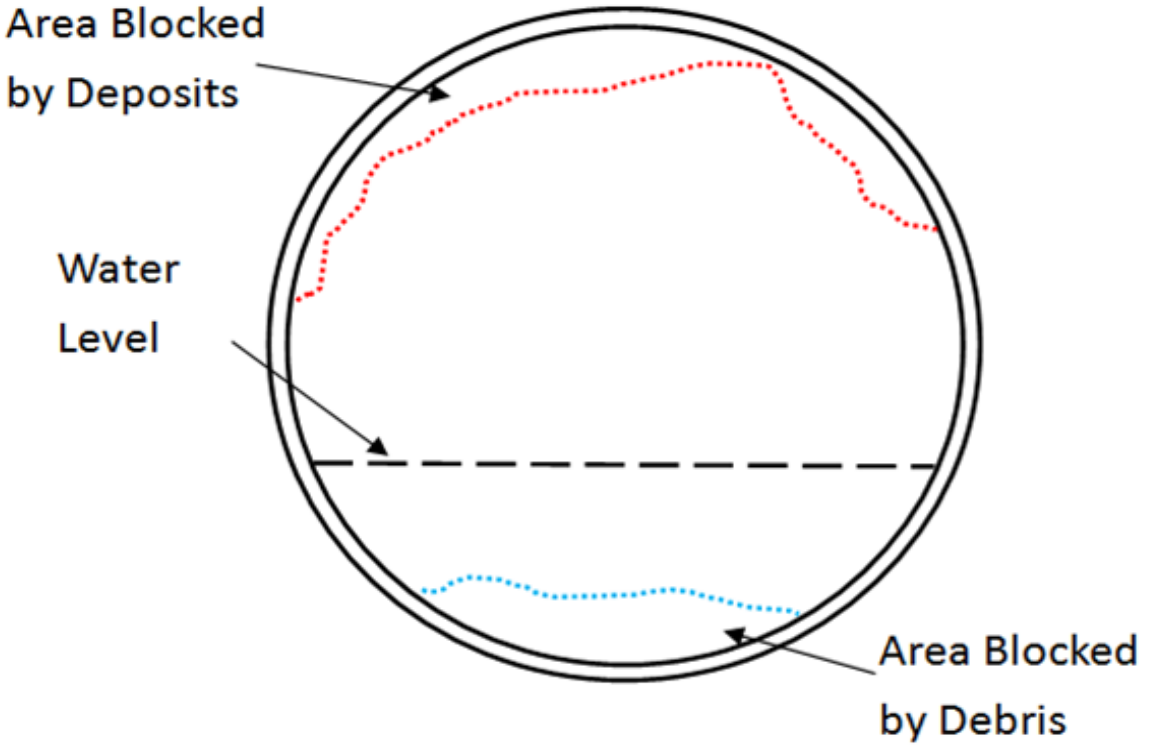
LINE INSPECTION SUMMARY			
Asset Number	D09SL0105	Inspection Number	2
Upstream Manhole	D09MH0045	Observed Material	VCP
Downstream Manhole	D09MH0108	Observed Pipe Length	590.8 ft
Inspection Direction	DOWNSTREAM	Observed Pipe Diameter	36 in

OBSERVATION METRIC	OBSERVATION
Distance Planned (ft.)	592
Percentage of The Line Not Inspected	0%
Total Collapsed	0
Total Fractures Multiple	0
Total Fractures Hinge	0
Total Fractures Longitudinal	0
Total Fractures Circumferential	0
Broken	0
Deformed Rigid	0
Joint Offsets	0
Total Roots Occurrences	0
Level 5 Defects	0
Level 4 Defects	0
Total Defects	0
Total Debris Volume (ft^3)	251.2
Total Deposits Volume (in^3)	50221.4
Maximum Blockage (%)	18.1
Maximum Deposit Height (in)	2.8

Results We Can Act On

Debris and Deposit Blockage

Rank	Line ID	Pipe Material	Pipe Diameter (in.)	Peak Area Blocked by Deposits (%)	Peak Area Blocked by Debris (%)	Peak Combined Blockage (%)
1	D09SL0101	VCP	36	2.6	9.7	10.2
2	D09SL0105	VCP	36	1.7	17.26	18.1
3	D09SL0222	VCP	36	1.4	7.5	7.67



Results We Can Act On

Debris and Deposit Blockage

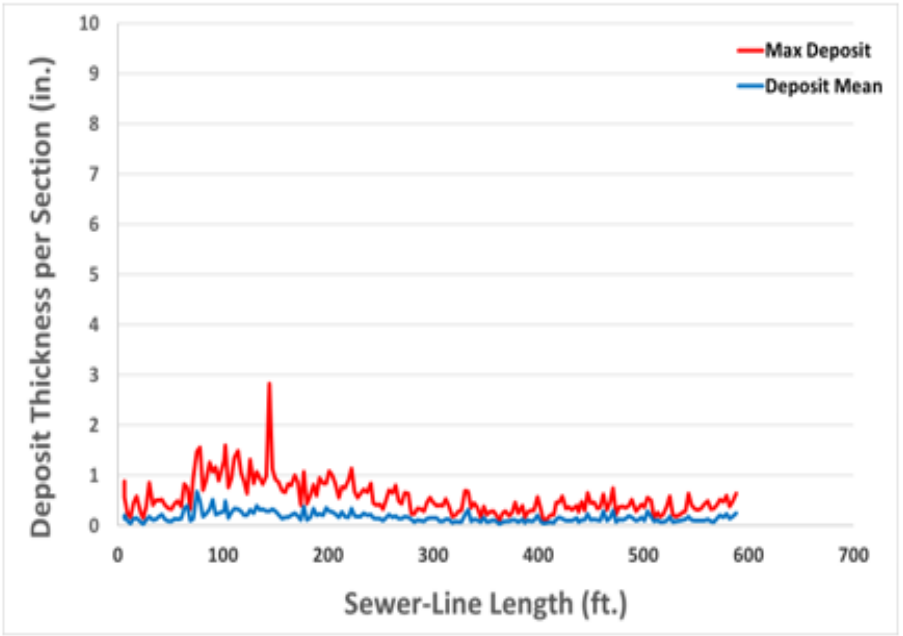


Figure A1.1.1: Deposit thickness per cross-section.

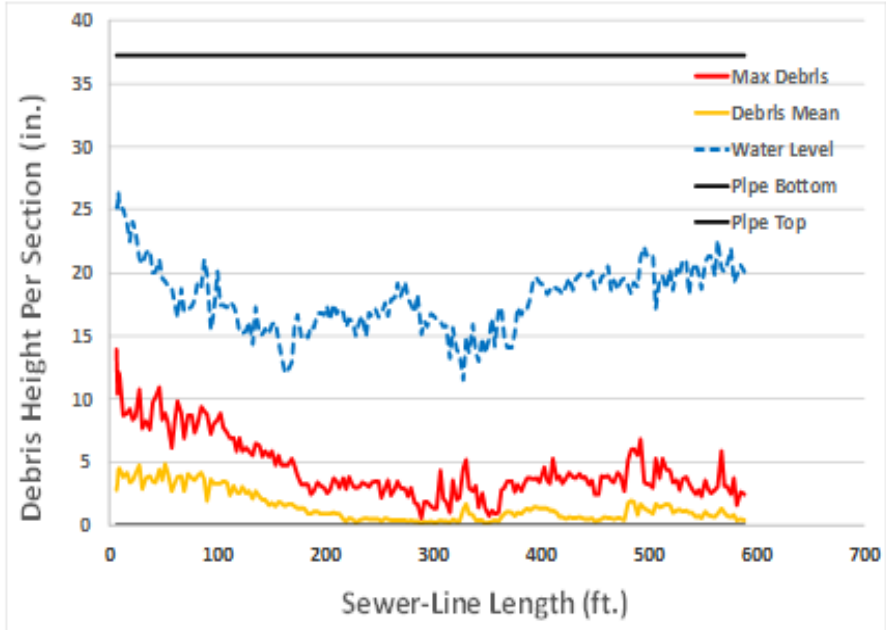
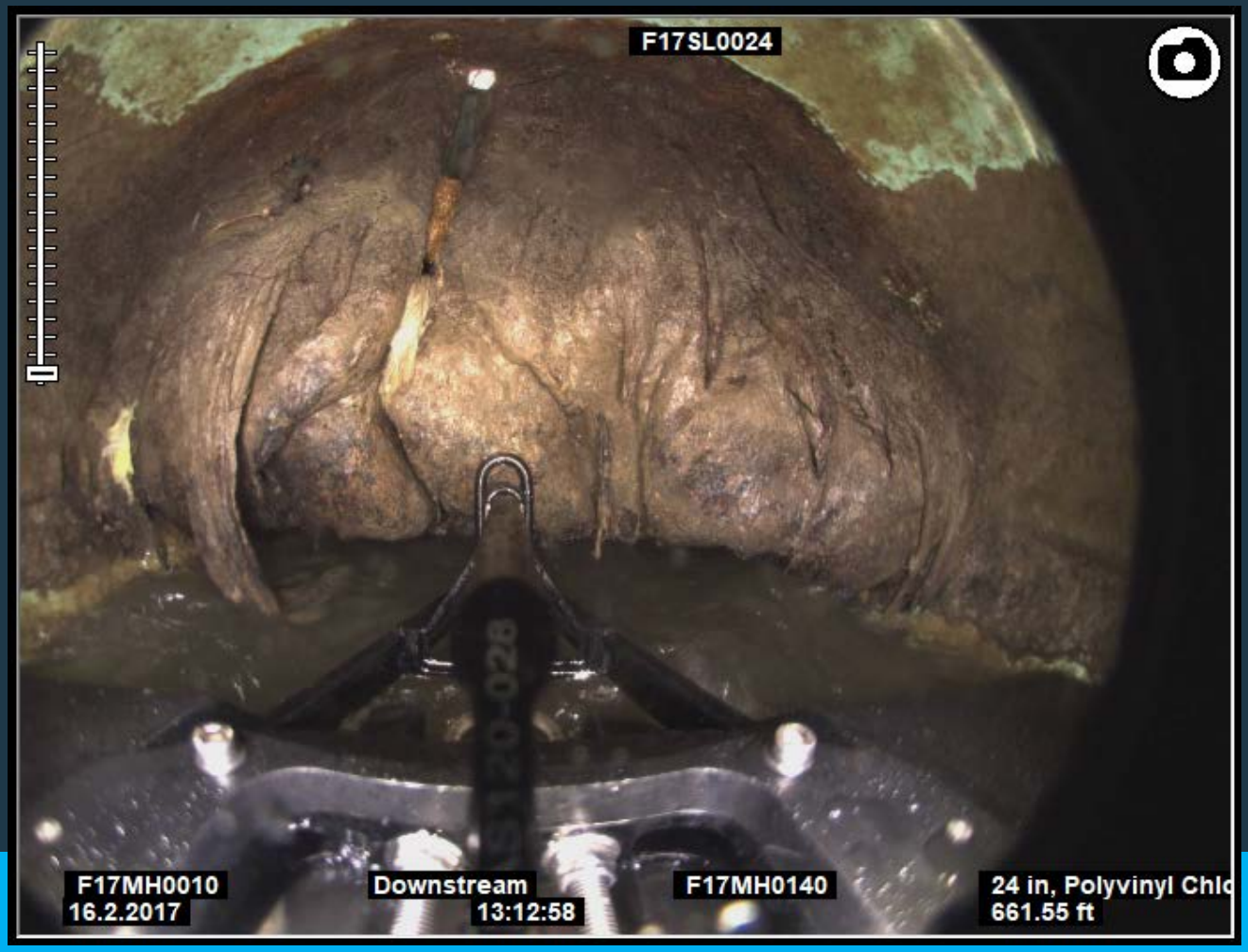


Figure A1.2.1: Debris height per cross-section.

Results We Can Act On

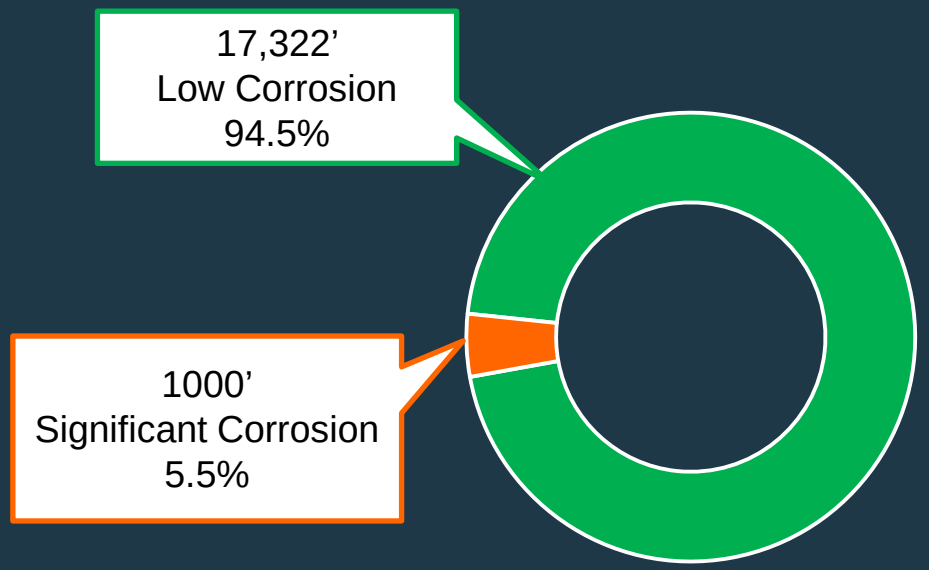
Root Intrusion



WHAT YOU DON'T KNOW CAN HURT YOU

66-Inch Sanitary Sewer Failure Survey Results

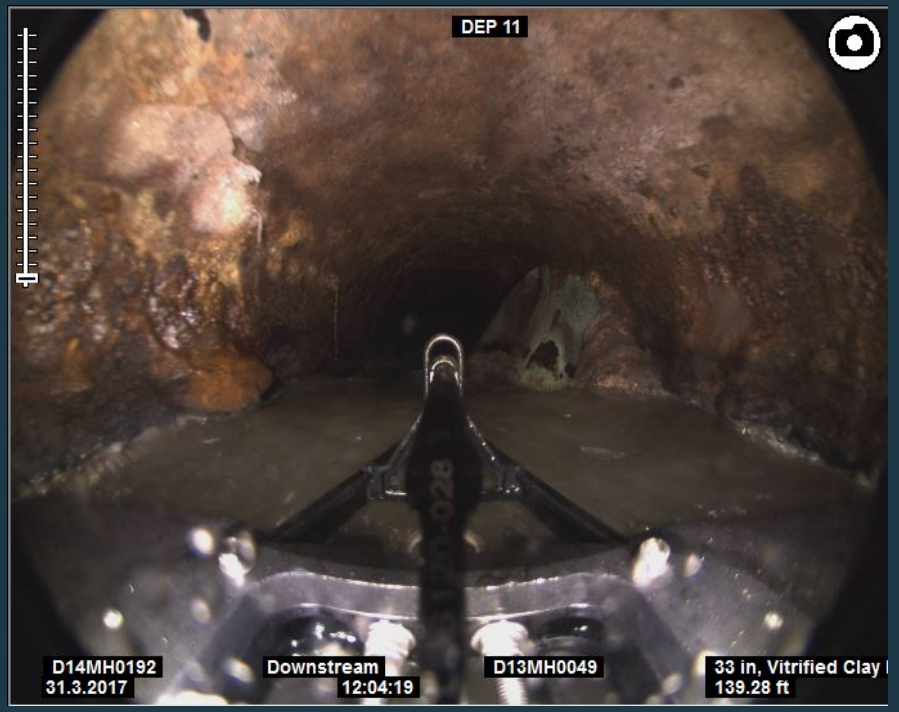
- Total Replacement Scope
  - 14,875’ of 66” Main
  - 3,450’ of 60” Main



- Assessment Results
  - 1,000’ Pipe with Measurable Wall Loss
  - Abandoned Meter Station (H2S Point Source)
  - Cost avoidance of $17,097,000

24-Inch Highway Crossing

- Heavily Corroded Ductile Iron Pipe
- 1 Large Obstruction
- 5ft drop at unnecessary wet well
- Pipe Age: 34 years
- Parallels creek



AWU BOLDLY GOING WHERE NO UTILITY HAS GONE BEFORE