

A background image of a blue water splash with many bubbles, set against a white background.

How IoT and Data are Changing the Water Industry and Extending the Life of Buried Infrastructure

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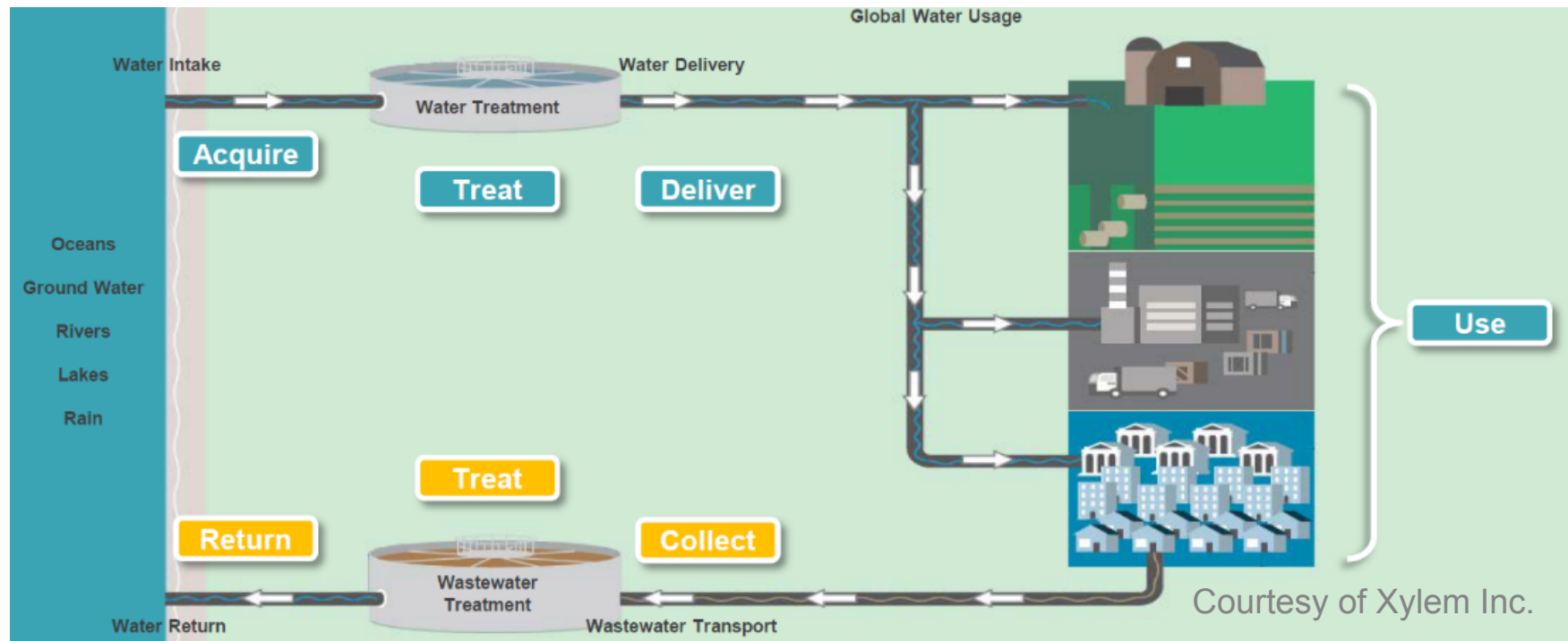


The Challenge Facing Water Infrastructure Owners

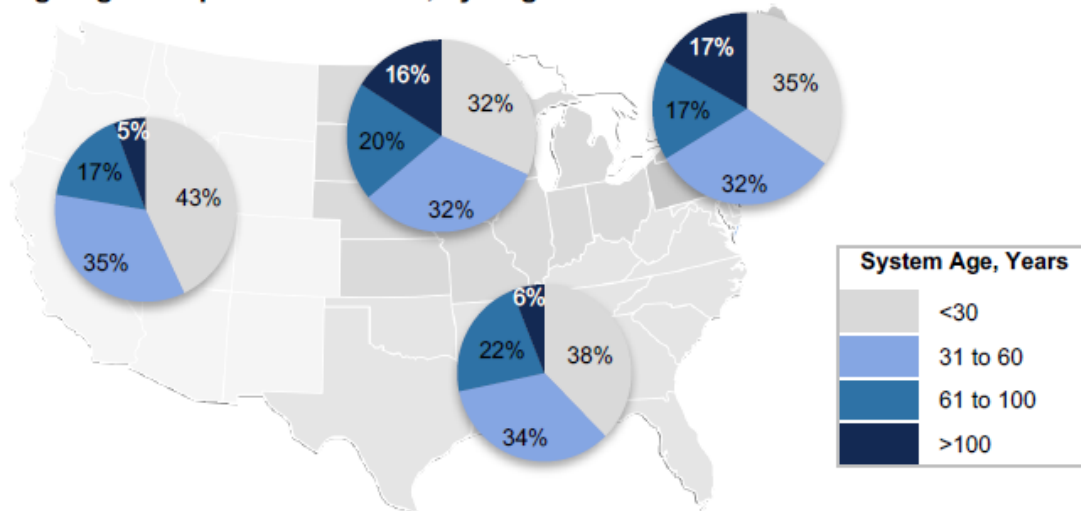
- **Ageing Infrastructure**
- Managing Non-Revenue Water (leakage, unbilled consumption)
- Maintaining Service (water quality, pressure, service interruptions)
- Financial Constraints (squeezed budgets, reduced revenues)
- Ageing Workforce (loss of institutional knowledge)

Primary Water Infrastructure Components

- Buried infrastructure accounts for more than 75% of total asset value



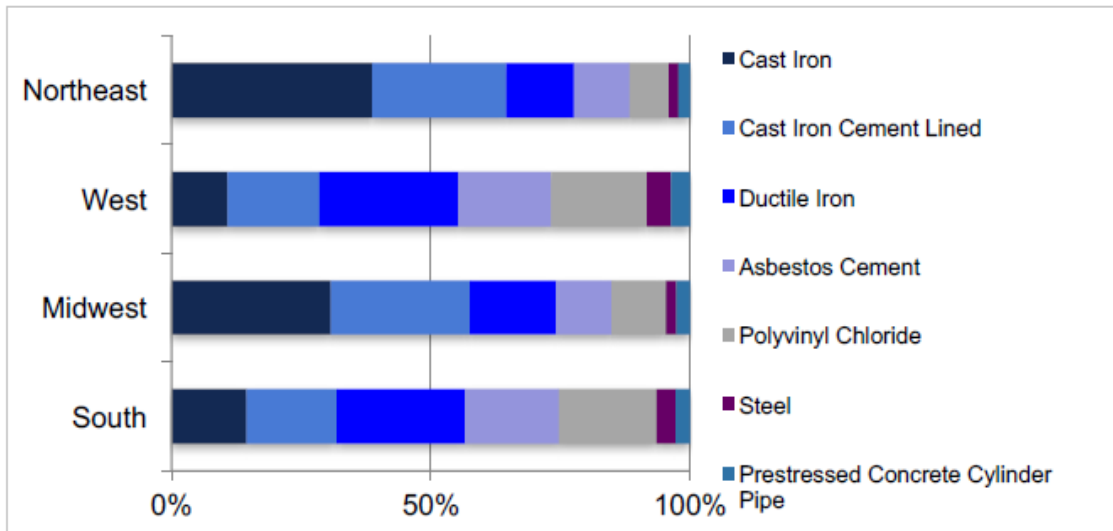
Average Age of Pipe Infrastructure, by Region



“The pipe infrastructure funding gap in the US is \$1 trillion over the next 25 years”

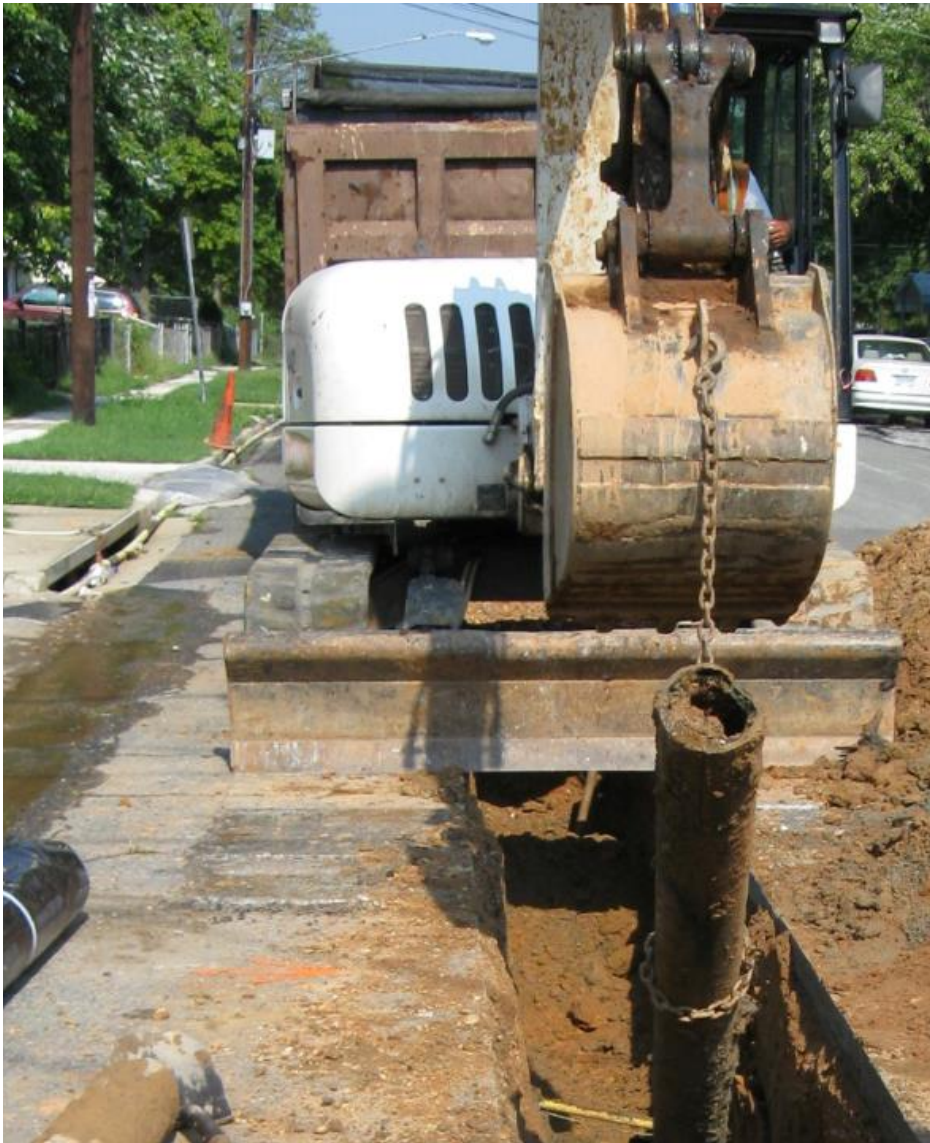
Buried No Longer: Confronting America’s Water Infrastructure Challenge. A report by the AWWA. 2012

Estimated Material Type, by Region



Bluefield Research

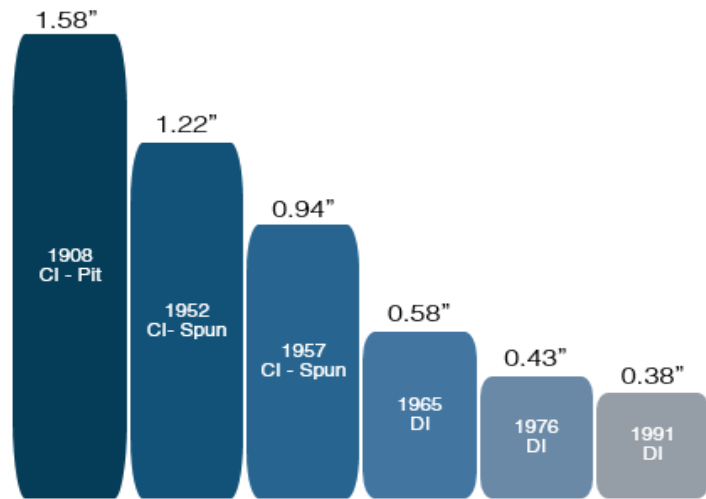




“Standard” Practices

- Ignore it/run to failure
- Programmed replacement based on age, materials, break history
- Major Capital Investment Programs (CIP)

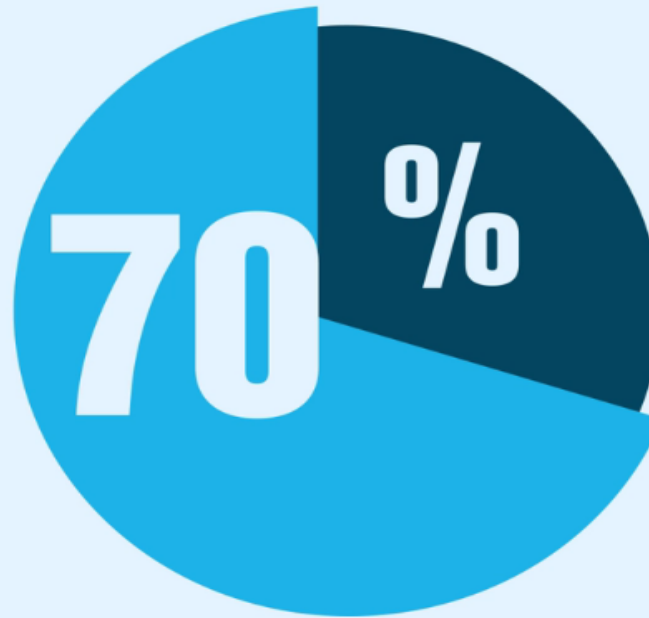
Evolution of Pipe Design



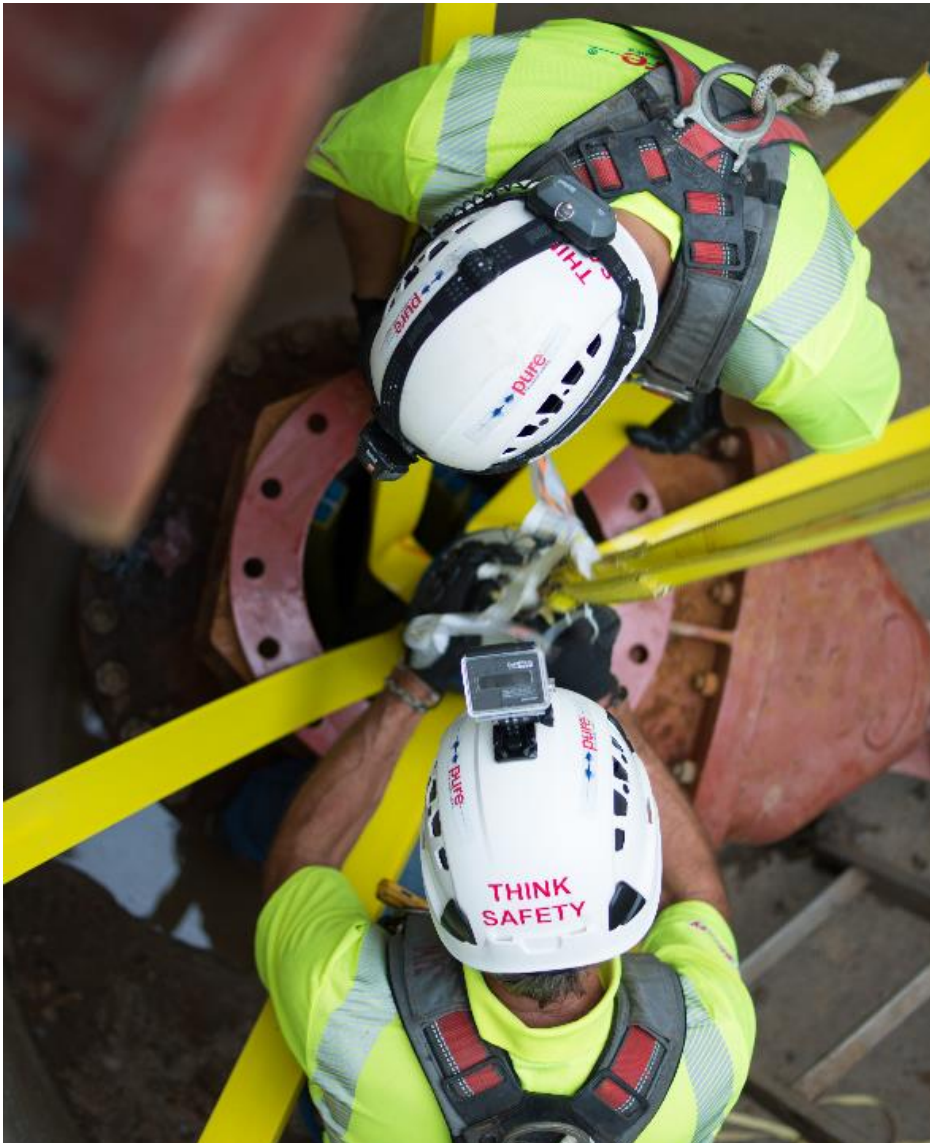
900 DN – 10 bar pressure rating



Age & Integrity

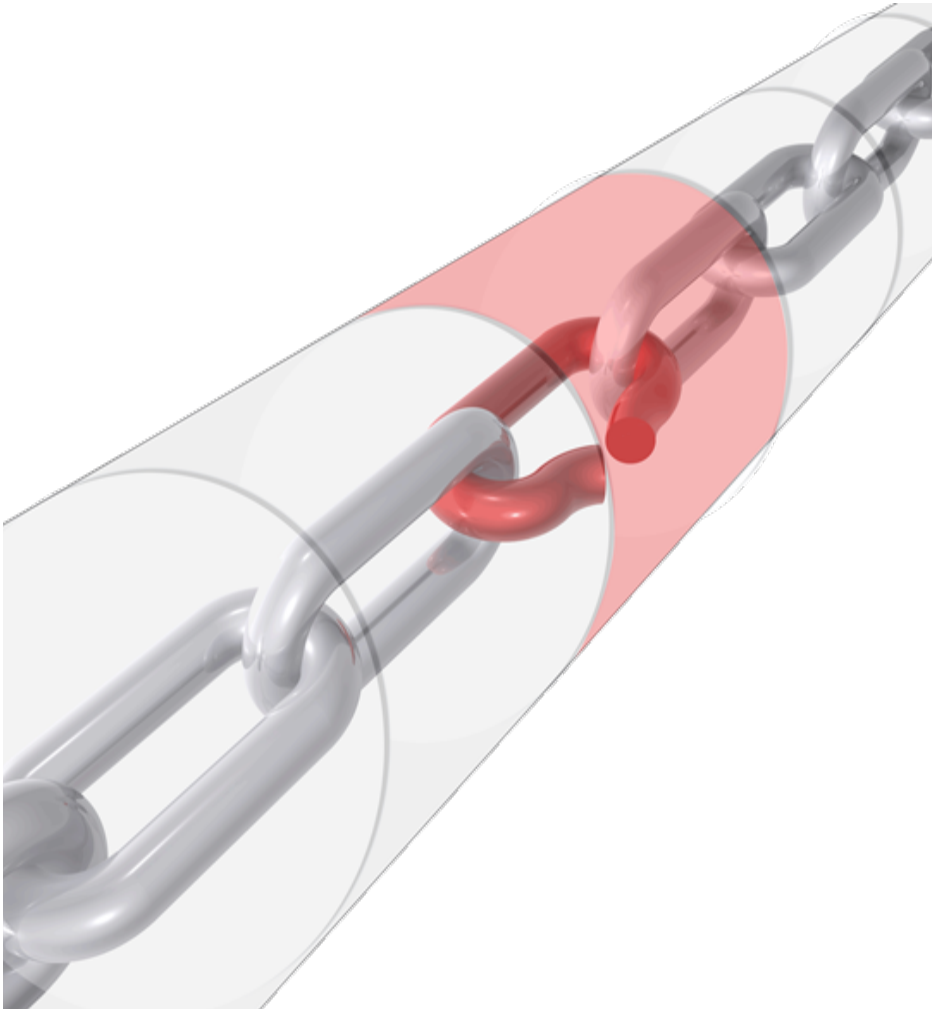


**OF REPLACED PIPE
STILL HAS REMAINING SERVICE LIFE**



Evolving Trends

- Technology-enabled, risk-based assessment of water networks
- Assess & Address™ approach to infrastructure resilience and renewal
- Optimized capital planning
- “Smart” strategies to optimize network efficiency



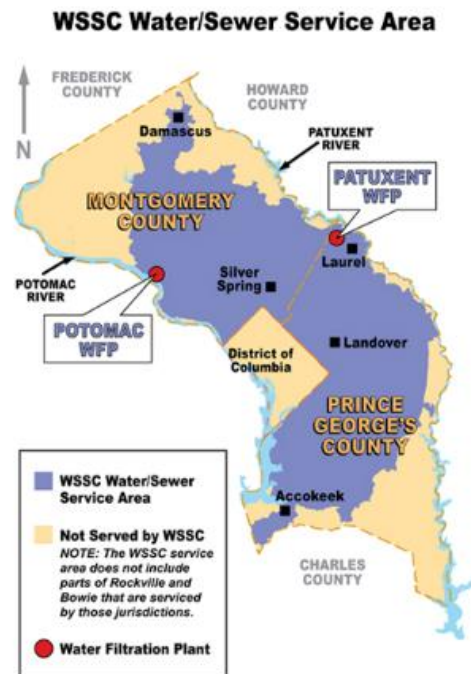
Finding the Bad Pipe

- Prioritization Analysis
- Condition Assessment
- Monitoring

Inspection & Monitoring Technologies

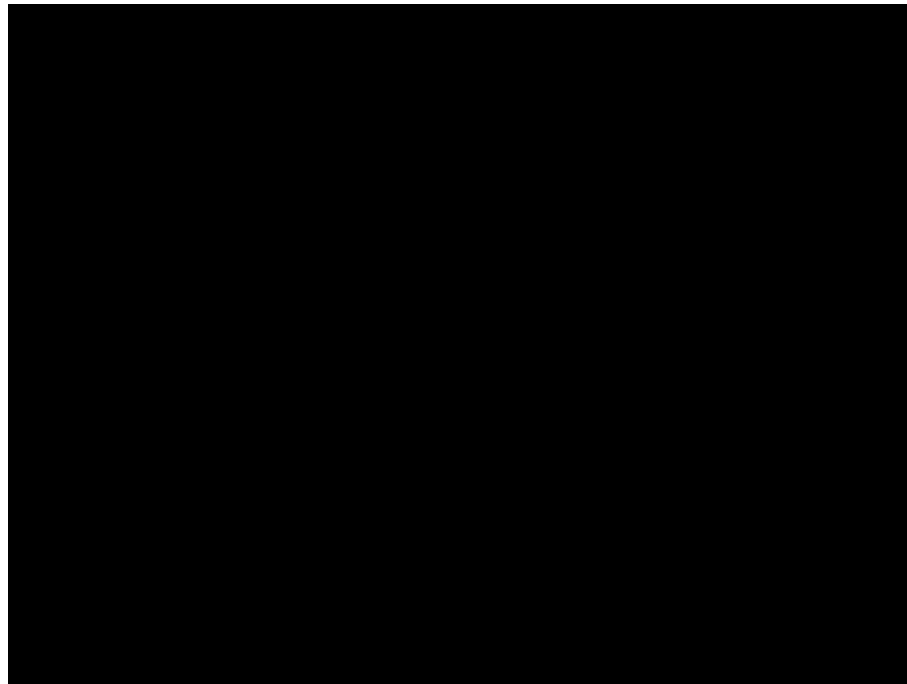


Case Study: Washington Suburban Sanitary Commission (WSSC)



- 8th largest utility in US
- Over 500 km of large-diameter (up to 2.4m) prestressed concrete pipelines
- Several high-consequence failures over last 20 years
- Capital replacement cost > \$2 billion
- Condition assessment & monitoring program commenced in 2007

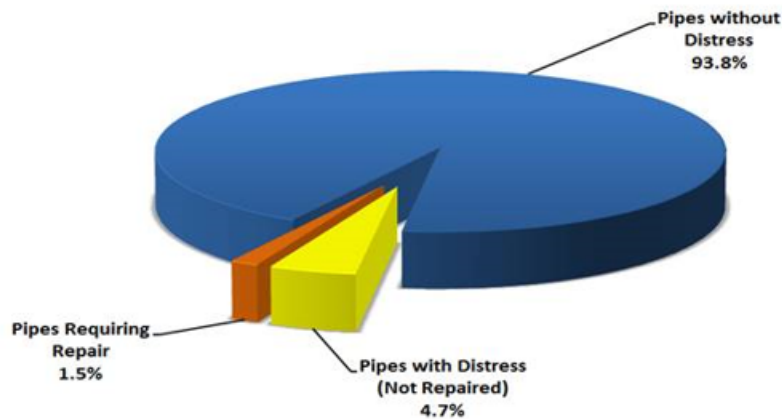
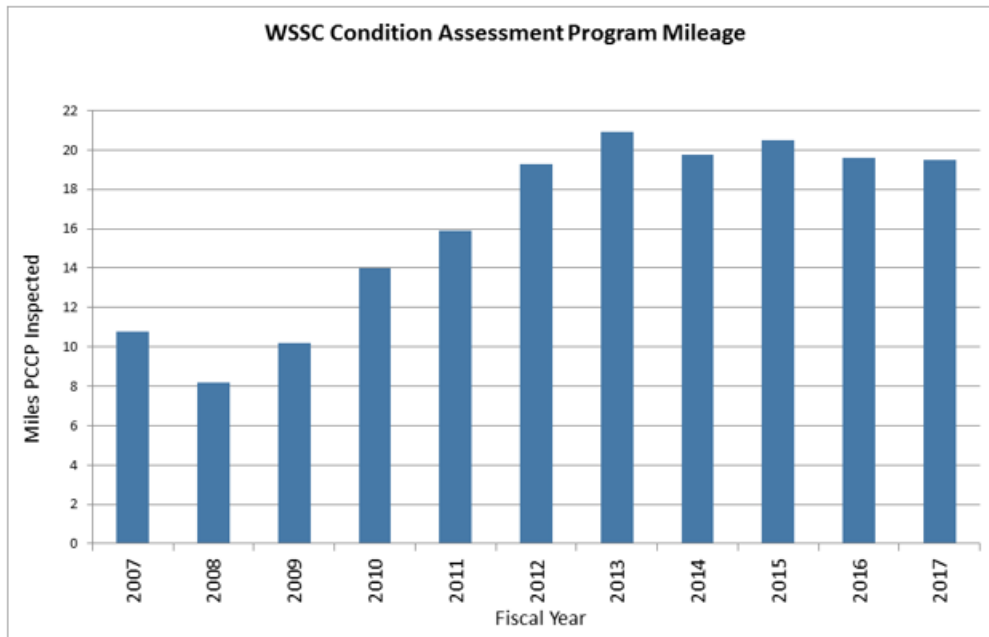
WSSC Inspection & Monitoring Program



[WSSC Video](#)

Washington Suburban Sanitary Commission (WSSC)

- Over 35 pipes in a state of incipient failure
 - 11+ impending major failures found by AFO monitoring system and repaired
 - 20 interventions since 2010
- 15 leaks found and repaired
- CFRP repair/upgrades of over 320 individual pipes
- Over 35,000 pipes monitored 24/7
- Over 240 km pipelines inspected
- Over 4,000 pipe joints repaired



The Value Proposition

Assess and Address
VS
Total Replacement

Capital Replacement

\$1.8M per Kilometer

Assess & Address

\$93K
per Kilometer

IoT and Smart Water



- Advanced Metering Infrastructure
- Distributed Sensing:
 - Pressure
 - Leakage
 - Water Quality
 - Structural
- Advanced analytics leads to information-based decision making and more efficient system operation & capital planning
- Smart Water is expected to attract over \$20 billion in investment in the US over the next 20 years



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