



**Mueller Water Products**

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# Best Practices for Optimizing Water Pipe Assets

Smart Acoustic Monitoring Solutions for Water Efficiency and System Resiliency

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# Echologics Solutions



Leak detection technology and services for pressurized water pipes

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Water pipeline integrity and condition assessment services

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Permanently installed leak detection monitoring for water mains

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# Optimizing Water Systems

## Water Efficiency and System Resiliency

### Older Water Pipe Networks:

- Leak more (background leakage)
- Leak quieter (more difficult to find)
- Have higher risk of catastrophic failure

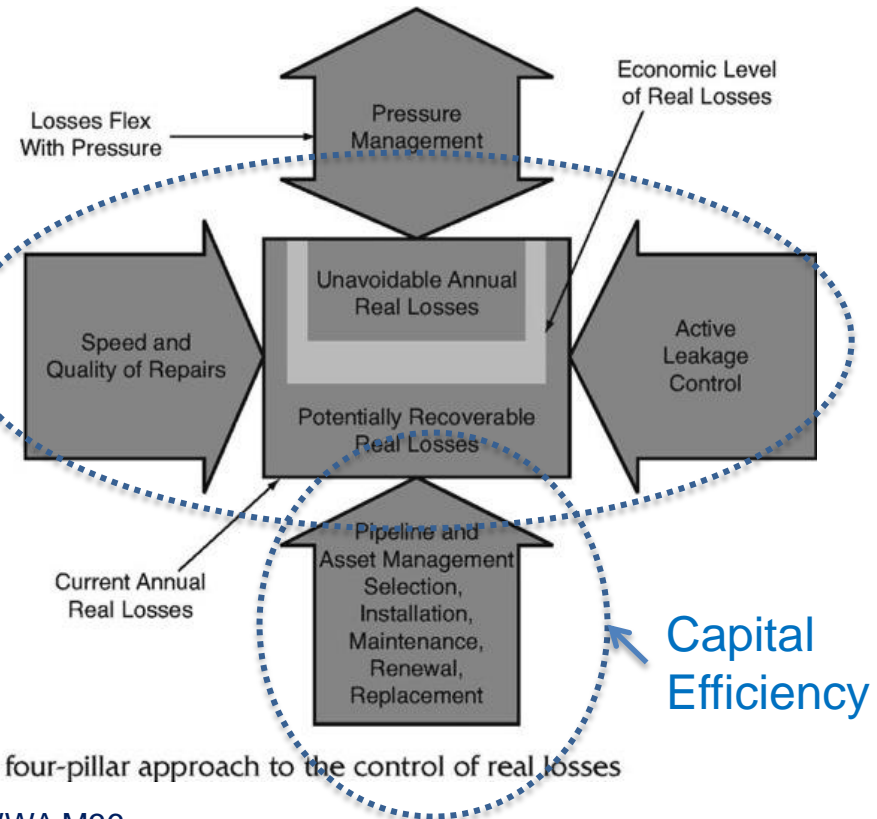


Figure 5-1 The four-pillar approach to the control of real losses

Reference: AWWA M36

# Condition Assessment and LD

## Tools of the Trade

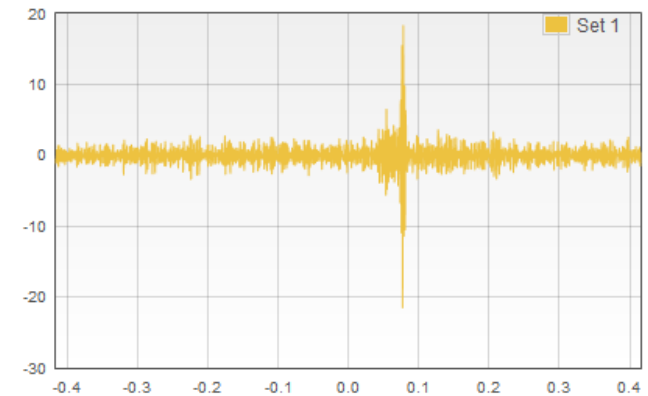
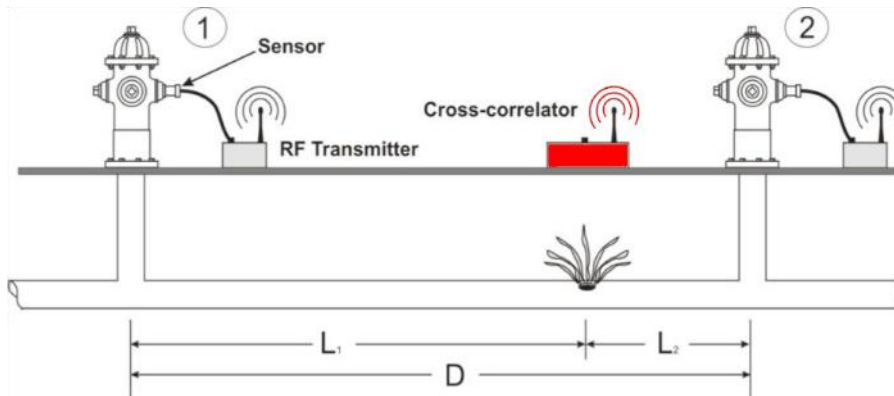
### LeakFinder Acoustic Correlator



# Leak Correlation Acoustic Analysis

## Principle of Operation

1. Bracket the leak with two sensors
2. The leak sound propagates in both directions
3. Correlator measures the time difference to reach each of the sensors to determine the exact leak location



Advances in correlation technology allow for lower frequencies and long-distance sensor spacing



# Permanent Monitoring Systems for Water Efficiency and System Resiliency



# Permanent Monitoring is Ideal for Critical and High-Risk Water Mains



- Major roadways, highways and bridges
- Railways and transport links



- Campus Environments



- Government buildings
- Tourism and financial districts



- Industrial zones

# Benefits of Permanent Monitoring

Financial  
Savings



Resource  
Allocation



Risk  
Avoidance

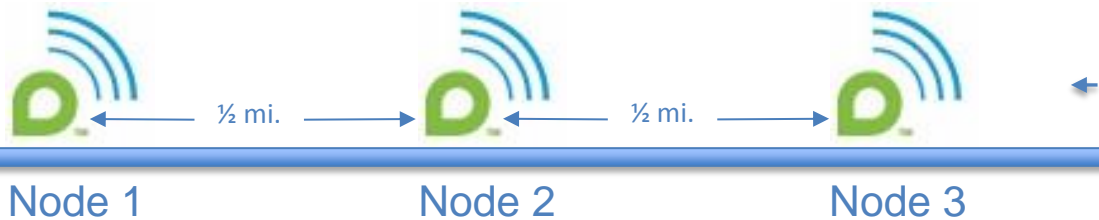




# System Components



Monitored  
Pipeline



# Operation

## 24 hour leak detection cycle

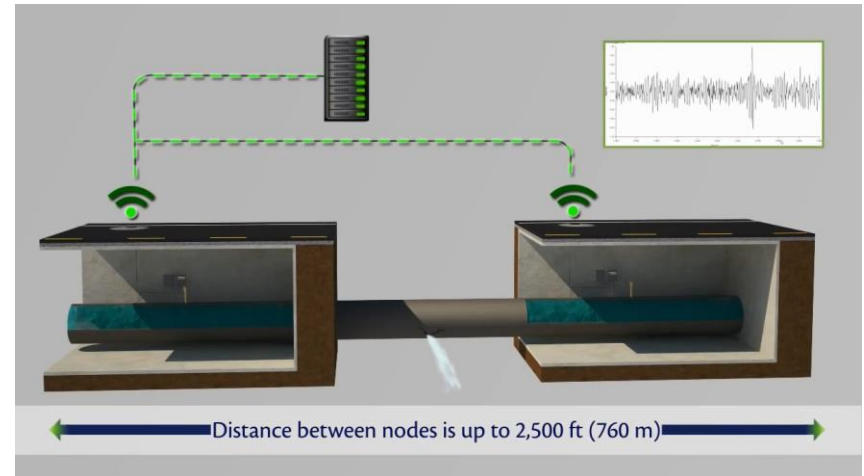
- Time-synced acoustic data capture
- Upload to central server and processed
- Results passed to UI or SCADA

## On-Demand Functionality

- Clients can force unscheduled data capture
- Manual correlation

## Autonomous

- Automated correlation peak selection
- Scheduled and Ad-hoc Reporting



Time between leak detection surveys reduced from years to hours

# Permanent Monitoring: Case Study

## West Virginia American Water

Service Area: 5 mi<sup>2</sup>, Average Production 25 MGD

Total Nodes: 386

Pipe: 4" – 12" DI and CI

Service Start: Dec 2014

Experience: 4<sup>th</sup> installation at American Water with 11 leaks found in the first month and 45 leaks in the first 5 months of operation, 40 of which had not yet surfaced prior to repairs. Credited with 2.3 MGD of water loss reduction. Phase 1 of multiple phased deployments.



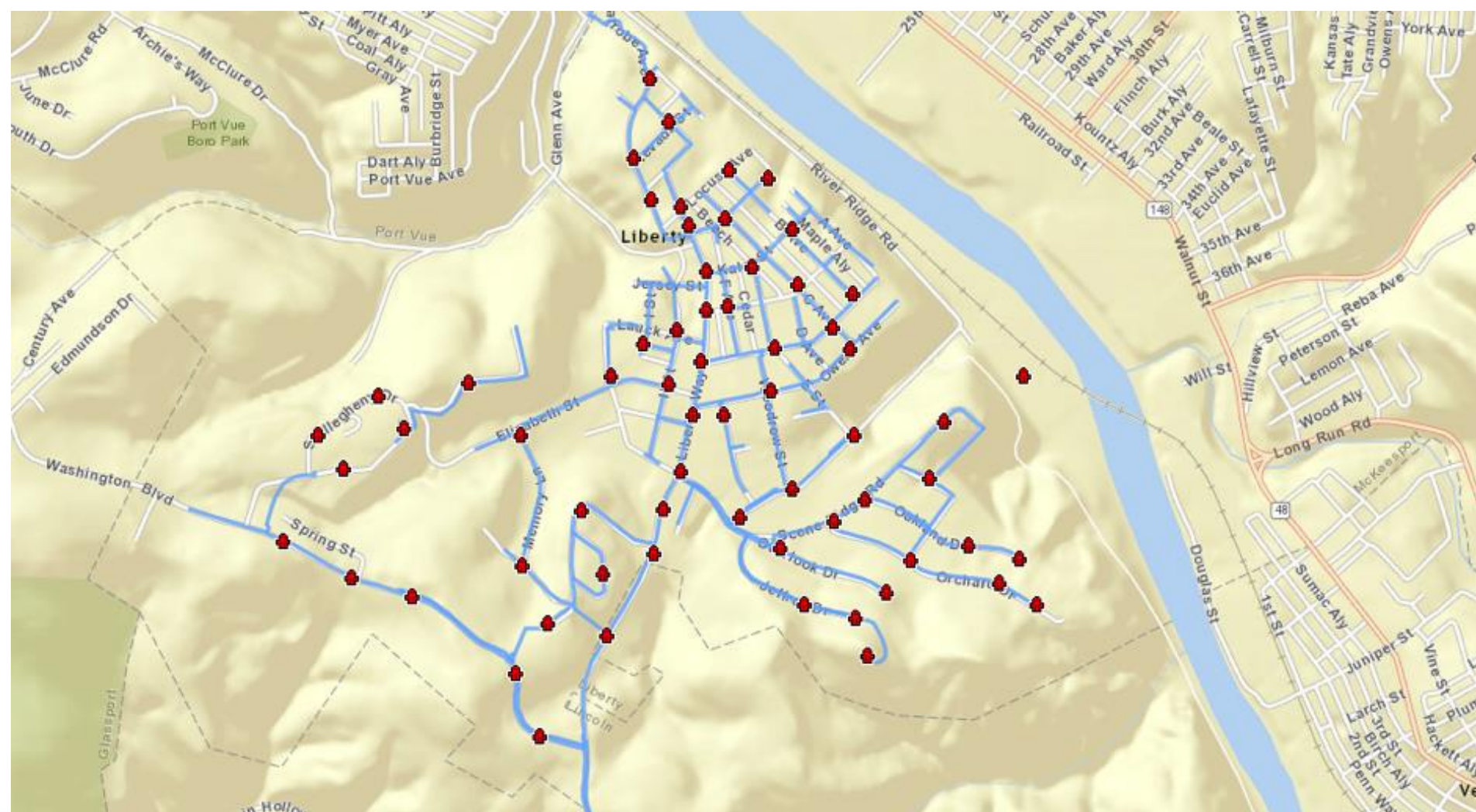
Another 1.5 MGD of water loss was recovered from a 36" PCCP main leak, that was picked-up by the DX system through ground vibration.





# Permanent Leak Detection in Practice

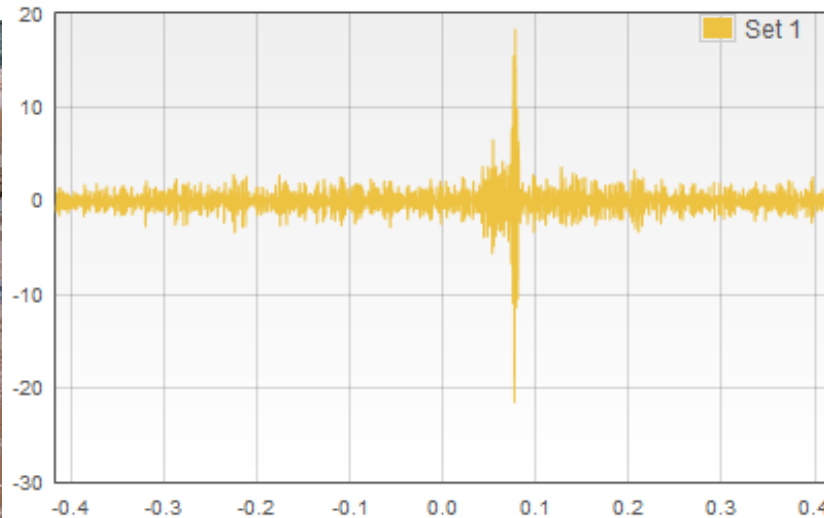
## *Leak Progression to Failure (almost) – Liberty PA*



# Permanent Leak Detection in Practice

## *Leak Progression to Failure (almost) – Liberty PA*

Ability to track the progression of a leak from...



+4 weeks  
(prior to excavation)



Dave Hughes: “...a time bomb defused”;  
5 gpm leak paid for the system



# Expandable Functionality

Core functionality is  
acoustic leak detection

Pressure/Flow



Temperature



Chlorine



Other Client  
Requirements

4-20 mA  
Signal

Opportunity to expand from advanced leak detection to  
customized pipeline monitoring

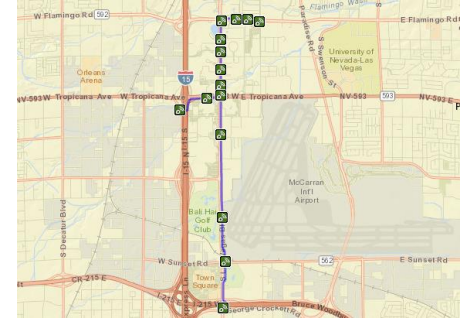
# NIST Global City Teams Challenge

- Initiative for the advancement of Internet of Things (IoT) technology within a Smart City / Community environment
- Mueller/Echologics, AT&T and IBM are participating vendors for water sector cluster
- Technology engagements consist of Echologics Permanent Monitoring in conjunction with AT&T wireless communications and IBM Visual Dashboard
- Las Vegas, Los Angeles and Atlanta are participating cities

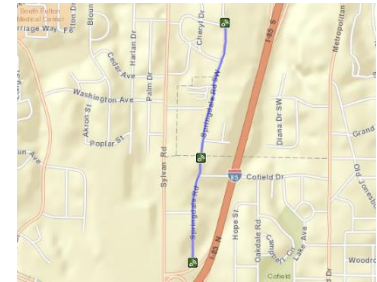
# Smart City Challenge

## Operational Experience

Project: Las Vegas, NV  
Pipeline: 36" Asbestos Cement  
Objective: Leak monitoring  
Monitoring Start: April 2015

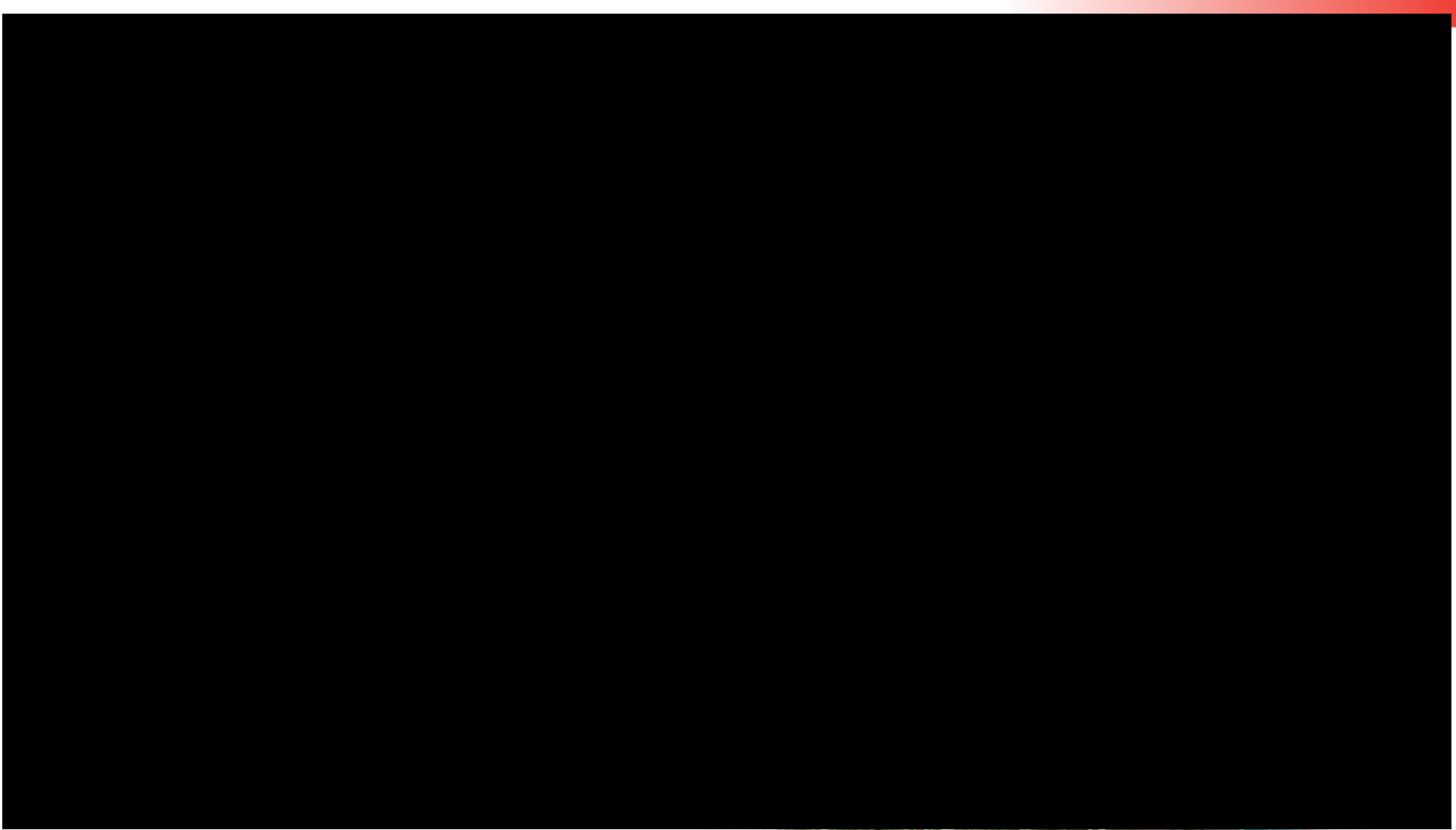


Project: Atlanta, GA  
Pipeline: 20" Ductile Iron  
Objective: Leak, pressure monitoring  
Monitoring Start: April 2015



Project: Los Angeles, CA  
Pipeline: 36" Concrete Lined Welded Steel  
Objective: Leak monitoring  
Monitoring Start: May 2015





# Recent Innovations

## Semi-Permanent Monitoring Solution



Antenna

Power Source

Processor &  
Comms HW

Hydrophone



EchoShore-Mobile system fills the information gap between periodic leak detection surveys and permanent monitoring for improved detection and reduced risk on critical water mains