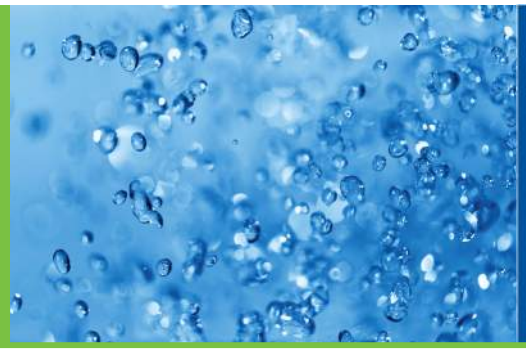
Water System
Existing and Future Supply

Presentation to the East Providence City Council

Robert Otoski, P.E.
Kevin Schott, P.E.

February 2021



CDM Smith

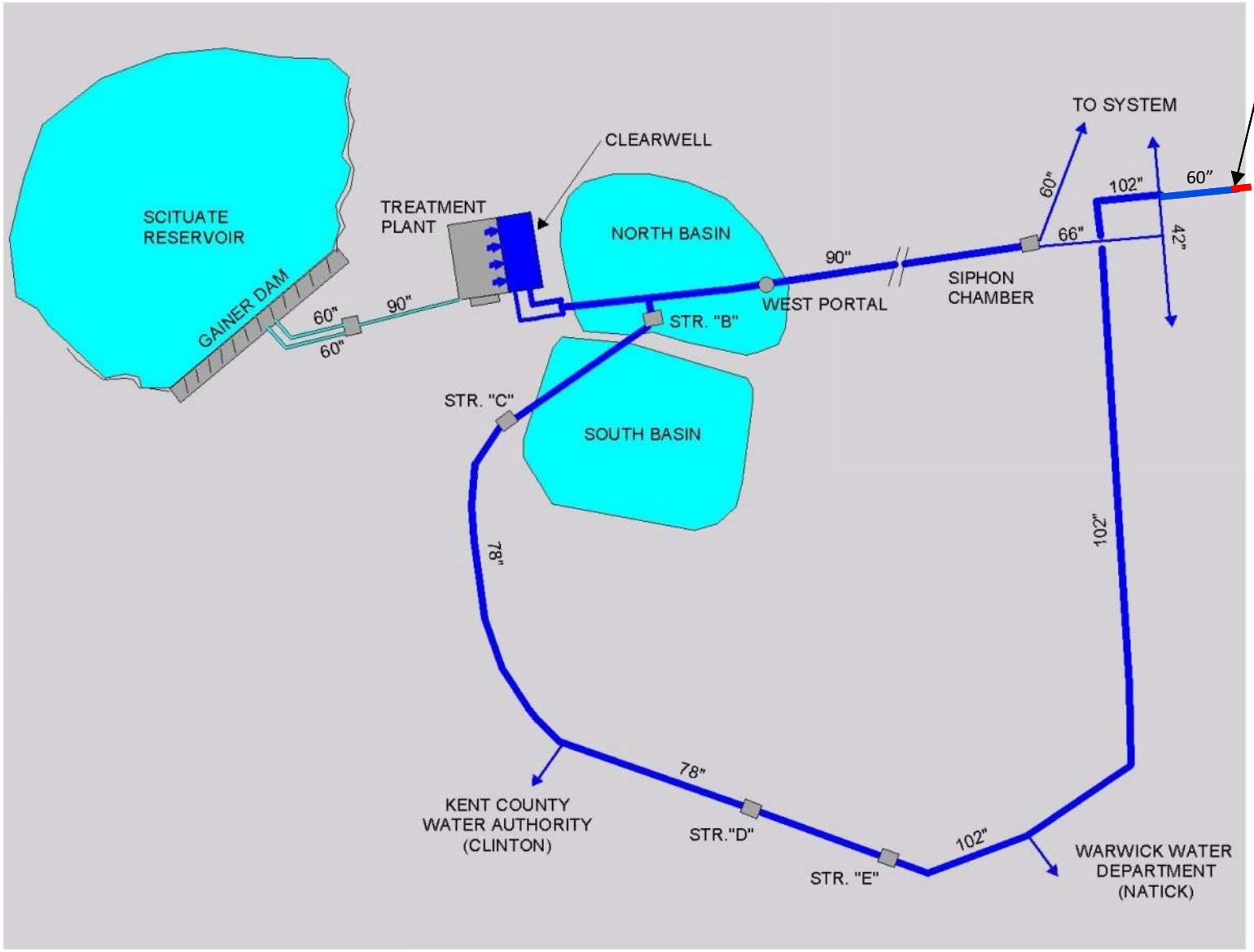
WATER + ENVIRONMENT + TRANSPORTATION + ENERGY + FACILITIES

Presentation Outline

- East Providence Water Supply Transmission
- Transmission Main Pipe Types
- Criticality of Transmission Main Inspection
- Proposed Condition Assessment
- Supplemental Supply Options
- Conclusion

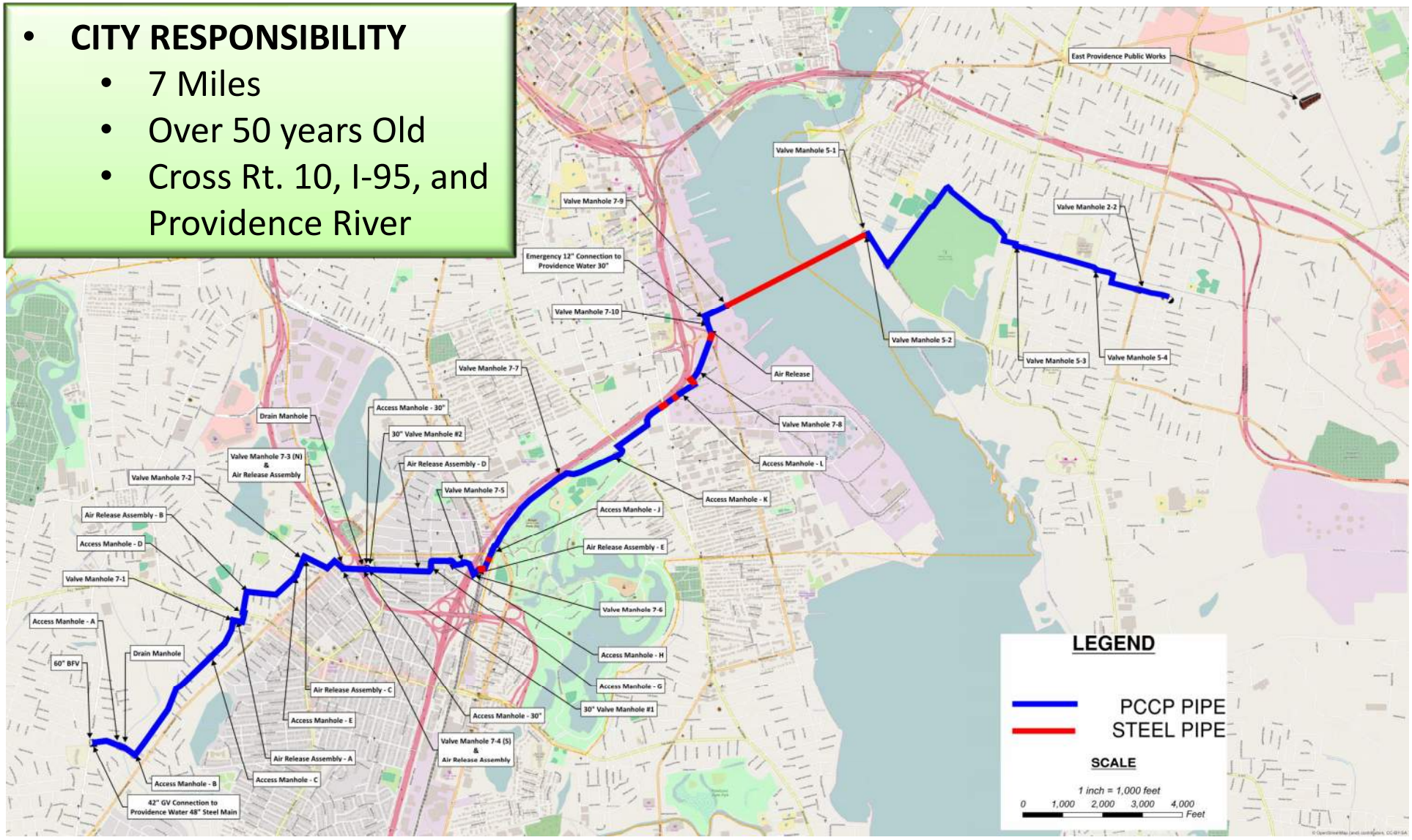
East Providence Water Supply Transmission

Water Supply & Aqueduct System



East Providence 42-inch Transmission Main Route

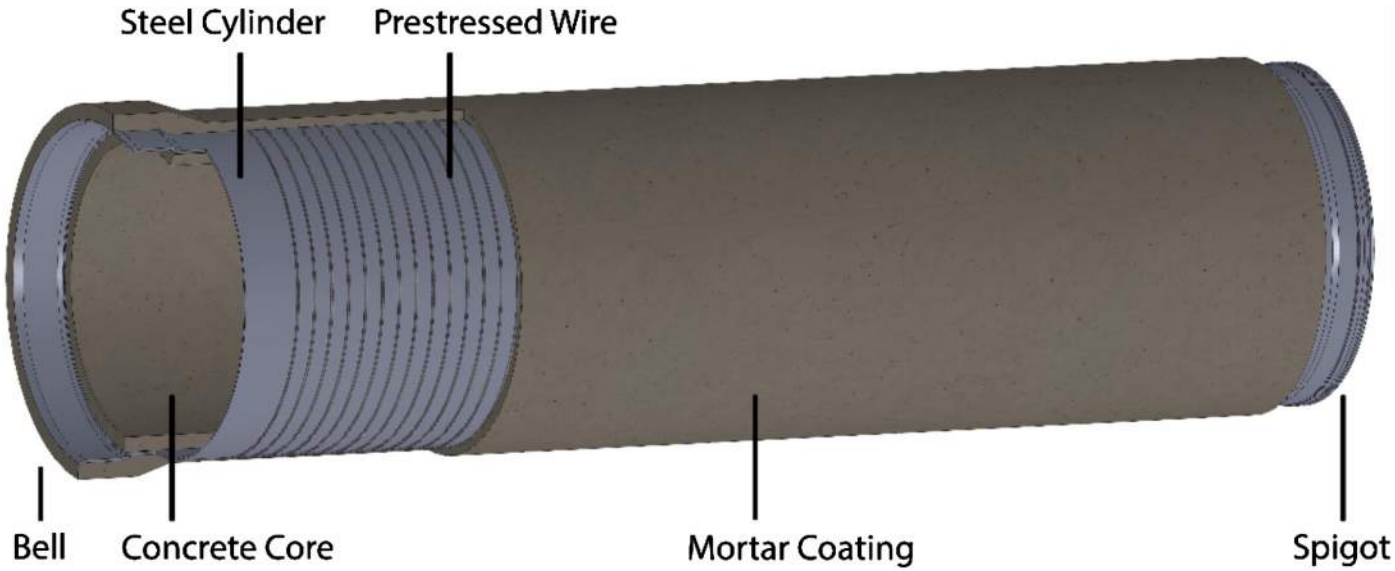
- **CITY RESPONSIBILITY**
  - 7 Miles
  - Over 50 years Old
  - Cross Rt. 10, I-95, and Providence River



Transmission Main Pipe Types

What is PCCP Pipe?

- 2 Types
  - Lined Cylinder Pipe – East Providence Transmission Main
  - Embedded Cylinder Pipe
- Lined Cylinder Pipe Consists of:



What is Steel Pipe?

- Consists of:
  - Interior Cement Lining
  - Steel Pipe
  - Protective Exterior Coating
- East Providence Steel Pipe Locations
  - Under Railroad Tracks
  - River Crossing
- Corrosion Control
  - Cathodic Protection System
  - Environmental Control

Photo No. 1: Providence Rectifier

Photo No. 4: East Providence Rectifier

November 1996 Rupture of 102-inch PCCP

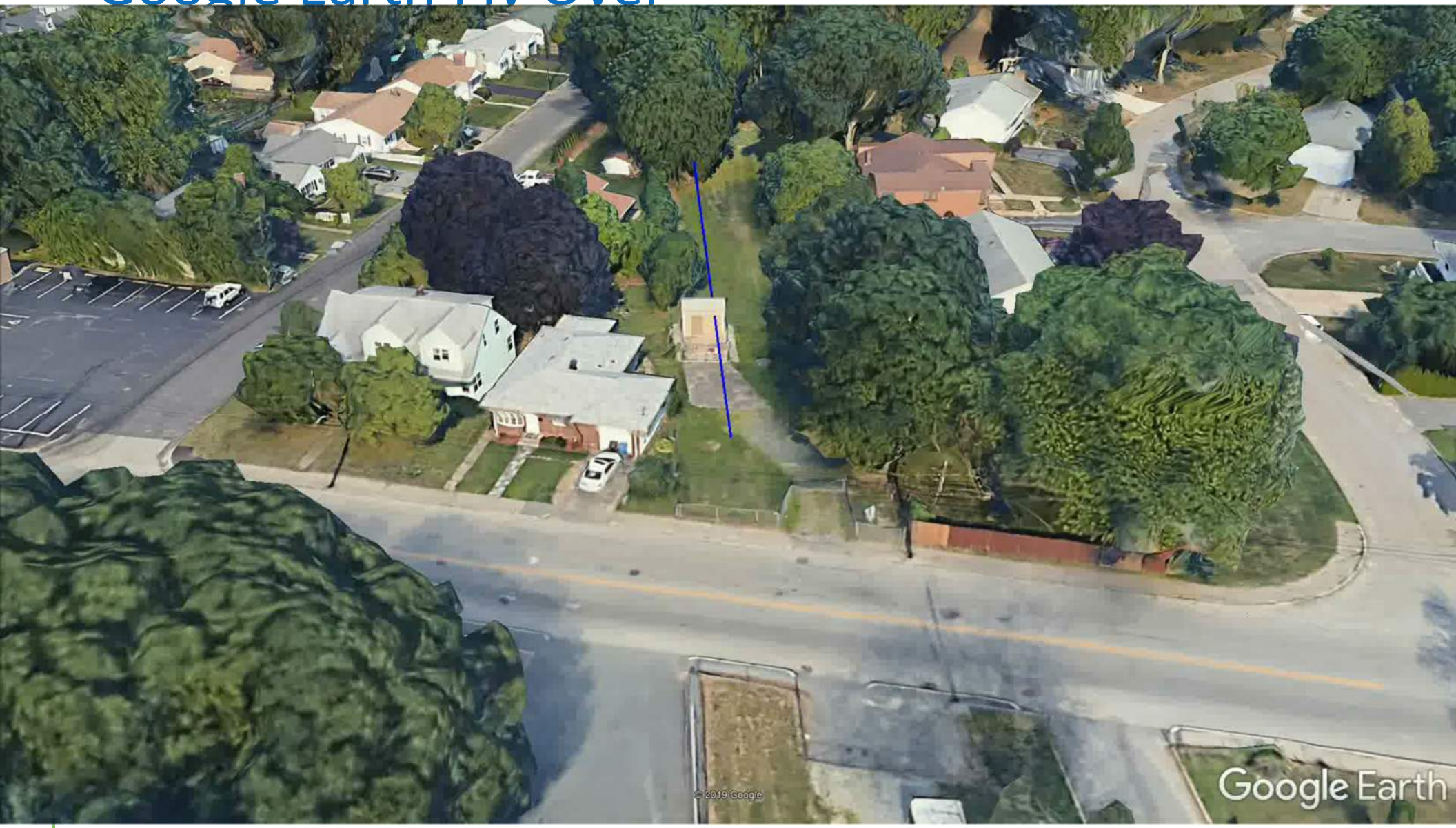
- East Providence
  - 42” Mfr. Date = 1967 - 1969
- Providence
  - 102” Mfr. Date = 1966 - 1967

Why Perform a System Assessment?

- Reduce failures (asset management)
- Make informed decisions (long-term operations)
- Proactive rehabilitation and maintenance

Criticality of Transmission Main Inspection

Google Earth Fly Over

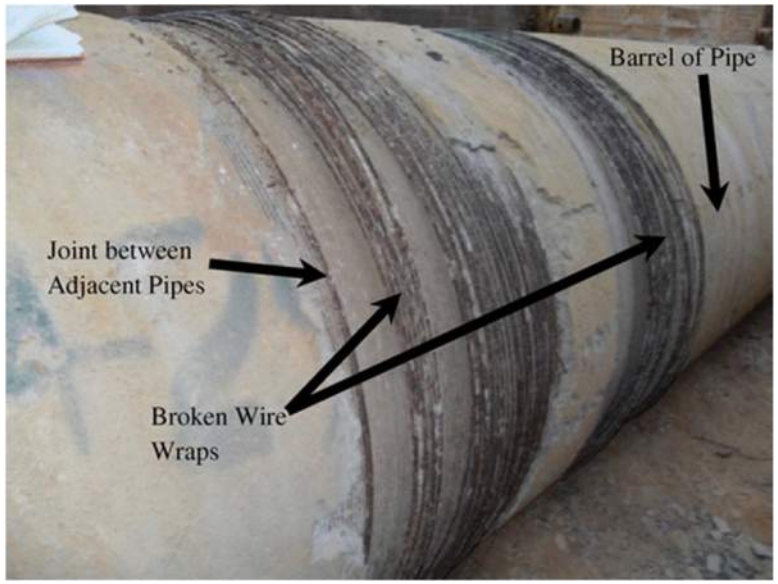


Field Walk

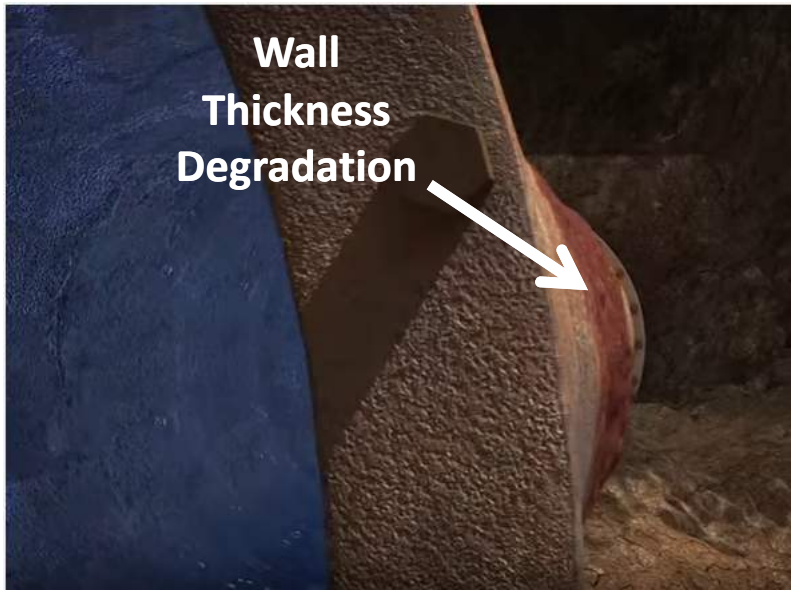
Proposed Condition Assessment

Elements of Condition Assessment

- PCCP
  - Pipe Location
  - Detected Defects
  - Wire Breaks
  - Failure Risk Assessment

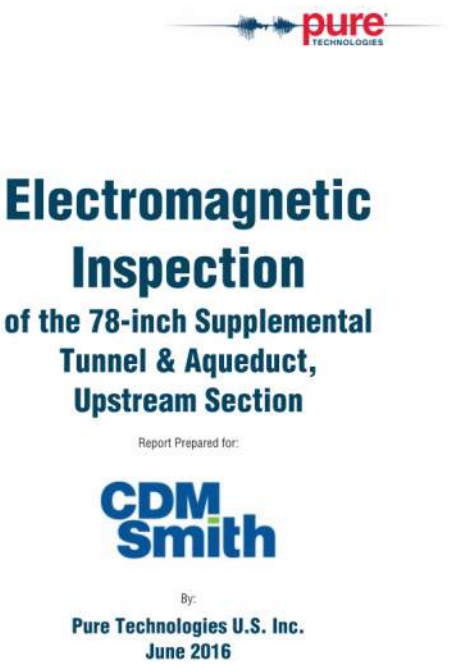


- Steel
  - Pipe Location
  - Detected Defects
  - Wall Thickness Degradation
  - Fitness for Service Evaluation



Assessment Program Objectives

- Non-Destructive Testing
- Maintain Supply to City
- Leak Detection
- Electromagnetic Inspection
- Determine Repair Priorities of Distressed Pipes
- Identify Areas of Distress of Steel Pipes



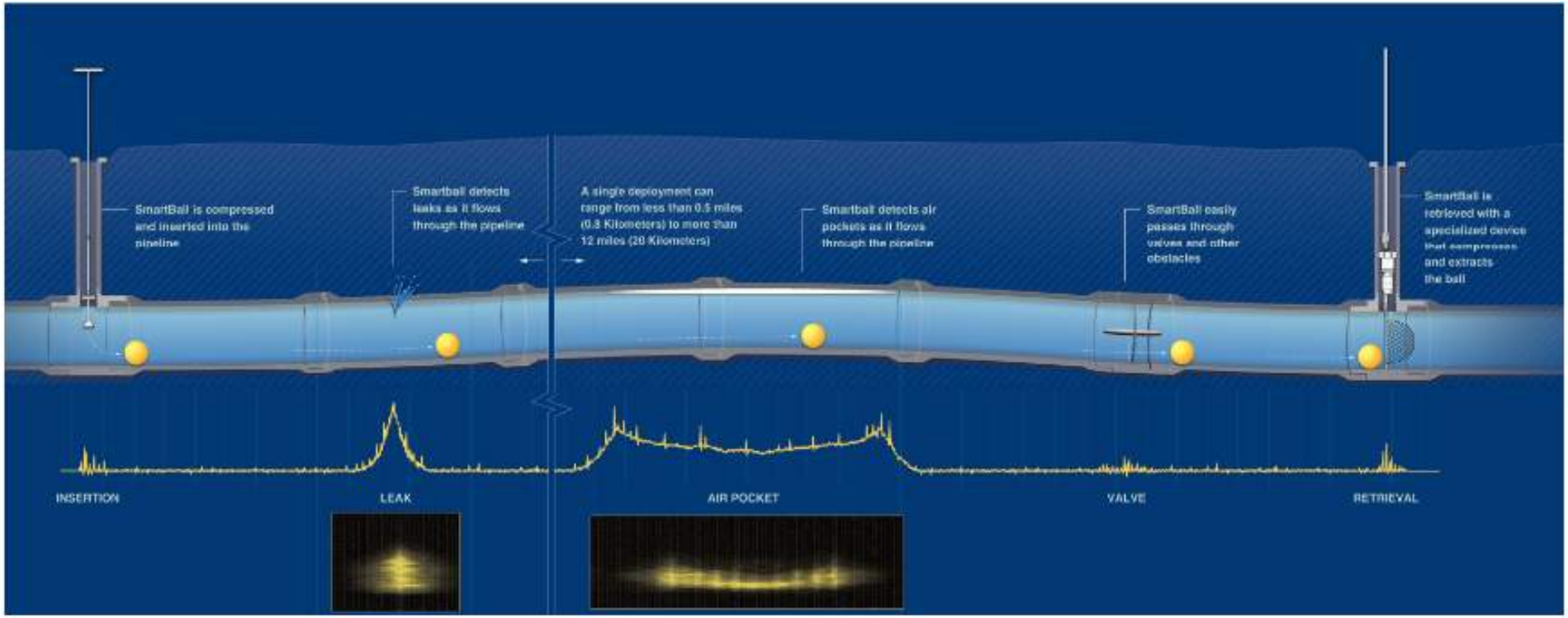
Pure Technologies
Smart Ball Acoustic Leak Detection

Ideal Application

- Large pipelines (16-inches+)
- Long distances (up to 20 miles)
- In-Service Pipelines

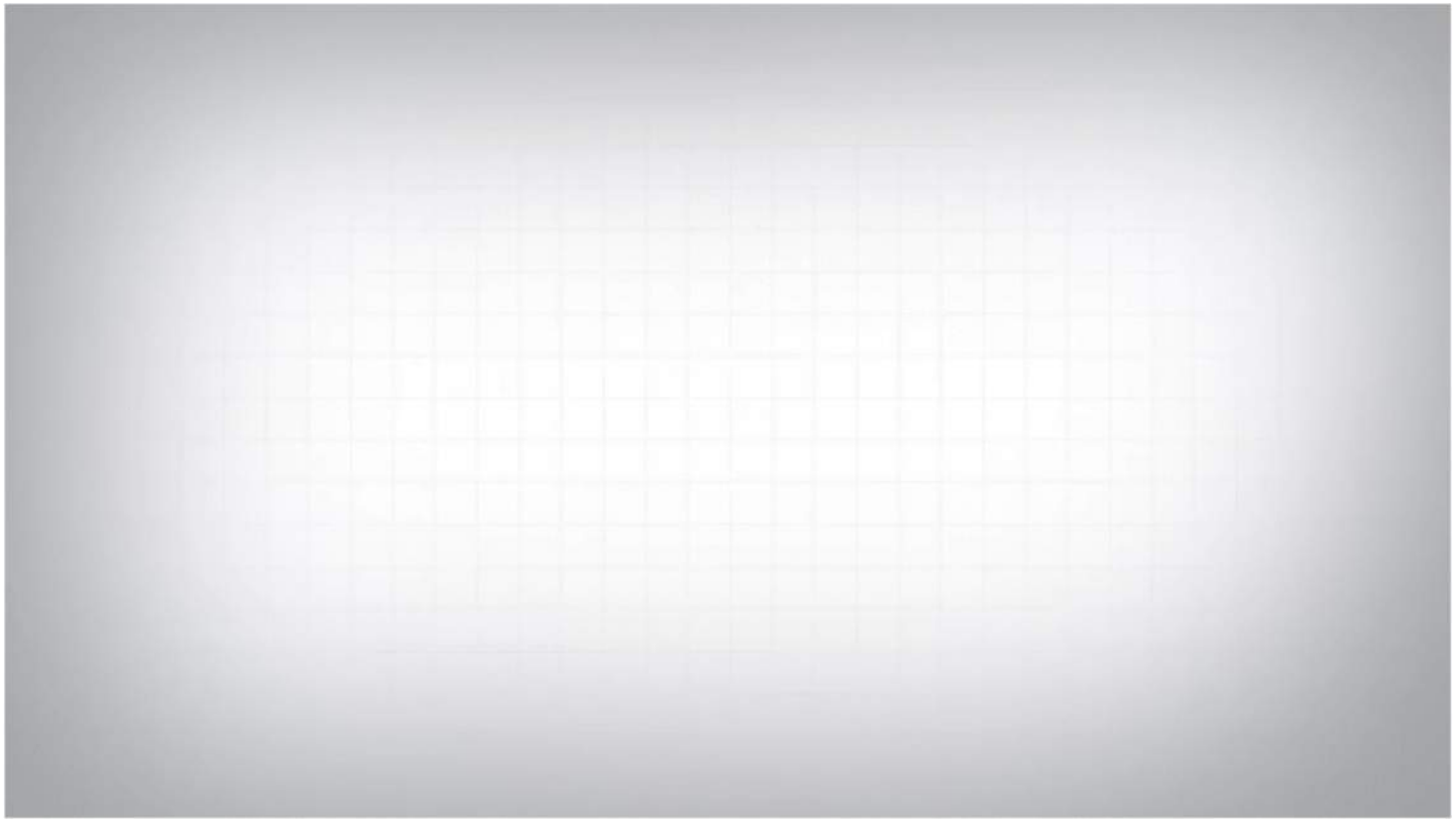
Inspection Technology

- Leak detection
- Air pockets



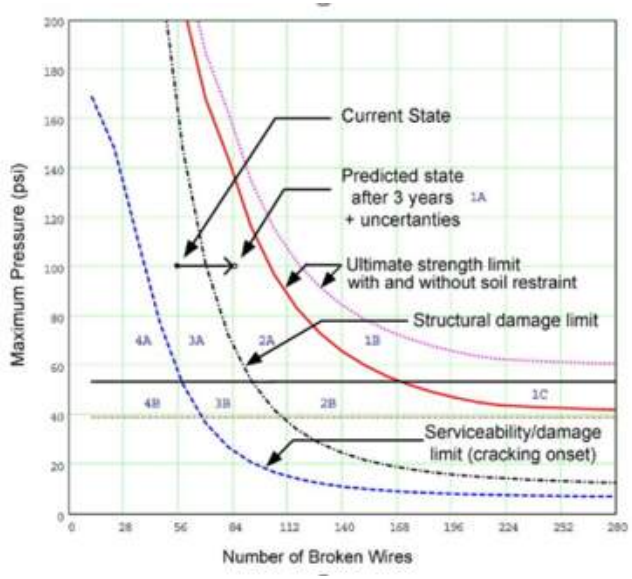
Pure Technologies Pipe Diver EM Inspection

- No disruption to regular pipeline service.
- Long inspection distances can be covered in a single deployment.
- Accurate results that pinpoint areas of distress to help optimize repair planning.
- Effective on a variety of pipe materials.
- More cost-effective than methods that require shutdown and dewatering.

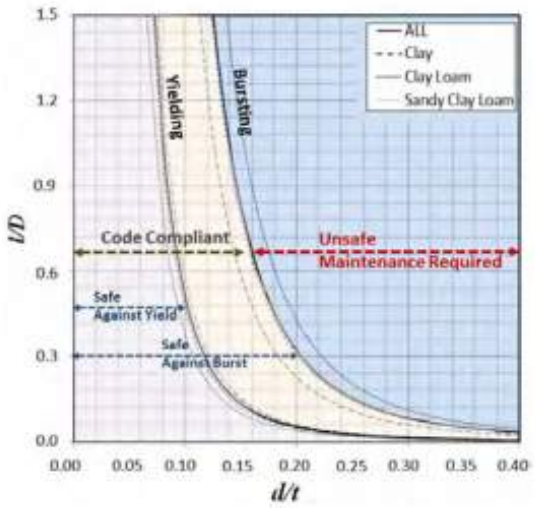


Condition Assessment Report

- PCCP
  - Determine Repair Priorities
  - Patented finite-element analysis
  - Primary Limit States
    - Serviceability limit state
    - Damage limit state
    - Strength limit state



- Steel Pipe Sections
  - Based on difference between Design and Current wall thickness
  - Comparison with AWWA Design Standards
    - Wall thickness degradation
    - Detected defects



Costs (February 2021)

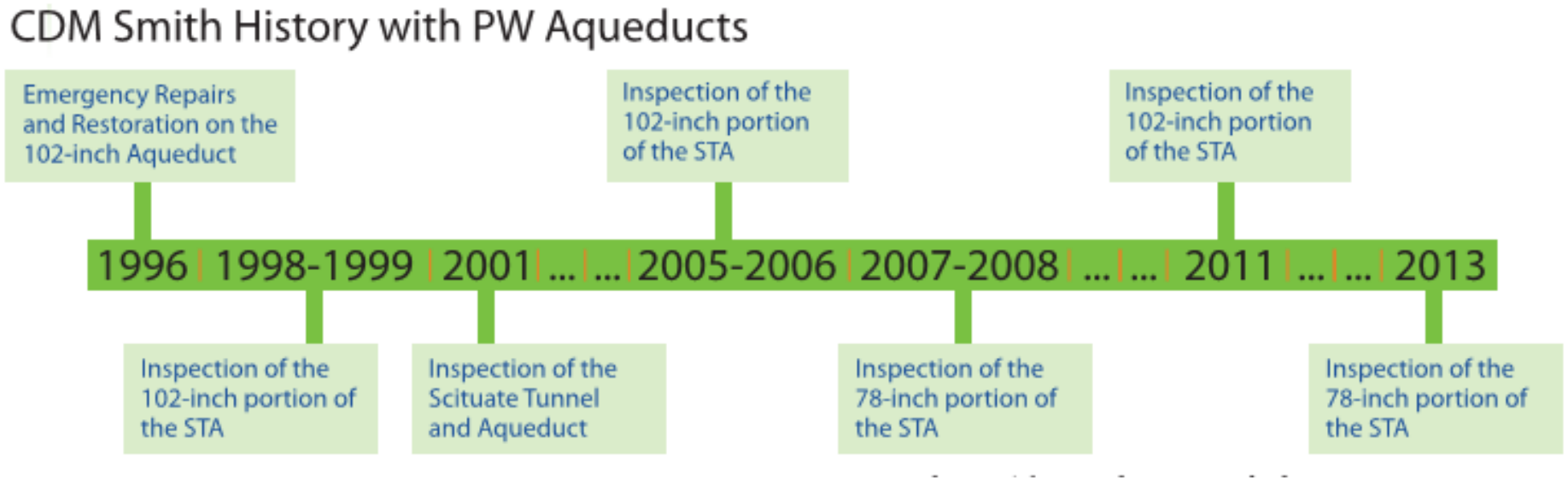
- Phase 1 - Pre-inspection Planning work
  - Pure Technologies Contractor – $50,000 (approx.)
  - Engineering & Implementation Budget – $35,000 (approx.)
  - **TOTAL PHASE 1 PROJECT BUDGET = $85,000 (approx.)**

- Phase 2 - Inspection and Analysis Work
  - Pure Technologies Contractor – $750,000 (approx.)
  - Construction Support - $25,000 to $250,000
  - Engineering & Implementation Budget = $75,000
  - **TOTAL PHASE 2 PROJECT BUDGET - $850,000 to $1,075,000**

- **Potential cost of pipeline failure = $ MILLIONS and Loss of Supply**

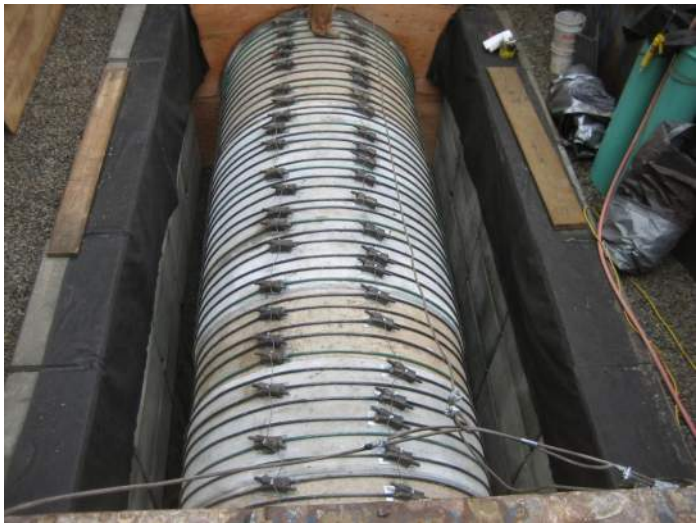
Schedule

- Useful life of PCCP ≈ 30 – 100 years
- East Providence PCCP ≈50
- Immediate implementation recommended
- Total Time of Inspection ≈ 12 - 18 months



Potential Rehabilitation/Repair Options

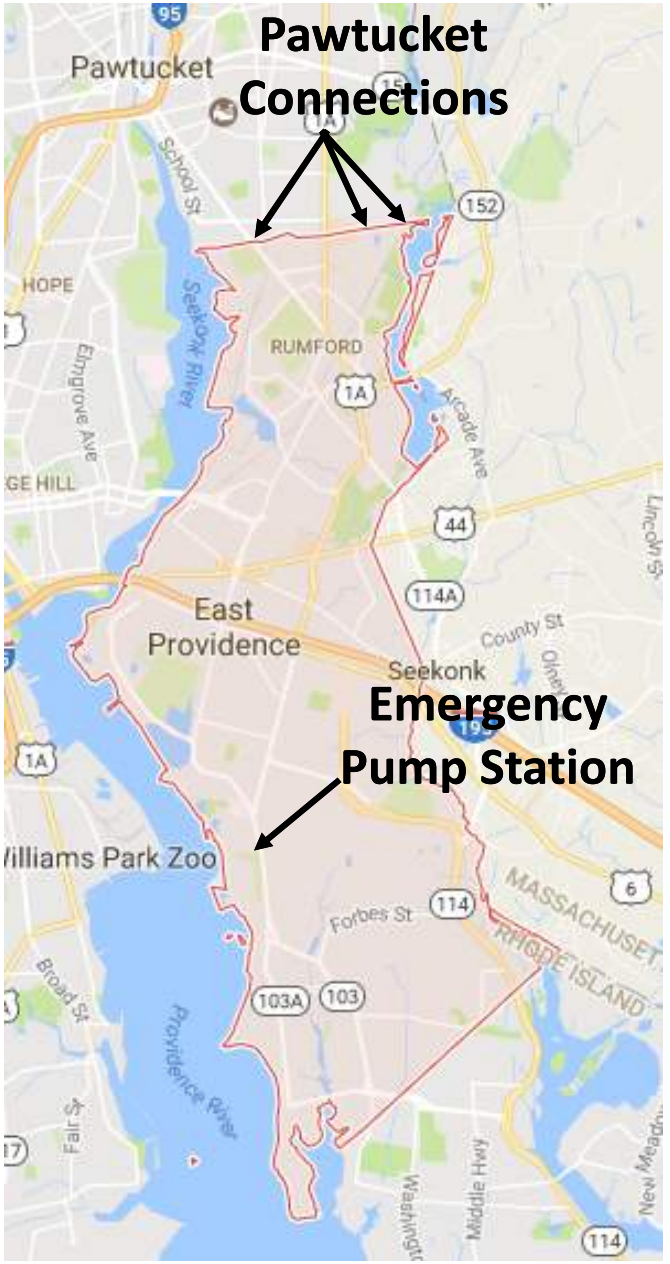
- Interior/Exterior Patching
- External Reinforcing
- Internal Lining / Coating
- Slip Lining
- Replacement



Supplemental Supply Options

Existing Supply Options

- Currently 100% Dependent on Providence Water
- Limited Emergency Supply Options
  - Pump Station from BCWA
  - 3 Unmetered Pawtucket Connections
- 2 Metered Connections under Construction
  - 3.5 mgd total capacity



Providence Water

Existing Pawtucket Avenue Pump Station

- **Advantages**
  - Supply up to 3 mgd
- **Disadvantages**
  - Dependent on Providence Water
  - Shared Pipeline with BCWA
  - Upgrades required

Pawtucket Water
Existing Emergency Interconnections

- **Advantages**
  - Connections have been used for emergencies in the past
- **Disadvantages**
  - Water Quality – Mixing of Water
  - Only available for temporary use
  - Limited supply

Backup Supply Options

- Providence Water:
  - BCWA proposed 24” transmission main from Pawtucket Avenue Pump Station to Kent Heights Storage Tank
- Pawtucket Water
  - Proposed Narragansett Park Drive and Pawtucket Avenue Connections
  - Construction Complete Summer 2021

Conclusion

Next Steps

- Proceed with improvements to existing Pawtucket Emergency Interconnections (under construction)
- Continue working with BCWA on 24” interconnection
- Proceed with preliminary planning work required to inspect City’s 42” transmission main
- Conduct inspection and perform condition assessment of 42” transmission main
- Determine need for pipeline rehabilitation