The Aging Water Infrastructure (AWI):

Needs and Challenges

Gregory M. Baird
AWI Consulting LLC
greg.m.baird@agingwaterinfrastructure.org

RMNASTT
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CURRENT “HOT SPOTS”

1950 - COUNTIES WITH POPULATION GREATER THAN 50,000
The Situation Room

• The water and wastewater systems are the most capital intensive enterprises
• Traditional capital improvement plans focus on new projects with a historical budget for repair and renewal costs
• There is growing investment gap in funding the repair and replacement of these systems
• The underground components make up the majority of the costs
• Each municipality is different based on demographic growth and movement and type of pipes installed
• Utilities are faced with system failure risks and a severe economic downturn
• New projects may be able to be quickly deferred, but this does not address the risk of system failures
• A low cost asset management approach is needed
Current Status...

- Engineering
- Politics
- Finance
What Success looks like...
Achieving Success…

- Asset Management
- Addresses the Aging Water Infrastructure (AWI)
- Affordability
- Sustainability

EPA/GAO
State/Regional
Local Politics
Sustainability Goals

Engineering
Condition Assessment
Trenchless Technologies
Asset Centric
Hydraulic Model Optimization
Design Build

GFOA/US-Canada
Finance Directors
Procurement Policies
SRFs/loans
Local Finance
Financial Advisors
Credit Agencies
Total Life Cycle Costs
Allocate work to extend the life of the asset in a cost effective manner
What were your Historical Investments?

Pipe Installed by Decade

Sewer Storm Reuse Water Replacement

Length of Pipe (FT)

Decades

Pipe Installed by Decade

US Drinking Water Infrastructure Report Card D-
American Society of Civil Engineers (2009)
20 Utilities by AWWA
Historical Investments and Future Replacement Costs

Time to Ramp Up Spending Expectations

We are here

There is no one time fix

Different Pipe Materials have been used


AC—asbestos-cement, Conc—concrete, DI—ductile iron, Pit CI—pit cast iron, PVC—polyvinyl chloride, Spun CI—spun cast iron
WATER and SEWER

Asset Replacement Projections for a Combined Water & Wastewater Utility

- Water Supply Plant
- All Water Mains
- Wastewater Plant
- All Sewers

$Millions

Years

1. What is the current state of my assets?
   • What do I own?
   • Where is it?
   • What condition is it in?
   • What is its remaining useful life?

2. What is my required level of service (LOS)?

3. Which assets are critical to sustained performance?
   • How does it fail? How can it fail?
   • What is the likelihood of failure?
   • What does it cost to repair?
   • What are the consequences of failure?

4. What are my best O&M and CIP investment strategies?

5. What is my best long-term funding strategy?
Goal to Extend the Life of the Asset

30-70% of equipment maintenance activity is typically misdirected – it is not cost effectively deterring failure.
Know your Current Condition
...Know your Risk

Condition assessment is not an end in itself, but is a means to an end...

_The end is to determine remaining useful life_
Extending Asset Life

Resource Allocation/Risk Assessment

- If you replace an asset too early - you have wasted money
- If you replace an asset too late – you have spent too much money
  ◦ (Cost of Catastrophic Failure)
Assessment Technologies
## Pipe Deterioration Conditions

<table>
<thead>
<tr>
<th>Pipe Condition</th>
<th>PCCP</th>
<th>Cast/Ductile Iron</th>
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<tbody>
<tr>
<td></td>
<td>Installation</td>
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<tr>
<td></td>
<td>Corrosion Initiation</td>
<td>Corrosion Initiation</td>
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<td></td>
<td>Cracking</td>
<td>Graphitization / pits/ tuberculation</td>
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<tr>
<td></td>
<td>Delamination</td>
<td>Serious graphitization / pits</td>
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<tr>
<td></td>
<td>Minor spalling</td>
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<tr>
<td><strong>Wire Breaks</strong></td>
<td>Extensive Spalling / Cracks</td>
<td><strong>Leaks</strong></td>
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<td></td>
<td>Collapse / Blow up</td>
<td>Scouring</td>
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<tr>
<td><strong>Excellent</strong></td>
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<td><strong>Break / Blow up</strong></td>
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<td><strong>Good</strong></td>
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<td><strong>Failed</strong></td>
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Cost Savings

From assessment of Australia’s advanced management practices, **20-30%** future life cycle cost *savings* typically is achievable for US water and wastewater utilities.

Where savings develop from…
- Efficiency gains
- Cost avoidance (defer, eliminate, reduce)
- Cost effectiveness and redirection
EXPECTED SAVINGS:
Asset Centric Approach
Trenchless Technologies
Condition Assessment
Asset Management

![Graph showing expected savings over fiscal years]

Net Total Annual Costs without AMIP Benefits
Expected AMIP Benefits $350 Million
Expected Net Total Annual Cost with AMIP Benefits
Aurora Water
City of Aurora, Colorado

- Current Population 314,000
- High Growth during the 1970’s
- Aging Water Infrastructure (AWI) Plan
  - Develop Asset Registry for 500,000 assets
  - Implement Condition Assessment and Asset Management Programs
  - Goal: Lower over-all asset life cycle costs and extend asset life
    - (Reduce future rate increases and debt issuances)
Aurora Water

City of Aurora Pipelines Installed by Decade

Miles of Pipe Installed

- 1940's
- 1950's
- 1960's
- 1970's
- 1980's
- 1990's
- 2000's

Sewer, Storm, Reuse, Water, Replacement
Based on GIS data
City of Aurora Pipeline Rehabilitation

Key Assumptions: 50 year useful pipe life, 3% inflation on costs per year, replace 10 percent of the pipe install per year. Based on GIS information on year installed.
Things to remember...

Replacement and refurbishment cost, not historic depreciation, is key to good financial decision-making

A cost-effective CIP is about the right solutions at just the right time – a balancing of demand and risk/Consequence

Even during an economic downturn, allocate some funding towards condition assessment to understand your risks

**REMEMBER IT IS REALLY ALL ABOUT RATES and AFFORDABILITY!!**
Aging Water Infrastructure (AWI)

Working together to solve the water challenges of the 21st century...

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