Restoration & Replacement Program
Today’s Topics

- Vision
- Program Development
- Existing Data
- Critical Sewer Analysis
- Condition Assessment
- Asset Risk
- Project Scoring
- Next Steps
Vision
Vision

• 10 Attributes of Effectively Managed Utilities
Vision

• Financial Viability
  – Understand full life-cycle cost of utility
  – Establish & maintain effective balance between:
    • Long-term debt
    • Asset values
    • Operations / maintenance expenditures
    • Operating revenues
  – Establish predictable rates (consistent with community expectations / acceptability) adequate to recover costs
  – Provide for reserves
  – Maintain support from bond rating agencies
  – Plan / invest for future needs
Vision

• Infrastructure Stability
  – Understand condition of & costs associated with critical infrastructure assets
  – Maintain / enhance condition of all assets
    • Over long-term at lowest possible life-cycle cost
    • Acceptable risk consistent with customer, community & regulator-supported service levels
    • Consistent with anticipated growth & system reliability goals
  – Assure asset repair, rehabilitation & replacements are coordinated to minimize disruptions & other negative consequences
Vision

• Customer Focused
  – Meet customer expectations - public values survey

• Environmental Stewardship / Protecting Water Resources
  – Proactive management of the system minimizes backups, I&I and unexpected pipe failures

• Financial Responsibility
  – Stable rates
  – Staffing and workload planning
  – Minimize the high cost of emergency repairs and overflows
  – Prioritizing limited resources - Fix the Worst First!

• Responsible Management
  – Practicality of managing 9,500 main line pipes segments

• Supporting Economic Development
  – Reliable sewer system
  – Targeted investments
Program Development
• Develop a Comprehensive Restoration and Replacement Program Including:
  – Critical Sewers Analysis
  – Condition Assessment
  – Asset Risk
  – Project Prioritization Process
  – Program Level Project Scoping
  – Documentation
Program Development

• Timeline
  – 2010
    • Critical Sewer Analysis
    • Condition Assessment
  – 2011
    • Asset Risk (by pipe segment only)
    • Define and Prioritize Projects
  – 2012 - Project Priority Array
  – 2013 - Pump Stations
  – 2014 - Force Mains / Air Valves
  – 2015 - Manholes
  – 2016 - STEP Systems
Program Development

• Program Outline
  ✓ Identify Existing Data
    • GIS and CCTV Investments
  ✓ Critical Sewer Analysis
    • Consequence of Failure (GIS Analysis)
  ✓ Asset Condition
    • Probability of Failure (CCTV Data)
Program Development

- Program Outline
  - Asset Risk
    - Combining Condition and Criticality (GIS Analysis)
  - Develop Prioritization Concept
  - Define R&R Projects
  - Prioritize R&R Projects
  - Project Priority Array
Existing Data
Existing Data

- Identify Existing Data
  - Assets
    - GIS
  - Asset Condition
    - CCTV Data
      - 240 miles of CCTV in Maintenance Management System (Granite & Lucity)
      - Data collected since 2005, 75% of main lines
      - All lines televised at some point
  - Tribal Knowledge of known defects
Existing Data

Sewer Lines Televised
Critical Sewer Analysis
Critical Sewer Analysis

- Defining Criticality
  - 1 to 3 scoring scale based on potential impact of asset failures or “consequence of failure”
Critical Sewer Analysis

• Score of 3 includes pipes:
  • in major roads (parkways, arterials)
  • in environmentally sensitive areas
    – Includes all difficult to access canyon lines
  • Greater than 18" diameter
  • More than 14’ deep

• Score of 2 includes pipes:
  • In urban collectors
  • Inaccessible lines
  • 10” to 18 ” diameter

• Score of 1 includes all other pipes
Critical Sewer Analysis - GIS Working for Us
Critical Sewer Analysis

GIS Working For Us
Critical Sewer Analysis
Condition Assessment
Condition Assessment

- CCTV Data
  - Infiltration / Inflow
  - Structural – Cracks / Shears
  - Sags
  - Roots
  - Fats, Oils, Grease (FOG)
Condition Assessment

- CCTV Data Collected from Cues CCTV trucks.
Condition Assessment

- CCTV Data Scoring “Weight”
### Condition Assessment

#### CCTV Data

<table>
<thead>
<tr>
<th>US Structure</th>
<th>DS Structure</th>
<th>Alt Pipe ID</th>
<th>Pipe ID</th>
<th>TV Rec#</th>
</tr>
</thead>
<tbody>
<tr>
<td>43-180</td>
<td>43-167</td>
<td>3474</td>
<td>3444</td>
<td>2333</td>
</tr>
<tr>
<td>Lakeshore Trunk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TV Observation

<table>
<thead>
<tr>
<th>Distance (ft)</th>
<th>VCR Counter</th>
<th>Location Text</th>
<th>Description Text</th>
<th>Rating [1-5]</th>
<th>Start Clock</th>
<th>Document Available</th>
<th>LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td></td>
<td></td>
<td>START US</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>8.70</td>
<td></td>
<td>Grease</td>
<td></td>
<td>3</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>39.20</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>41.80</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>44.40</td>
<td></td>
<td>LAT</td>
<td></td>
<td>0</td>
<td>2</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>51.00</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>62.70</td>
<td></td>
<td>LAT</td>
<td></td>
<td>0</td>
<td>10</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>94.00</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>3</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>102.30</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>3</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>105.40</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>3</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>105.40</td>
<td></td>
<td>LAT</td>
<td></td>
<td>0</td>
<td>2</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>110.60</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>117.90</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>120.80</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>127.00</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>130.00</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>133.50</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>136.50</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>148.30</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>153.00</td>
<td></td>
<td>Root-in-Joint</td>
<td></td>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Condition Assessment
Condition Assessment

- CCTV Data Simplified Based on Score

= Failing: Imminent failure

= Poor: Monitor, proactive repairs

= Good: No concerns
Asset Assessment
Asset Risk
Asset Risk

• Integrating Criticality & Condition
  – Criticality – Consequence of Failure
    • Score 1, 2, or 3
  – Condition – Risk of Failure
    • Score Red, Yellow, Green
  – Extra point, or fraction of a point added for hot spots.

Asset Risk = Criticality + Condition
Asset Risk

Sewer Lines Identified
Asset Risk

Project Zones Identified
Project Scoring
Asset Risk = Criticality + Condition
Next Steps
Next Steps

– Project Priority Array
– Capital Project component
– Possible use of Lucity’s Rehab Module
– Pump Stations