A Sewer Asset Management Case Study

City of Walla Walla

Agenda

Today’s talk:
NOT about “what is asset management”
NOT why you should do asset management
IS how Walla Walla approached asset management of the sewer collection system

Five Step Approach
- Data Inventory
- Performance Assessment
- Condition Assessment
- Risk Assessment
- Prioritize
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The Problem

- 150 miles of pipe from 6” to 36” diameter.
- Estimated $200M asset.
- Significant I/I problems, overflows
- City wanted to target 150 pipes for renewal/replacement over 10 years.
- No major hydraulic bottlenecks
- Condition ratings showed large portion of system in very poor condition – need better way to prioritize

Objectives

- **Evaluate** existing collection system
  - Create hydraulic model – ID existing bottlenecks & future
  - Develop master plan for extension to serve entire UGA
  - Develop pipe scoring criteria to prioritize replacement
    - Risk of Failure – incorporating City’s pipe condition ratings
    - Consequence of Failure – additional criteria to further prioritize
    - Ability to update in-house utilizing GIS

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Objectives – Cont.

- **Develop** 10-year CIP
  - Determine collection system replacement costs
  - Coordinate with IRRP
  - Focus on addressing overflows within next 5 years
  - Incorporate existing improvement plan for WWTP
- **Document** financial condition and ability to fund CIP
- **Satisfy** WDOE requirements for a General Sewer Plan

Step 1 – Data Inventory

Compile the data you already have

- Location Mapping
- Condition assessments (CCTV inspection) Granite
- Maintenance history (cleaning frequency and causes)
- Collapses and emergency repairs
- Customer complaints
- Basement backups
- Previous evaluations (master plans, flow studies)
- Institutional knowledge
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**Walla Walla – GIS**

2. City has dedicated GIS department.
3. GIS data for each pipe includes: material, date of install, invert elevations.
4. GIS track locations of backup claims.
5. Track “hot list” of spots visited monthly and quarterly for preventative maintenance.

**Data Inventory - CCTV**

2. CCTV 20% of system each year.
3. City has reviewed tapes and determined condition scores for all pipes in the system – using Granite XP software.
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Step 2 – Performance Assessment

- Hydraulic Capacity (Existing and Future)
- Flow Data Utilized Winter Water Service Meter Data
- Hydraulic Model - Calibrated with Field Data
- Assessment showed a few bottlenecks – but nothing significant.
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Sewer Basins

Hydraulics

Trunk Pipes (>8"

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- > 1.00
Step 3 – Condition Assessment

- “Likelihood of Failure” - LOF
- Pipe and manhole inspection
- Condition assessment methods:
  - Subjective grading – visual inspection
  - Distress-based evaluation – defect coding
  - Non-Destructive Testing Methods
Granite XP Scores

Walla Walla LOF Score

- 50% - Granite Pipe Score
- 10% - Pipe Material (Conc 100, Clay 90, DI 80, PVC 0)
- 10% - Time since last CCTV inspection
- 30% - O & M Frequency (Monthly 100, Qtr 50, Routine 0)
- +20 – Overflow/claim
- +40 – 2x Overflow/claim
- +10 – 6-inch diameter pipes
Step 4 – Risk Assessment

"Consequence of Failure” – COF

Location
- Land use
- Traffic intensity
- Access for repair
- Proximity to sensitive environments
- Provides service to critical facility

Infiltration and Inflow
- Soil type can lead to higher failure risk from high groundwater potential erosion if break occurs
- Increased costs for bypass pumping

Burial Depth
- Indicates degree of difficulty for emergency repairs
- Increased excavation costs

Pipe Diameter
- Affects rehab method and execution of repairs
- Degree of contamination from surcharging or failure

Peak Flows
- Increased costs for bypass pumping
- Pipes with same diameter can have different peak flows

Risk
Walla Walla COF Score

- 20% - Pipe Diameter (36”-100, 18”-50, 8”-10)
- 20% - Peak Flow (scaled by highest peak flow in system)
- 20% - Pipe Depth (30’-100, 15’-40, 10’-20)
- 20% - Location (Distance from major waterway, road classifications, Railroad, and local important locations such as Historic Downtown, State Penitentiary, VA Hospital, Schools)
- 20% - I & I Volume (scaled by highest I/I in system)

Step 5 – Prioritize
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Likelihood of Failure (LOF)
- CEMS Test Pipe Score (20%)
- Calculated Based on CEMS Score and Eastern Washington County WWRA Score (15%)
- New Material Determined by subsurface and review of records and updated in the field during CTV inspections (15%)
- Time Since Last CTV Inspection (20%)
- O & M Program (Determined by operations staff) (15%)

Consequence of Failure (CoF)
- Plan Area (100%)
- Existing Peak Flow (100%)
- Pipe Depth (100%)
- Location - River, Stream, Wastewater District, and Important Locations (100%)
- Infiltration and Inflow Volume (100%)

Hydraulic Capacity
- pipe size (100%)
- Loss of Capacity (0-25%)

CIP Prioritization

Prioritization Score:
- F (0-50)
- D (51-75)
- C (76-99)
- B (100-200)
- A (200+)

LOF Scores

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COF Scores

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Priority Scores
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Capital Improvement Plan

• “F” assigned to pipes with score > 50
• 129 pipes – 6% of system
  – 43% already planned for replacement – IRRP
  – Remaining 73 pipes mapped, developed CIP
  – Expanded projects to include adjacent “D” rated pipes where it made sense to
  – Resulted in 200 pipe segments in CIP
  – Approximately $15M over next 10 years

Estimated Yearly Replacement

- Replacement Cost for All Gravity Collection Pipe by Open Trench
- Replacement Cost for All Gravity Collection Pipe by Open Trench, excluding PVC and HDPE
- Replacement/Rehab Cost for All Gravity Collection Pipe by Open Trench and CIPP, excluding PVC and HDPE

<table>
<thead>
<tr>
<th>Cost per Year</th>
<th>$/yr Over 50 years</th>
<th>$/yr Over 75 years</th>
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<tbody>
<tr>
<td>Replacement Cost for All Gravity Collection Pipe by Open Trench</td>
<td>$4,094,360</td>
<td>$2,728,573</td>
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<tr>
<td>Replacement Cost for All Gravity Collection Pipe by Open Trench, excluding PVC and HDPE</td>
<td>$2,514,520</td>
<td>$1,676,547</td>
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<tr>
<td>Replacement/Rehab Cost for All Gravity Collection Pipe by Open Trench and CIPP, excluding PVC and HDPE</td>
<td>$5,634,400</td>
<td>$1,086,500</td>
</tr>
</tbody>
</table>
Summary

- Not rocket science – you can do it
- **START GATHERING DATA! (GIS)**
  - Pipe Material
  - Condition ratings
  - Time since last CCTV inspection
  - O & M Frequency
  - Sewer back-up/claim
Questions?

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