The Benefits of Continuous Flow Monitoring

A Case Study of the Downers Grove Sanitary District Flow Monitoring Program

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Purpose

• Describe the Flow Monitoring Program at Downers Grove Sanitary District

• Identify benefits
District Background

- Serves 60,000 people
- 245 miles of pipe
- 11 MGD Design Average
- Performed SSES work in 1980’s to reduce SSO occurrence
District’s Objective

MH 1H-009
4 / 11-12 / 01 Rainfall Event

Reduce Inflow and Eliminate SSOs

Flow (gpm) vs Time of Day

Rain (in)
Wet Weather Flow
Dry Weather Flow

Rainfall (inch)
Flow Monitoring Program

• 150 flow basins
• Owns 19 temporary flow meters
• Owns 9 permanent flow meters
• 2-month rotation
• District Staff installs, maintains, and removes flow meters
• B&W analyzes flow data
Flow Monitoring Program
Flow Monitoring Program

- **Annual Cost**

  **Equipment**
  - Purchase $14,000
  - Maintenance $6,000

  **Internal Labor** $38,000

  **External Labor** $24,000

  **Total** $82,000
What does $82,000/year give you?
Detect Pipe Blockages
Capacity Analysis

• Data “on the shelf”
• Eliminates waiting period for flow monitoring
• Development review is faster
• Hydraulic modeling
Support Funding Applications

- Comparative Analysis (Prioritize)
- IEPA Low Interest Loan
- 2009 ARRA
  - Received over $6 million in loan assistance for collection system improvements
Murphy’s Law

(... eliminates decision making of when to install and remove meters.)
## Evaluate Improvements

<table>
<thead>
<tr>
<th>Basin</th>
<th>Construction Method</th>
<th>I/I Removed</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H-009</td>
<td>Comprehensive (CIPP)</td>
<td>65%</td>
<td>$679/gpm</td>
</tr>
<tr>
<td>1M-012A</td>
<td>Comprehensive (Open Cut/Grout)</td>
<td>56%</td>
<td>$1,093/gpm</td>
</tr>
<tr>
<td>E1-014</td>
<td>Mains, Connections, MHs (Grout)</td>
<td>3%</td>
<td>$4,051/gpm</td>
</tr>
<tr>
<td>ARRA</td>
<td>Mains, Connections, MHs (Grout)</td>
<td>21%</td>
<td>$222/gpm</td>
</tr>
</tbody>
</table>
District Summary

- Targets peak I/I flow reduction
- Owns flow meters
- Rotate flow meter locations
- Most labor performed in house
- $82,000 per year
Benefits Summary (Top 5)

• Measures present conditions
• Measures how conditions change over time
• Provides objective data
• Data is readily available
• Guidance for resource allocation
Questions

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Calibration (Q&A)

• Magnetic Meters
  – Essentially none required after installation.

• Area-Velocity Meters
  – Measure pipe diameter
  – Measure water level depth
  – Measure velocity with ultrasonic probe

• Bench Testing
I/I Number (Q/A)

\[
\text{I/I Number} = \frac{\text{I/I (gpm)} \times 1000}{\text{Tributary Sewers (feet)} \times \text{Rain (inch)} \times \ln[\text{WWTC I/I (MGD)}]}
\]

- Basin Peak I/I Flow
- Tributary Sewers: normalize basin size
- Rain: normalize rainfall size
- WWTC I/I: normalize antecedent moisture condition