Evanston’s Leak Detection Program

Cost Savings & Many Other Benefits
Evanston’s Leak Detection Program

- Service Population 473,900
  - 74,900 retail
  - 399,000 wholesale

- Average Flow = 45.5 mgd
- Max Rated Cap = 108 mgd

- Treatment is conventional sand filtration.

- 3 intakes extending one mile into Lake Michigan
Evanston’s Leak Detection Program

• One-third of City’s water mains are over 100 years old (red).

• More than half of the water mains are over 80 years old (orange).

• We target replacing 1% of our system per year (equals 1-1/2 miles).
Correlator captures the sound of water escaping from a pipe

Correlation is all-day work, can’t multi-task

Traffic, major water usage, other utilities can interfere

Result: Proactive leak detection was limited to 3-4 miles per year or 2% of the distribution system
New Program: Loggers (First)

• Loggers only detect presence or absence of leak “noise”

• Logger deployment can be done in between other tasks

• Loggers fit in valve vaults and boxes, can be left overnight
Leak Surveying with Loggers

Step 1: Deploy in grid pattern for efficiency
Evanston’s Leak Detection Program

Previous Program  2013-2014 Program
Evanston’s Leak Detection Program

2018
Leak Surveying with Loggers

Step 2: Loggers listen for leak noise

- **Noise <22 dB**
  - No leak

- **Listen at 2:00 am for 5 minutes**
  - **Noise ≥22 dB**
    - Listen again at 3:00 am for 5 minutes
      - **Noise ≥22 dB** again
        - LEAK MODE
Leak Surveying with Loggers

Step 3: Obtain logger readings

- Loggers transmit readings from 8 am – 12 noon daily
- Readings upload to a handheld device
- Loggers are then moved to the next deployment location
# Evanston’s Leak Detection Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Miles Surveyed</th>
<th>Main Breaks</th>
<th>Service Leaks</th>
<th>Water savings after repairs (MG/YEAR)</th>
<th>Savings (Using water rate of $2.74 per 100 CF)</th>
<th>Savings (Combined water &amp; sewer rate of $6.13 PER 100 CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>57</td>
<td>2</td>
<td>1</td>
<td>8.85</td>
<td>$32,418.45</td>
<td>$72,527.41</td>
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<tr>
<td>2014</td>
<td>100</td>
<td>1</td>
<td>4</td>
<td>6.26</td>
<td>$22,931.02</td>
<td>$51,301.87</td>
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<tr>
<td>2015</td>
<td>157</td>
<td>2</td>
<td>3</td>
<td>9.9</td>
<td>$36,264.71</td>
<td>$81,132.35</td>
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<tr>
<td>2016</td>
<td>149</td>
<td>3</td>
<td>2</td>
<td>13.534</td>
<td>$49,576.42</td>
<td>$110,913.66</td>
</tr>
<tr>
<td>2017</td>
<td>156</td>
<td>2</td>
<td>3</td>
<td>9.9</td>
<td>$36,264.71</td>
<td>$81,132.35</td>
</tr>
<tr>
<td>2018</td>
<td>143</td>
<td>3</td>
<td>3</td>
<td>14.5</td>
<td>$53,114.97</td>
<td>$118,830.21</td>
</tr>
</tbody>
</table>

**TOTAL** 762 13 16 62.9 $231,000 $516,000
Benefits

- Verify valve locations and correct GIS
- Improve valve accessibility
- Eliminate illicit discharge to sewers proactively
- Identify private irrigation systems
Benefits

• Existing staff have incorporated leak detection into their routines with no resulting overtime

• Improved maintenance of valves

• Evanston has already recouped the cost of the equipment during the initial 3 years
Evanston’s Leak Detection Program

PCCP Large Diameter Water Main Inspection
Evanston’s Leak Detection Program

- 48” main (1960)
- 36” main (1956)
- 36” main (1964)
- Repair (2000)
Evanston’s Leak Detection Program

1. Limited In Trench Inspection and Dissection
   • Cost: ~$15K

2. Non-Destructive Internal Evaluation
   • Cost: ~460K
1. Limited In Trench Inspection and Dissection

- Inspected 16 foot long section (0.2%)
Evanston’s Leak Detection Program

36” main (1964)
Findings

• Good condition for its 50+ years of age
2. Non-Destructive Internal Evaluation

- Inspected ~12,954 ft. (71%)
Evanston’s Leak Detection Program

PipeDiver

SmartBall

Internal Televised Inspection (Sahara)

Robotics
Challenges to Inspection

- Bends and valves
- Insertion points
Challenges to Inspection

- Changes in elevations
- Pipeline hydraulics
Challenges to Inspection

- Control of water
- Phosphate disturbance
Actual Approach - Robotics
Visual Inspection
Findings

Overall good condition
Other Benefits to Evanston

• Crews are now more open to using new technology to improve productivity and safety

• Loggers are compatible with AMI – can use to continuously monitor critical mains

• Demonstrates that Evanston is actively working to comply with IDNR rules on water loss (2018 Non-revenue water = 5.2%, 2015 NRW = 19.1%)
QUESTIONS?