To Build or not to Build: Field Verification for Capital Planning

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01 Setting the Stage

02 The CSIP Approach

03 Boots On the Ground

04 Looking Forward
01 Setting the Stage
Background

**What?** Collection System Improvement Program (CSIP)

**Why?** Reduce SSO’s and increase operational efficiency

**Where?** City of Winston-Salem, Forsyth County, NC

**Who?** City/County Utilities (CCU) serving

- 100k sewer connections
- 225 FTEs working in collection and treatment
- 1750 miles of gravity sewer lines
- 50 pump stations

**When?** 5-year program kicked off in July 2016 (assessment and fast start activities Mar-Jul 2016)
Vision
We will be a top-performing utility supported by a trained, knowledgeable, and proactive staff, dependable equipment, efficient processes, effective information management, and fair and affordable rates.

Mission
To improve collection and conveyance of wastewater while protecting the environment and community we serve by complying with all regulatory requirements.
Overarching Concepts of the Program

- Ownership and accountability
- Team integration
- Knowledge transfer
- Operational optimization
- **Condition and capacity assessment**
- Design and delivery of construction solutions
Capacity Initiatives Set a Firm Foundation for CCU’s Capital Program

- Document Assessment and Design Criteria
- Streamline the Capacity Assurance Process
- Develop Capacity Constraint Identification and Tracking Protocol
- Establish Field Verification Program for Potential Capacity Constraints
The Planning Framework is in Place

**MASTER PLAN**

Completed 2015
Important Pieces need to be included to Maximize the CCU Investment

- Prioritization across basins?
- Include observed capacity issues?
- Verification methods for model-predicted capacity issues?
- What role does condition assessment play?
02 The CSIP Approach
CSIP Approach to Capital Planning for Capacity-Based Projects

Potential Capacity Constraints

- Evidence from CCTV and Inspections
- Staff/Crew Knowledge
- Hydraulic Model
- SSO Database
- Development Review

Apply Prioritized Assessment Criteria to each Asset

Field Verify Potential Constraints

Decision
- Remedial Action and Alternatives Analysis
- Deferment or Removal from List
Potential Capacity Constraint Prioritization
Strategy Focuses Field Verification Efforts

Categorize All Observed "Wet Weather" SSOs
1. Category A: Likely Capacity Related (I/I)
2. Category B: Maintenance with Capacity Element
3. Category C: Not Capacity Related

Sort Model Results Into Groupings:
1. Predicted SSOs
2. Predicted High HGL
   - 3' Freeboard
   - 5' Freeboard
3. Predicted Pipe Surcharge

Combine Model Results with Observed Data into Priority Groupings:
1. Priority 1 -- Category A Observed SSOs and Modeled SSOs
2. Priority 2 -- Category A Observed SSOs
3. Priority 3 – Model Predicted SSOs
4. Priority 4 – Category B Observed SSOs
5. Priority 5 – Model Predicted High HGL (3’)
6. Priority 6 -- Model Predicted High HGL (5’)
7. Priority 7 -- Model Predicted Surcharge

Rank Priority Events by Magnitude/Risk within Each Priority Grouping
Field Verify Priority Events in Order of Rank by Priority Grouping
## Comprehensive Potential Capacity Constraint Tracking Tool

<table>
<thead>
<tr>
<th>Pipe Asset ID</th>
<th>Pipe Diameter</th>
<th>Pipe Length</th>
<th>Model HGL</th>
<th>Model SSO?</th>
<th>Model SSO Volume (MG)</th>
<th>Model Depth from Rim (Feet)</th>
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<th>Observed SSO?</th>
<th>Recurring SSO?</th>
<th>Observed SSO Category</th>
<th>Capacity Constraint Priority</th>
<th>iCIP Project ID</th>
<th>iCIP Project Year</th>
<th>iCIP Project Year</th>
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Tracking Constraint through Verification

- Identify and Prioritize for Field Verification
- Field Verify
- Decision

- **YES?**
  - Alternative Analysis for Remediation
- **NO?**
  - Remove and Re-program
Field Verification Workflow and Approach

- Identify and Prioritize Potential Capacity Constraints
- Field Verify Priority Events in Order of Rank
- Field Verification Methodology
  - Monitor Location Identification
  - Monitor Location Verification
  - Monitoring Installation and Data Collection
  - Review for Adequate Storm Event
  - Model Monitored Storm
- Decision
  - Move Segment to Alternative Analysis for Remediation
  - Remove Segment from Potential Capacity Constraint List
Field Verification Technology

- Ultrasonic flow meters
- Smart covers
  - Electronic devices that measure the depth of flow passing through the manholes where installed.
- Chalking and other manual level gaging methods for peak surcharge for lower priority potential constraints
Boots on the Ground
First Pilot Field Verification - North Fiddlers Creek
Typical Field Verification Schedule

- Field Verification Setup Memorandum
- Geometry/Obstruction Verification (CCTV)
- Cleaning as Necessary
- Monitor Installation
Geometry Update

Field Verification Process
CCTV and Obstruction Memo
Obstructions Identified
Data Collection and Review

- Monitor for dry weather and wet weather flows
- Micro-calibrate the model in the vicinity of the capacity constraint
  - Wet weather flow characteristics
  - Dry weather and wet weather hydrographs
- If exceed assessment criteria:
  - CONFIRMED capacity constraint
  - Move to alternative analysis for remediation
- If does not exceed assessment criteria:
  - DEFER or REMOVE as potential capacity constraint
Looking Forward: Condition’s Important Role
How does Condition Assessment Impact the Verification Process?

South ForkInterceptor (SF-G-02)
Develop a Streamlined Process to Prioritize Condition and Capacity
In Closing

- Have a Strong Plan in Place
- Put your Data to Good Use
- Decide on a Consistent Prioritization Strategy and Verification Approach
- Field Verification is a Useful Tool to Confirm Project Expenditures and Build the Right Project at the Right Time
Questions?

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The CSIP Program – the Road Map

- Capital Delivery
- Field Operations and Management
- First Response
- FOG
- Cleaning, Root Control and Easements
- Inspection
- Construction and Repair
- Lift Stations
- Condition Assessment
- Capacity
- Management
Potential Capacity Constraint
Prioritization Strategy Focuses Field Verification Efforts

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<tr>
<th>Priority</th>
<th>Criteria</th>
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<tr>
<td>1</td>
<td>SSOs that are both Category A Observed and Model-Predicted</td>
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<tr>
<td>2A</td>
<td>Category A Observed SSOs, but not model predicted</td>
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<td>2B</td>
<td>Category A Observed SSOs, but not in the model</td>
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<td>3</td>
<td>Model-Predicted SSOs, but with no observed SSOs</td>
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<tr>
<td>4</td>
<td>Category B Observed SSOs</td>
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<td>5</td>
<td>Model Predicted HGL Within 3’ of Manhole Rim</td>
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<td>6</td>
<td>Model Predicted HGL Within 5’ of Manhole Rim</td>
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<tr>
<td>7</td>
<td>Model Predicted Surcharged Pipe</td>
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