Columbia’s $750M Consent Decree:
Program Update and Improvements in the O&M and Management Processes
Agenda

- Who is Columbia and what’s going on?
- Year 4 of the CD – are we on schedule?
- Management Efficiencies
- Infrastructure Investments
  - Pipeline Asset Management
- Operations and Maintenance
  - Better Processes
  - Better Tools
- Eye to the Future
Who is Columbia and What’s Going On?
City of Columbia Wastewater System

- Large wastewater system
  - 60 MGD WWTP
  - 1,100 miles of pipe & 56 pump stations
  - 60,000 accounts, and several major satellite systems
- Water and Wastewater is embedded within the City Government Structure
- 600 ‘Columbia Water’ staff
Columbia’s Consent Decree Specifics

- EPA/DOJ Federal Consent Decree Entered on May 21, 2014 (in Year 4)
- Infrastructure improvements
  - Assessment and rehabilitation requirements
- 13 Specific O&M ‘programs’
  - Use of CMMS, GIS and mapping upgrades, and other information management systems (IMS)
  - Requires development and training of SOPs
  - Establishes key performance indicators (KPIs)
- Programs are developed by CW2020 and submitted to EPA for approval, then implementation by CleanWater 2020 and City
Year 4 of the CD – Are We on Schedule?
**CD Program Submittals- The Die is Cast**

<table>
<thead>
<tr>
<th>CD Deliverable</th>
<th>First Due Date</th>
<th>% Complete</th>
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<tbody>
<tr>
<td>Sewer Mapping Program (SMP)</td>
<td>7/21/2014</td>
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<tr>
<td>CAP List (Checkbook)</td>
<td>8/21/2014</td>
<td>100%</td>
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<tr>
<td>Maintenance Management System (MMS)</td>
<td>5/21/2015</td>
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<td>Satellite Sewer System Agreements (SSSA)</td>
<td>5/21/2015</td>
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<td>Transmission System Operations and Maintenance Program (TSOMP)</td>
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<td>Continuing Sewer Assessment Program (CSAP)</td>
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<td>100%</td>
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<tr>
<td>WWTP Operations Program</td>
<td>11/21/2015</td>
<td>100%</td>
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<tr>
<td>Contingency and Emergency Response Plan (CERP)</td>
<td>11/21/2015</td>
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<tr>
<td>WCTS Training Program</td>
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<td>Information Management System Program (IMS)</td>
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<td>100%</td>
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<td>Financial Analysis Program</td>
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<td>Gravity Sewer System Operations and Maintenance Program (GSOMP)</td>
<td>11/21/2015</td>
<td>100%</td>
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<td>Infrastructure Rehabilitation Program (IRP)</td>
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<td>WWTP Training Program</td>
<td>5/21/2016</td>
<td>100%</td>
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<td>IR Report for the WCTS</td>
<td>2/10/2018</td>
<td>20%</td>
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<tr>
<td>Sewer System Hydraulic Model Report</td>
<td>11/10/2018</td>
<td>20%</td>
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<tr>
<td>Supplemental Environmental Project Implementation (SEP)</td>
<td>5/21/2019</td>
<td>80%</td>
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<td>SEP - Quality Assurance Project Plan (QAPP)</td>
<td>7/21/2014</td>
<td>100%</td>
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<td>Capacity Assurance Program (CAP)</td>
<td>6/27/2019</td>
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<tr>
<td>Supplemental IR Report</td>
<td>11/15/2020</td>
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What is CleanWater 2020 about?..... (hint: it’s not the CD!)

- **Old Answer:**
  - “A consent decree and capital improvements program”

- **New Answer:**
  - “...the City initiative to implement an increased capital improvements program and transform the Department of Utilities and Operations into a leader among it’s peers...”

- **Clear Direction from City Leadership**
  - Implement best management practices and asset management approach
  - Utilize best-in-class tools
  - Become a leader among peers
Are you Columbia...?

- **Columbia Wastewater (4 years ago)**
  - Insufficient past CIP investment
  - Needed to upgrade support tools (GIS, CMMS, SCADA, etc.)
  - Needed improved asset condition assessment, mapping, and renewal planning
  - Needed to improve internal processes and capacity to match growing workload
  - Needed a long-range roadmap
  - Needed better standards

- **Your Name Here...**
  - ✅ Insufficient past CIP investment
  - ✅ Need to upgrade support tools (GIS, CMMS, SCADA, etc.)
  - ✅ Unknown asset condition, inaccurate system mapping, and no asset renewal planning
  - ✅ Need to improve internal processes and capacity to match growing workload
  - ✅ Need a long-range roadmap
  - ✅ Need better standards
Management Efficiencies
Management Efficiencies

- Increased workload in ALL areas of the utility
- Extension of Staff program format allows for CW2020 to assist on implementing efficiencies
- My rule: “if you are going to do something a lot, do it efficiently”
- Standards Development
  - Project Management & Reporting Standards
  - Standard Specifications and Scopes
  - Standard Processes and Workflows
Infrastructure Investments
Infrastructure Investment Roadmap

- Robust Mapping / GIS Improvements
- Continuing Sewer Assessment
- Prioritization of Rehab Needs
  - Major Vs. Minor pipe
- Execution of Rehab Projects
- COLLECTION SYSTEM ASSET MANAGEMENT
Major Pipe Assessment – 110 Miles

- **36”-60” Multi-Sensor**
  - CCTV w/ PACP Coding
  - Sonar
  - Laser profiling
  - H₂S

- **15-30” CCTV**
  - Inspection of all pipe
  - CCTV w/ PACP Coding
Multi-Sensor is COOL... and complicated...
Condition Assessment

- **Pumps & Valves** – inspections and bar coding
- **Gravity Sewer**
  - Multi-sensor inspection (laser, sonar, CCTV, H₂S, etc.)
  - CCTV
  - Zoom camera / smoke / SL-Rat
- **Force Mains**
- **Desktop / Proxy measures**
  - Age, work orders, SSO reports, breakages, I&I from flow monitoring, etc.
Criticality Model Development (Pipeline Example)

- Maintenance Staff Input is Critical
  - Ease of Repair is often overlooked
- GIS Based Model

<table>
<thead>
<tr>
<th>Criticality Category</th>
<th>Criticality Factor</th>
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<tbody>
<tr>
<td>Quantity of Flow</td>
<td>Diameter</td>
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<tr>
<td>Transportation Impacts</td>
<td>Roads, Railroads, Etc.</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>Waterbodies (Streams, Lakes)</td>
</tr>
<tr>
<td>Ease of Emergency Repair</td>
<td>Maintenance Staff Input</td>
</tr>
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Combining Condition and Criticality

- Combining asset condition with asset criticality is where the magic happens!
  - Probability Vs. Consequence of Failure
Pipeline Asset Management

- Understands pipe condition
- Prioritizes based on criticality
- Reduces surprises (SSOs)
- MINIMIZES cost to the ratepayer

- USEPA definition
  “managing infrastructure capital assets to minimize the total cost of owning and operating them, while delivering the service levels customers desire”
Infrastructure Planning & Prioritization
Show me the Money $$$

- Revisiting the $750M
  - Rehab – $400M
  - Capacity - $130M

- Major Program Controls Effort to Track, Monitor, Report

“If one of you wants to build a tower (or rehab a sewer system), won’t you first sit down and estimate the cost to see if you have enough money to complete it?”

— Jewish Carpenter 2,000 years ago
Operations and Maintenance
Smart Infrastructure
Operations & Maintenance Advancements

- CMMS (Cityworks)
  - WWTP
  - Pump Stations
  - Collection System
    - Inspections Module
  - Inventory Management
    - Storeroom

- Gravity Line Maintenance Changes
  - SL-RAT
  - Dashboards
Acoustic Inspection

- **Proactive** inspection
- **Efficient** inspection
- **Focused** deployment of costly cleaning resources
- CMMS and Asset Management Systems support work processes
Data, Data, Everywhere, But Not a Drop to Drink

- All these systems create Data

- It is CRITICAL to:
  - Manage it efficiently
  - Be able to understand it
  - Use the information to make better decisions
Dashboards Done Right

- Only as good as the data

- Makes the information
  - Accessible
  - Actionable

- Make better decisions
  - Fact, not intuition

- Don’t Assume
Collection System Dashboard Example
Gravity Sewer Inspected History
More on Dashboards and Making Better Decisions

- Today @ 3:20 – Room 306C
- Utility Manager’s Dream: Intelligent Dashboards
- Wayne Miles
- Free Beer (...While supplies last...)

2017 Annual NC AWWA-WEA Conference
Smarter Infrastructure… Coming to a Utility Near YOU!
Eye to the Future
CW2020 Looking Forward

- Smart Infrastructure & Asset Management
  - Advancing the Dashboards
  - Going Mobile
- Rehabilitation of Major Pipe
- CMMS Live for ALL Wastewater systems
- Columbia’s Goal:
  - Leader among peers
Contact Us
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