The Effectiveness of New Technology and Performance Based Standards
Introduction

1. What is the current state of my system’s assets?

The first step in managing your assets is knowing their current state. Because some of this information may be difficult to find, you should use estimates when necessary. Over time, as assets are rehabilitated, expanded or replaced, your inventory will become more accurate.

You should ask:
- What do I own?
- Where is it?
- What is its condition?
- What is its useful life?
- What is its value?

Best practices include:
- Preparing an asset inventory and system map.
- Developing a condition assessment and rating system.
- Assessing remaining useful life by consulting projected useful life tables or decay curves.
- Determining asset values and replacement costs.

3. Which assets are critical to sustained performance?

Because assets fail, how you manage the consequences of failure is vital. Not every asset poses the same failure risk, or is equally critical to your water system’s operations. Therefore, it is important to know which assets are required to sustain your water system’s performance. Critical assets are those you decide have a high risk of failing (old, poor condition, etc.) and major consequences if they do fail (major expenses, system failure, safety concerns, etc.). You can decide how critical each asset is and rank them accordingly. Many water systems may have already accomplished this type of analysis in vulnerability assessments.

You should ask:
- How can assets fail?
- How do assets fail?
- What are the likelihoods (probabilities) and consequences of asset failure?
- What does it cost to repair the asset?
- What are the other costs (social, environmental, etc.) that are associated with asset failure?

Best practices include:
- Listing assets according to how critical they are to system operations.
- Conducting a failure analysis (root cause analysis, failure mode analysis).
- Determining the probability of failure and listing assets by failure type.
- Analyzing failure risks and consequences.
- Using asset decay curves.
- Reviewing and updating your system’s vulnerability assessment (if your system has one).

This flow chart shows the relationships and dependencies between each core framework question.
5 PRACTICAL STEPS

STEP 2: ASSESS YOUR DATA NEEDS. WHAT DO YOU WISH YOU KNEW?

- Are collection system maps and GIS current?
- All manholes located?
- Complete structural and O&M baseline snapshot?
- I&I sources located?
- R3 options identified at the specific asset level?
- Do you have system-wide understanding of:
  - What you own and where it is?
  - Locations of all connections?
  - Assets listed by criticality?
CASE STUDIES-MI

SCOPE OF 1.6 MILLION LN FT

- Auburn Hills
- Westland
- Lansing
- Livonia
- Orion
- Battle Creek
- Dundee
- Superior
- Owosso
1. Phase 1 Pre-cleaning Inspection.
   a. The preferred method for Pre-Cleaning Inspection is color CCTV conforming to NASSCO Pipeline Assessment Certification Program (PACP), and for the data to be exported electronically in a PACP certified format. Since this inspection is performed prior to cleaning, it is understood that the video may not provide an “unobstructed view of the entire pipe”.
   b. The Contractor may propose other methods to the Owner prior to bid for inspection such as, zoom camera inspections, acoustical technology, etc.
   c. If the Contractor is performing the P must be pre-approved by the Owner prior to bid for.

2. Phase 2 Sewer Pipe Cleaning. Based on the Owner’s review, he or she will determine if additional work will be required. At the sole discretion of the Owner is to either declare the work on the particular sewer segment complete or notify the Contractor of additional work (i.e. Phase 3: Light Sewer Cleaning, Heavy Cleaning, Deposit Cut, Root Cut Medium, Root Cut Ball, or Lateral Cut)
ONLY 20% OF SEWERS WILL REQUIRE SOME SORT OF ACTION TO REMOVE DEPOSITS, ROOTS OR OBSTRUCTIONS.....

KNOWLEDGE ABOUT YOUR PROBLEMS IS CRITICAL BEFORE MAKING DECISIONS

80% REQUIRE NO ACTION

YOUR ENTIRE SYSTEM
SMALL ROBOT, HUGE IMPACT

- An industry first!
  - Unmanned, autonomous inspections
- Recognized within and outside of the industry
- Facilitates Y.E.S. Program – Rapid Data Acquisition
- Inspect abundant pipe 8”, 10”, 12”
- Battery operated – Green technology.
- Non-disruptive…quiet
- 3-5X Daily CCTV output
- Lightweight, easily transported platform
- 100% pipe coverage
- Digital data format
- Increased safety
- Simplified access
- Not limited by weather conditions
- Minimal traffic control
Inspecting with Solo®
Critical Pipe Survey Report structural integrity measurements in a useful way
- Ovality/Deflection - How much deformation exists?
- Diameter – What is the pipe geometry?
- Corrosion/Pipe loss – How much of the crown is gone?
- Sediment volume – How much debris and where is it deposited?
- H2S/Temperature – What is the likely corrosion rate?

Manage your Critical Pipe for predictive risk management
Above the Flow
3D Laser (LADAR)
H₂S Gas Temperature CCTV

Platform
Incline
Payout

Below the Flow
Sonar

Useful Information
(Examples)
Ovality
Corrosion
Gas Levels
PACP
Sediment
Water Level
COMPARISONS OF LINES:
• 2 Sections of 30” Trunk Sewer
• 4,000 LF Each
• 30-40 Years Old
• CCTV shows indications of corrosion (Surface Aggregate Visible)
• Rehab Estimate: $360k Each

PRACTICAL QUESTIONS:
• Which is worse?
• What is the remaining useful life? Risk of Failure?
• What action to take?
Pipe B is ready to fail!!

8% corrosion

90% corrosion
Initial Estimate-Annual Clean to Inspect: 1.4 mil over 3 years

Budget Cost of Condition Assessment: $750,000 over 6 months!

**Battle Creek operations staff and Engineer’s are already acting on that information.**
THANK YOU
Q&A

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