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Using innovative practices to enhance the 5-year sewer system inspection program for Woodinville Water District

By: Commissioner Aleksandra Kachakov

In this article we will present how the Woodinville Water District (District) has started implementing innovative practices to improve the 5-year sewer system inspection program. We will explain the importance of accurate condition data for effective asset management and share District efforts related to manhole and pipe video inspection improvements over the last several years. We will describe how the District has adopted the use of the NASSCO (National Association of Sewer Service Companies) condition coding standards in tandem with a new Cloud based technology service (CCTV software) and used targeted employee training to build a solid program foundation. These actions will provide the data, knowledge, and tools the District needs to proactively plan an effective sewer system maintenance and replacement program to ensure that our customers receive reliable, safe, and affordable services.

Background:

The Woodinville Water District Sewer Service Area is comprised primarily of properties within the City of Woodinville city limits and the English Hill area of unincorporated King County. We maintain approximately 54 miles of sewer piping infrastructure (gravity mains, force mains), manholes, lift stations and siphon stations. Most of the sewer piping system effluent flows by gravity, however pumping via a lift station is required in various locations due to the topography. All the District's sewer effluent flows to King County Metro's trunk lines, and then on to the Brightwater Treatment Plant for processing. Our sewer system is relatively new compared to most systems, (some of the oldest pipe is only 50 or so years old) and is mostly constructed of pvc material

The District has had an active sewer main video and manhole inspection program for years. We are required to run a camera down each of our sewer mains and video the entire system every 5 years. Sewer cameras give staff a better view of the sewer pipes so they can determine first if the pipe was installed correctly and afterwards to see where root intrusion has happened, cracks have developed, and blockages have occurred. Having videos of each pipe, recorded over time, reveals changes in pipe condition and helps us plan maintenance and replacement projects.

The manholes are inspected at different intervals during the 5-year period based on the type of inflow they receive. Higher and more damaging inflow requires more frequent inspection. We currently maintain and inspect approximately 1,600 manholes. In the early years of our inspection program (prior

to 2005) we collected inspection data using paper forms and it was very cumbersome to analyze the data collected in a comprehensive way. In 2005, we began using an ESRI Geographic Information Systems (GIS), and had each manhole surveyed for geographic accuracy. This allowed us to map each manhole, store collected information (manhole type, elevation, depth, pipes in/out, etc.) and make it available to all staff. Eventually, we began to use mobile applications to perform maintenance inspections and store that information in the GIS. This new way of doing electronic manhole inspections enabled the crew to see the entire sewer system on a mobile device and collect and store the data faster using an electronic form (eliminated the need for paper).

New opportunities:

In the last couple of years, we started looking for even better opportunities to improve our sewer system inspection program.

Over the years we have collected extensive video recordings, however these videos are not available in an easily accessible way. To overcome this issue, we are planning to implement ITPipes CCTV software. The software will provide the ability to attach data to the video of damaged portions of pipe, link the video to the pipe feature in ITPipes Web Map Viewer, and access the data and video across multiple mobile and desktop devices.

We also determined that we had very good location and asset descriptive data in GIS, such as size, material, length, etc., however the condition of our assets was not rated in any standardized way. This made it difficult for us to plan and time the maintenance and replacement activities in the most effective way. Therefore, we started looking for best practices and industry standards in assets condition rating. We discovered that most agencies follow the National Association of Sewer Service Companies (NASSCO) standards. Staff members from Operations, Engineering and GIS were trained and obtained certification in NASSCO Pipe, Manhole and Lateral Condition Assessment. Additional staff members are scheduled to be trained soon. The training will help us learn how to collect relevant condition data (list and rank deficiencies), and how to document it, store it and use it for planning.

The new ITPipes CCTV software uses the NASSCO standards which will allow us to complete the video inspection, code each pipe observation, and store that video with associated data in the Cloud. The software uses those observation codes to assign each pipe a condition score, which can be symbolically shown on a map in a comprehensive way to see where the highest risk pipes are located. This map can be viewed from any desktop or mobile device from anywhere with the appropriate login and password.

Expected Outcomes and Customer Benefits:

- Identify issues with higher degree of accuracy due to standardized assessment
- Have data and reports in a consistent format available to employees and vendors
- Use accurate data to develop preventative maintenance programs to keep problems from occurring in the first place
- Determine the correct rehabilitation program based on condition rating and location

- Provide more cost-effective services based on system rehabilitation plans that focus attention on what is the most important issue and will benefit the community the most
- Reduced service interruptions and system failure/breaks

Looking Forward:

The use of ITPipes for sewer main condition assessment scoring and the improved ESRI manhole inspection program will help staff collecting and analyzing the best data available to predict and prevent failures in the sewer system. In 2022, we will be looking at Computerized Maintenance Management Systems (CMMS) that works in tandem with ITPipes to automate and standardize even more the District's maintenance activities. Our goal is to continue improving and innovating our approach to proactive infrastructure maintenance to allow for the best possible customer services now and in the future.