THE CITY OF HOUSTON'S SANITARY SEWER COLLECTION MONITORING AND ALERTING SYSTEM

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Executive Summary

The City of Houston sanitary sewer collection system has approximately 6,950 miles of pipe ranging in diameters from 6 inches to 144 inches and includes approximately 124,500 manholes. Identification and mitigation of Sanitary Sewer Overflows is part of the City's system-wide operation management plan. In an effort to mitigate potential overflows in the sewer pipelines, as well as decrease the time it requires to resolve incidents involving sewer pipeline overflows, the Wastewater Organization and Utility Systems Science & Software (US3) developed a technology based vision and strategy to address these critical issues. This technical solution focused on utilizing the existing wireless broadband communications network built by the City of Houston's Public Works Department for remote monitoring and management of water meters, traffic signals, and other Public Works equipment and assets. Using this internal wireless broadband communications network significantly reduces the total cost of ownership by eliminating recurring communications costs and improving real-time monitoring capabilities. In addition to leveraging the wireless broadband communications network, the Wastewater Organization and US3 also worked on identifying innovative ways to solve the problem by designing and developing equipment responsible for automatically collecting sewer pipeline water levels, monitoring rises in the water levels, and performing real-time alerting when specified thresholds in sewer pipeline water levels were exceeded.

Technical Solution

The result was the development of the Sanitary Sewer Collection Monitoring and Alerting System. This innovative solution leverages the existing wireless broadband network as well as the City's Automatic Meter Reading (AMR) system. By working across different divisions the Wastewater Organization was able to identify ways to leverage investments already made in technology and using it in an innovative way that provides functionality and delivered results for the Sanitary Sewer Collection Monitoring and Alerting System.

Technical Components

The City of Houston's Utility Customer Service Branch is in the final stages of deploying an AMR system across the Houston metropolitan area. The AMR system repeaters and collection points cover approximately 80% of the City of Houston. Consequently, the AMR system coverage corresponds to approximately 80% coverage of existing sanitary sewer collection system.

While substantial wireless broadband network and AMR repeater/collection coverage existed that could be leveraged for monitoring of manholes in the same coverage area, a technical solution to perform the monitoring and alerting of sewer pipelines levels was not readily available in the market. As a result, the Wastewater Operations Branch worked closely with US3 & Itron for the past two years to develop monitoring and alerting hardware components for sewer pipelines. Itron is one of the AMR manufacturers the City of Houston is working with in the deployment of the Utility Customer Service's AMR system. The close joint development between the Wastewater Operations Branch, US3 and Itron resulted in the creation of a modified device that operates very similar to the water meter reading devices as illustrated below (Figure 1).

In addition, the Houston Sanitary Sewer Collection Monitoring and Alerting System interface's directly with the City's SCADA (Supervisory Control and Data Acquisition) system.

Figure 1: Original and Modified Meter Reading Devices

By working with the City of Houston's existing AMR network, the Wastewater Operations Branch was able to develop a solution for the Sanitary Sewer Collection Monitoring and Alerting System that would implement the same communications protocol utilized for existing residential water meter reading and therefore the same repeaters, collection points, and back-end application servers for initial data collection to determine sewer pipeline overflows. Once the data is collected into the AMR system, the Waste Water SCADA system accesses the AMR back-end system to analyze the data and provide real-time alerts when specified thresholds are reached. When the Sewer Collection Monitoring and Alerting System identifies a rise in

water level that is indicative of a stoppage and potential for overflow notifications are relayed to staff.

One Solution, Multiple Benefits

Prior to the Sanitary Sewer Collection Monitoring and Alerting System, residents or city personnel would identify and report sewer stoppages and overflows with response being reactive meaning valuable time was lost. In addition to improved responsiveness, the City will be able to analyze the data collected through this Sewer Collection Monitoring and Alerting System for further planning and continuous improvement.