

City of Grand Rapids

City saves up to \$1 billion in unnecessary capital work projects by utilizing data-driven real-time decision support technology

Grand Rapids, MI is a community that has garnered accolades in the clean water industry for taking significant proactive steps to improve its sewer system. In the early 1990s, "River City" took the initiative to invest in transforming its collection system from a combined sewer system to separate storm and sanitary sewers. By moving from a single pipe for both stormwater and wastewater conveyance to separate pipes, the City avoided the introduction of sewage into its waterways, reducing overflows and subsequent pollution into the landmark Grand River that flows to Lake Michigan 40 miles downstream.

The challenge

After nearly 25 years, Grand Rapids finished retrofitting its combined sewer overflow system to a separate sanitary and stormwater system, completing its long-term control plan (LTCP) in 2015. But now, the City needed to get a better understanding of the infiltration and inflow into these newly separated sanitary sewers to ensure compliance with a mandate from the Michigan Department of Environmental Quality (DEQ). This mandate allowed them zero overflow events of any kind, except as part of a wet weather event of a magnitude in excess of a 24-hour, 25-year storm.

For compliance purposes, the City needed analytic data to certify performance and understand how the system behaved during a wide variety of wet and dry weather conditions. While gathering this information, the City was also presented with a hydraulic report stating that areas of the community were experiencing excessive surcharging and flooding. They suspected otherwise, but needed proof to answer regulators, as mitigation to eliminate the surcharging and flooding was estimated to cost much as \$1 billion; a capital expense the city could ill afford.

The solution

To satisfy regulators, Grand Rapids turned to Xylem to understand how the sewer separation behaved, with the goal of modeling the performance in a computer environment to better predict how the system would perform with less costly improvements to existing infrastructure. First, the City installed and commissioned the deployment of a sensor network comprised of 90 flow meters and 10 rain gauges to collect real-time data from the sanitary lines. This data was analyzed using [Xylem Vue's SSO/CSO Prediction and Prevention applications](#), which collected, organized, analyzed and served



An example of SSO/CSO Prediction and Prevention, a real-time database and data analytics tool that offers full SCADA integration..

Program highlights:

- Real-time decision support system brought in to help the Environmental Services Department for the sanitary system separation
- Data demonstrated that the infiltration and inflow problem could be solved for \$30-50 million as opposed to the original \$1 billion estimate
- The City has expanded the sensor network to more parts of the system

the data via dashboards, giving city operators visual cues to understand and regulate the operation of their sewer systems. Once built, the model was then compared against ongoing sensor data, generating a higher level of system intelligence which is continuously improving with each wet weather event.

The results

Upon completion of the investigation using SSO/CSO Prediction and Prevention, the City demonstrated to DEQ regulators that, by focusing on a few critical areas needing improvement, its infiltration and inflow problem **could be solved for between \$30-50 million as opposed to the original \$1 billion estimate.**

Since implementing SSO/CSO Prediction and Prevention, Grand Rapids has achieved the performance required by the long-term control plan and continues working towards final certification with the Michigan Department of Environmental Quality. Encouraged by those results, Grand Rapids has subsequently expanded their sensor network by an additional 70 sensors, many of which are now delivering real-time data from the City's stormwater network and, over the next few years, the City will also embark on a multi-phased program to improve sustainability and improve water quality for wildlife and recreational use in the Grand River.



A Grand Rapids I/I analytics dashboard showing the intensity and characterization of their inflow and infiltration sites.