

Project Summary

Project:
Salt Lake Fire Flow Improvement Study

Project Location:
Salt Lake City, Utah, U.S.A.

Organization:
Salt Lake City Department of Public Utilities

Be Inspired Awards Category:
Innovation in Water, Wastewater, and Stormwater Networks

Project Objective:
Evaluate required distribution system improvements to meet pressure and fire flow requirements

Product Used:
WaterGEMS

WaterGEMS® Provides Salt Lake City with Improved Fire Flow Planning

Delivering Higher Pressure Increases Customer Satisfaction While Satisfying Fire Flow Constraints

The Challenges

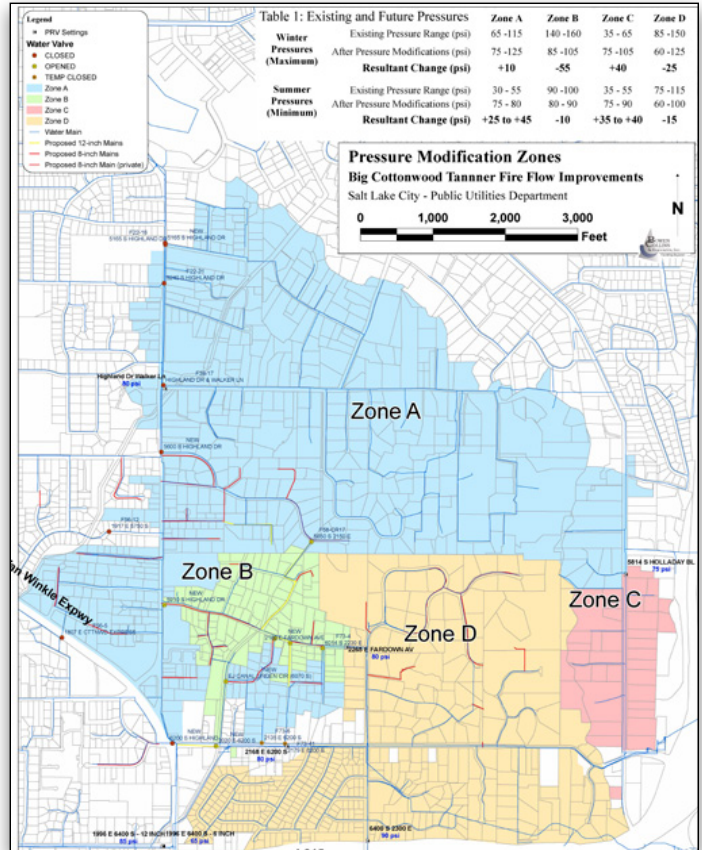
The past several years, pipelines in areas of Salt Lake City, Utah, have fallen behind current fire flow service requirements, and customers regularly complained of low pressures during peak demands. This was caused by a combination of problems, including small pipe diameters (4 inches and smaller), dead-end pipelines, and pressure zone boundary issues. To resolve them, the Salt Lake City Department of Public Utilities used WaterGEMS, Bentley's water distribution modeling software, to evaluate required distribution system improvements to meet pressure, fire flow, and fire hydrant coverage requirements in the area serviced by Green Ditch and Big Cottonwood Tanner Irrigation Companies. The software also helped the department develop a prioritized plan for the completion of these improvements.

Fire Flow Study Conducted with WaterGEMS

WaterGEMS, which can run within ArcGIS, MicroStation®, AutoCAD, or as a stand-alone application, was used to complete all modeling tasks. The water model was built as a complete representation of the city's distribution system and included all of the pipelines, pump stations, tanks, and control valves in the current system.

WaterGEMS was also used to determine which pipes were the best candidates for replacement in order to meet current fire flow requirements. In addition, the utility used the model to determine the best placement for control valves (and their settings), along with the boundaries for the new pressure zones.

Pressure and flow patterns were consistent with field observations and fire flow tests that the city's engineers used for



Pressure modification zones – Big Cottonwood Tanner Fire Flow Improvements

calibration of pipe roughness coefficients. The performance of the distribution system was evaluated against four criteria:

- system delivery pressure: pressure should not drop below 60 psi during peak demand conditions;
- fire flow capacity – 1500 gpm or 3000 gpm at 20 psi, depending on the area;
- fire hydrant size – replace all 4-inch pipe diameter hydrants;
- fire hydrant coverage – hydrants should be located no more than 500 feet apart.

Fast Facts

- Pipelines in some areas of the city had fallen behind current fire flow service requirements, and customers complained about low pressure during periods of peak demand
- WaterGEMS was used to determine which pipes were the best candidates for replacement to satisfy fire flow constraints
- Higher pressure was achieved, and all hydrants now meet the fire department's flow requirements of 1500 gpm

"By combining the high-powered modeling capabilities of WaterGEMS with Esri's ArcGIS, Salt Lake City was able to develop a plan of action that improves the city's infrastructure and provides a great benefit to our customers."

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No constraints were placed directly on flow velocity in the system; however, pipe velocity was used to identify possible restrictions in the system.

During the fire flow evaluation, it was determined that existing pressure zone boundaries in the area would need to be modified, as they created less than ideal pressure ranges throughout the zones. In addition to the boundary adjustments, two new zones would also be created.

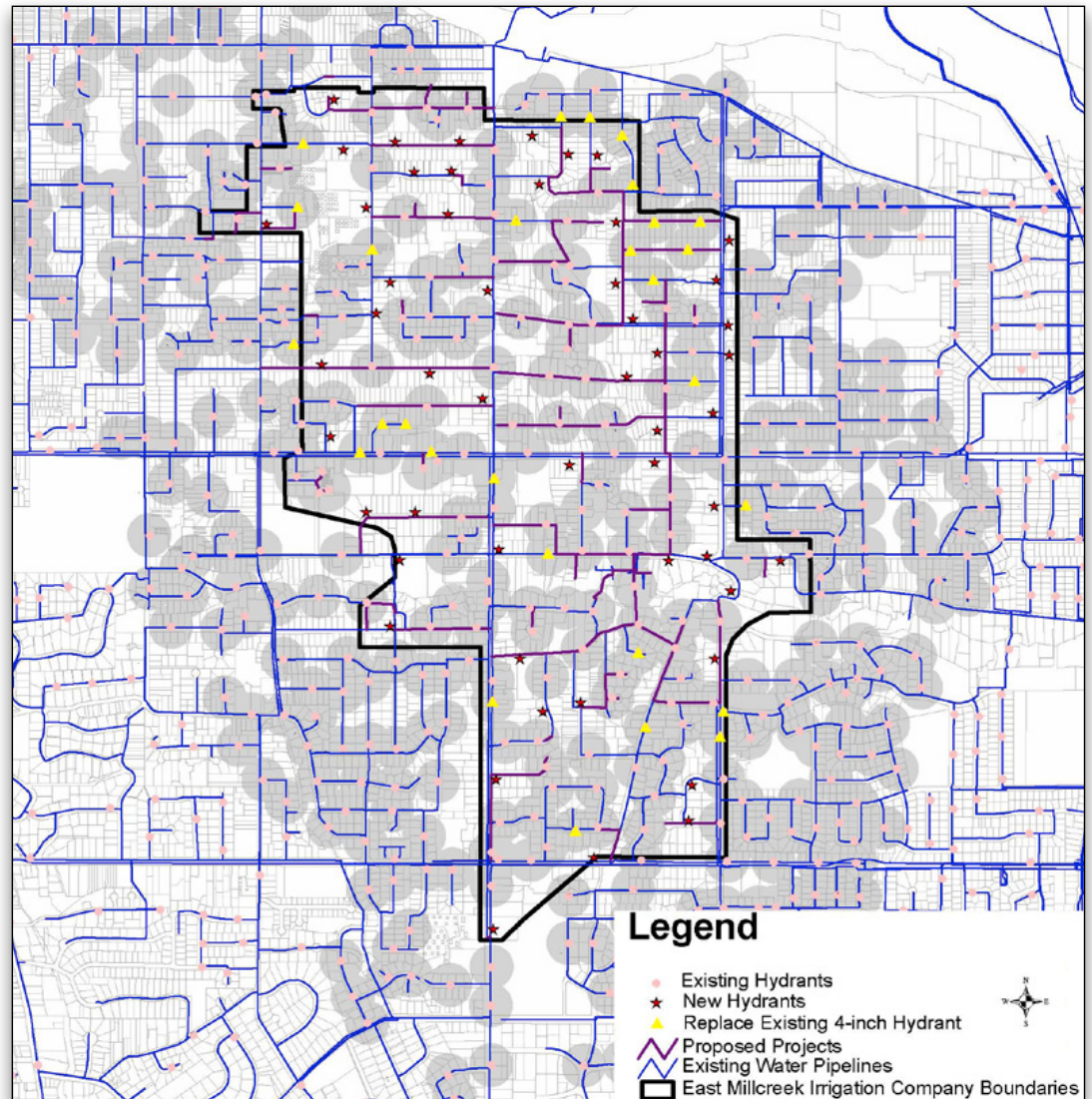
Brandon Arnold, GIS specialist at the Salt Lake City Department of Public Utilities, said: "By combining the high-powered modeling capabilities of WaterGEMS with Esri's ArcGIS, Salt Lake City was able to develop a plan of action that improves the city's infrastructure and provides a great benefit to our customers. The water model has also been critical in determining new pressure reducing valve settings and provided a

very easy way of doing 'what-if' scenarios to test different design alternatives."

Pressures Now Adequate for Fire Flow Requirements

The first phase of this project, including the creation of two new pressure zones, was completed in late 2009. This was the largest phase and included numerous pipe replacements, as well as the zone boundary changes. As a result, all new hydrants now meet the 1500 gpm flow requirement. Some areas are even able to meet the 3000 gpm required by the presence of larger homes.

Arnold concluded, "This project enabled the city to boost the available fire flow to the area and provide a higher pressure for many customers, increasing customer satisfaction."



Recommended additional hydrants for East Millcreek