

# Case Study

## Federal Building Exceeds Efficiency Goal by Upgrading its Hot Water System

Customer	Whipple Federal Building
Location	Minneapolis, Minnesota
Industry	Government/Federal Building
PVI Product Installed	AquaPLEX® storage tanks



### What the Customer Needed

Located southeast of Minneapolis, Minnesota, the Whipple Federal Building was originally constructed in 1969. The 11-story building contained offices, conference rooms, a kitchen/dining area, detainee cells, forensics labs and courtrooms, and housed 1,400 employees and occupants, but its mechanical, electrical and life-safety systems had not been through any major changes in 40 years. The modernization of the building, funded through the American Recovery and Reinvestment Act (ARRA), had four primary objectives:

- Replace and modernize all existing mechanical, plumbing, fire protection and electrical systems
- Design systems that are at least 30% more efficient than Standard 90.1-2004 and at least 20% more efficient than actual data from 2003
- Achieve LEED Gold
- Sequence the replacement of systems to allow more than half the occupants to continue working in the building throughout the entire duration of construction<sup>1</sup>



At the heart of the plumbing system upgrade was a 72-panel, roof-mounted solar domestic water heating system. The new system required:

- Storage tanks and water heaters that could withstand very high temperature operation resulting from solar thermal
- Heat exchangers sized within large storage vessels that could generate very hot water meeting peak demand, or act as a pre-heat means when solar harvesting was at a minimum
- Flexibility of design and extra tank fittings to accommodate pre-heated water to gas-fired equipment

### PVI Solution

Jason Zitzloff with Brekke Sales Company worked with HGA engineers to specify two 1750 gallon AquaPLEX storage tanks to store and supply water. The tanks were specifically chosen for their ability to withstand high temperatures and because they have a long life. The all-AquaPLEX construction of these storage tanks allowed storage of water up to 180°F to maximize the energy captured by the solar panels and to accelerate the return on investment. Their 25-year warranties will last long-past the project's expected 14-year payback. The system was sized to meet roughly 66% of the domestic hot water load. Two 999 MBTU Tricon Condensing Gas Water Heaters, located in the basement mechanical room, will meet full load when solar thermal is not available.

## Return on Investment

The 5-year project met every goal. "Using the energy cost budget analysis, the building systems were determined to be 46% more efficient than ASHRAE/IESNA Standard 90.1-2004, well beyond the original goal 30%. With its integrated design and high efficiency systems, the Whipple Federal Building is now positioned for the future as a regional and national model of energy efficiency."\*

\*Berseth, Sarah. "Modernized High Performance." ASHRAE Journal August 2016:48-55.



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