

CASE STUDY

Transforming Wichita’s Water Future With New Water Facility

The Northwest Water Facility in Wichita, Kansas, showcases how a collaborative, progressive design-build approach can deliver clean water efficiently and cost-effectively, despite financial constraints, a global pandemic, labor shortages and rising inflation.



Challenge

With a growing population and its only water treatment plant aging past 80 years, the city of Wichita, Kansas, saw the need for a new water treatment facility that was more adaptable to its diverse water supply and was more resilient during extreme climate conditions. In particular, city officials recognized the need for a new facility capable of treating a variety of water sources, including 100% groundwater, 100% surface water or a combination of both.

The existing main water treatment plant had been partially rehabilitated and upgraded in 1992. However, despite upgrades, the original plant lacked the necessary redundancies to provide the resilience and flexibility required for a sustainable water future. Of special concern, the city’s water supply is vulnerable to drought conditions that have resulted in water restrictions for residents.

Project Stats

Client

City of Wichita

Location

Wichita, Kansas

120M

gallons per day capacity

\$594M

construction cost

\$15M

under budget

20%

of kansans served



Given recent challenges with the aged existing water treatment plant, the urgency of the situation caused the planning team to move forward amid a backdrop of financial constraints, a demanding project schedule and unforeseen global challenges such as the COVID-19 pandemic, labor shortages and inflation. Issues of particular concern related to the project were:

- **System limitations:** The existing facility, though partially rehabilitated, was outdated and not efficiently able to treat the diverse water supply needed to meet peak demands, especially during periods of drought or other extreme weather.
- **Budgetary constraints:** To minimize rate impacts on water customers, city officials had to find an efficient, cost-effective way to achieve a reliable water supply without exceeding financial means. The project team needed to prioritize cost management while taking into account durability and adaptability.
- **Tight project timeline:** The city secured funding through the Environmental Protection Agency’s Water Infrastructure Finance and Innovation Act (WIFIA), which came with nonnegotiable, fast-approaching deadlines.

Solution

The Northwest Water Facility, was designed to utilize Wichita’s diverse water supply, enabling the city to adapt its operations to climatic conditions and advance its municipal water goals. With treatment and supply capacity of 120 million gallons per day (MGD), the facility can supply more than enough water for half a million Wichitans and nearby residents — nearly 20% of all Kansans.

Burns & McDonnell, a collaborator with the city on water infrastructure projects since the 1990s, executed the design-build effort with joint venture partner Alberici. The project brought together the city, design and construction teams from Burns & McDonnell, Alberici, and other local construction and design partners early in the process. This early collaboration aligned design and construction with the city’s technical, scheduling and budgetary requirements while allowing stakeholder input from a variety of sources.

With the goals of protecting public health, accelerating environmental progress and increasing the community’s vitality, the water facility’s location was chosen carefully — with proximity to both the Equus Beds Aquifer and Cheney Reservoir, the city’s two primary water sources.

The project team’s conceptual planning, designing, siting, permitting, value engineering and construction resulted in a world-class \$494 million solution. The design-build process enabled over 20 engineering and design optimizations, ultimately shaving around \$15 million off the projected budget, with an additional \$10 million in savings realized due to a collaboration with Evergy for the construction of a dedicated electrical substation for the plant.

To help reduce the city’s overall financial burden, Burns & McDonnell worked with city officials to secure financing through the Kansas State Revolving Fund and WIFIA.

Project Execution and Innovation

One of 38 projects funded by the EPA at the time it was started, the Northwest Water Facility utilized a progressive design-build delivery process for increased adaptability. Because of funding requirements, the project team had to move quickly. WIFIA funding defers payments for five years from the loan approval date, so starting on time was essential in order to maintain financing benefits.

In order to meet the schedule demands, the project team right-sized design packages and worked with the state regulatory agency, the Kansas Department of Health and Environment, to expedite construction. While other projects around the country were significantly impacted by the pandemic, the Wichita team was able to overcome supply chain challenges and circumvent labor shortages by expediting early procurement of long-lead equipment and maintaining continuity of work for the local labor force. To maintain warranty and reduce exposure to the elements, the site team constructed an on-site warehouse for storage of major components until they were needed to protect the equipment while minimizing potential delays to the project.



The design incorporated 24 hours of water storage capacity, along with a pump station that connected to existing and planned distribution networks. Additional on-site power solutions, including backup generators, were included to support operations during outages and extreme weather events. In total, the project required more than 450,000 cubic yards of earthwork, more than 18 million pounds of reinforced steel and over 1.5 million labor hours.

Because redundancy is an important component of the plant's resiliency, over 17 miles of process piping is included in the design. This feature helps eliminate any single point of failure and facilitates simultaneous treatment of groundwater and surface water sources. The clarifier complex, which spans the size of four football fields, also has added redundancy and includes six clarifiers, each with a capacity of more than two million gallons, making them some of the largest in the country.

Complementing this is the two-level filtering complex, featuring 16 filters that treat five gallons per minute per square foot, designed with a depth that exceeds current requirements and offers room for potential future biofiltration capabilities. Additionally, the chlorine contact basin is equipped with significant valving, providing maximum operational flexibility and full-capacity redundancy.

Results

The Northwest Water Facility — officially renamed Wichita Water Works — was completed on time and under budget. Its nearly \$500 million price tag stands as the single largest capital investment in Wichita's history. While it is a substantial sum, it represents a big win for the city. By maintaining schedule discipline throughout this multiyear project, the team will prevent \$93 million in interest

and cost escalation for water ratepayers. These savings have been calculated by the EPA, based on the combination of early cost certainty and a 1.17% interest rate through WIFIA.

The project generated \$2 billion in local economic benefits, with 77% of contracted dollars remaining local to Wichita and over 12% going to minority-owned, woman-owned and disadvantaged businesses. In an effort to help buoy the construction labor market in the city, one highlight of the project was the collaboration with Wichita State Tech on an apprenticeship program that will contribute positively to the long-term development of the community's workforce. As a result of this project, Burns & McDonnell helped grow the city's emerging business enterprise capacity, leaving a lasting impact on the local business community.

The Northwest Water Facility is part of a decades-long plan to make Wichita more resilient to drought and other extreme conditions. With this new facility, Wichita is positioned to provide the city and surrounding area with a sustainable, flexible water supply for decades to come.

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