BURNS McDONNELL

CASE STUDY / **LAYNE HIGH-SERVICE PUMP STATION**

PROGRESSIVE DESIGN-BUILD PUMPS NEW LIFE INTO TOPEKA FACILITY

The City of Topeka needed to rehabilitate its primary high-service pump station. To avoid long-term interruption of residents' water service, a progressive design-build approach was utilized to quickly address the complex project.

FLEXIBILITY AND COMMUNICATION ARE KEY TO ZERO INTERRUPTION

A progressive design-build procurement strategy offered flexibility and a collaborative environment to keep the City of Topeka in the loop throughout the duration of the project.

PROJECT STATS

CLIENT
City of Topeka

LOCATION
Topeka, Kansas

COMPLETION DATES
Round 1: February 2017
Round 2: April 2017

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SERVICE OUTAGES

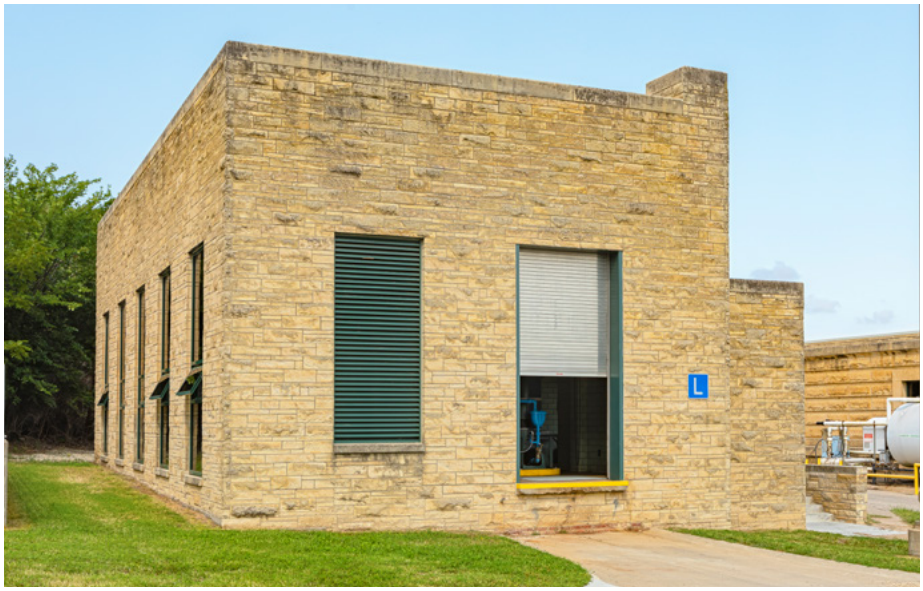
$2.6M
PROJECT

CHALLENGE

Constructed in 1953 and operated by the City of Topeka, the Layne High-Service Pump Station (Layne Station) was past its original design life. Layne Station and the East High-Service Pump Station are two critical pieces of Topeka's water distribution system. Together, they provide a water supply capacity of up to 75 million gallons per day (MGD) to the residents of Topeka and six surrounding rural water districts.

When the outlook for construction of a new pump station became uncertain, city staff began actively pursuing plans to rehabilitate Layne Station. In 2015, the city issued a request for qualifications for a progressive design-build team to provide the rehabilitation services. Specifications called for the project be carefully staged and scheduled so there would be no risk of inability to meet higher water demands especially during the summer peak season.

This was an extraordinarily complex project for two reasons: 1) Overall condition of the pump station had many unknowns, including deterioration of key pieces of equipment and 2) critical need to maintain service throughout the project duration. This placed a premium on the need for flexibility by the team in responding quickly to challenges and to create contingency plans to mitigate the magnitude of potentially disruptive events.



SOLUTION

The rehabilitation was approached as a collaborative project from the very beginning. Our design-build team of Burns & McDonnell and CAS Constructors held a very close partnership with the city throughout the project to develop the optimal solution in terms of risk performance and price. The progressive design-build approach was chosen because it delivered maximum cost value while securing reliable water services for residents.

Because keeping the station operational during construction was mandatory, the design-build team and city developed contingency plans with multiple alternatives for each plan to guard against the possibility of failure as the staged construction was completed. The careful planning allowed long-lead-time equipment to be purchased well in advance so all components were available at precisely the time needed. In addition, all project activities were adjusted based on potential system water demands for that day.

Thanks to a highly collaborative process between city staff and the design-build team, a key objectives list was reprioritized to create combinations of objectives to choose from, with all combinations remaining within budget. During these discussions, city staff determined that some materials and equipment such as pumps, suction valves and flow meters, could be purchased with funds that had already been allocated for that purpose. By procuring these items within the municipal system, the city was able to redirect money to other key objectives.

During the exploratory phase, a valve that was originally thought to be inoperable was discovered to be operable. This was a significant discovery that allowed the team to do away with three expensive line stops and completely changed the focus of the entire project. This discovery and resulting savings enabled the city to allocate funds to maximize the scope of the project. The city also secured additional funding outside the original project budget to allow for completion of remaining items on the key objectives list that they initially elected not to prioritize during the original review.

The project was broken into two phases. The first phase consisted of installing new yard piping and valves as well as completing the meter vault work. Completing phase one allowed the pump station to be “split” into two separate pump stations but still remained fully functional, allowing the city to operate throughout the summer to meet water demands.

Once the summer water demands eased in the fall, the project team began phase two and was able to isolate each side of the station accordingly. One side was operated in tandem with the East High-Service Pump Station while the pumps, suction and discharge lines on the other side were replaced.

RESULTS

The partnership and continuous communication between our team and the city of Topeka was key to the quick completion and successful rehabilitation of the station. A flexible contract form and delivery method allowed the city to shift funds as the project progressed, consistently maximizing the project’s scope. In addition, the proactive planning approach was highly effective, allowing the project to be completed with zero service outages, and the city’s decades-long record of delivering high-quality water continued uninterrupted. As a result of the project, the community has gained assurance that the same high level of water quality will be available for many decades to come.

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