

CASE STUDY

Marshall Municipal Utilities Wastewater Treatment Plant Fast-Tracks Improvements

After years of making repairs at its wastewater treatment plant, MMU needed to implement upgrades and improvements fast, turning to a design-build approach helped prevent a complete plant failure.



Challenge

The potential of equipment failure and limited availability of replacement parts due to equipment age and market conditions at the Marshall Municipal Utilities (MMU) wastewater treatment plant were incredibly severe. The plant operated two rotating bridge aeration trains and only one of two aeration basins was operational.

With one system had failed, and the other was on the brink of failure, fast improvements were needed. Because the equipment's age, the ability to repair what was broken was limited due to unavailable spare parts. Additionally, since this was during the start of the COVID-19 pandemic, procurement issues, including price escalations and long lead times, were a challenge.

Project Stats

Client

Marshall Municipal Utilities

Location

Marshall, Missouri

\$8.4M

construction cost

7.1 MGD

capacity

\$300K

design-build budget savings



“The Burns & McDonnell team has proven to be a trustworthy partner and we look forward to opportunities to work with the team on future projects.”

JEFF BERGSTROM
General Manager, Marshall Municipal Utilities

Solution

When Burns & McDonnell first assessed the MMU wastewater treatment plant, only one of the two existing aeration trains was functioning, and several blowers were out of commission.

The aeration equipment had been installed 30 years earlier and had reached the end of its useful life. To enhance the secondary treatment process and restore full treatment capabilities, the team partnered with MMU and proposed a number of conceptual solutions. MMU opted to move forward with the implementation of a cyclic aeration process to handle future nitrogen limit requirements, standards that continued to evolve in the state of Missouri.

Design-Build Provides Quick Fix

The \$8.4 million plant improvement project was accomplished using a progressive design-build delivery, which helped expedite the design, procurement, construction, and commissioning of these necessary treatment improvements. This method of execution allowed for high transparency, a streamlined workflow for quicker decision-making, and built-in schedule flexibility — all helping accelerate all portions of project delivery against a racing clock.

As the project neared substantial completion, equipment startup was expedited as the remaining aeration basin failed and the new system was needed immediately. After an open-book cost review, MMU was able to identify and ultimately self-performed some tasks like demolition, providing gravel, and systems integration to reduce project cost. Without multiple degrees of separation

between designers, vendors, constructors and the owner, direct and streamlined communication helped further expedite decision making and procurement.

Secondary Treatment System

The team planned for future possible regulatory constraints when designing the new aeration system. The project consisted of replacing an old rotating bridge aeration system with retrievable diffusers and submersible mixers mounted on full-diameter bridges.

Because the system was retrievable the Utility was able to make repairs to only a single basin at this time, saving significant capital cost. The design also improved maintenance access and reduced the number of wear parts associated with a rotating bridge-based system. The optimized aeration design reduced the number of blowers from 14 existing tri-lobe blowers to three new screw-type blowers. New screw-type positive displacement blowers provide process air, while improving on energy efficiency and allowing for more fine-tuned process control by the Utility’s operators.

Similar to the aeration equipment, the final clarifier mechanism had reached the end of their useful design life. They were no longer reliable and required frequent maintenance. Burns & McDonnell and MMU replaced three existing clarifier mechanisms, improving scum removal, sludge collection, and system reliability.

Results

The MMU wastewater treatment project was completed on time and under budget, despite supply chain delays and escalated costs. Value engineering items were identified throughout the project that provided savings to the utility. One such item included optimizing the size of the service electrical feeder to the new building. These savings helped the project come in at more than \$300,000 under budget and allowed the team to return the savings to the owner’s project allowance.



Critical to the project's success was the guidance provided by Burns & McDonnell on advanced nutrient removal as Missouri's environmental regulations continued to tighten. Also, key were relationships between the equipment suppliers and Burns & McDonnell as the utility explored more efficient technologies, especially during a time of market volatility and price escalation.

By working in a streamlined way with the project owner, Burns & McDonnell used transparency and trust to help build a strong relationship with the utility that has resulted in additional future projects.

About Burns & McDonnell



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