BURNS McDONNELL

CASE STUDY / **CITY OF HUTCHINSON WATER**

TREATMENT FACILITY IMPROVES WITH INTERMEDIATE PUMP STATION

Old infrastructure, outdated systems and regulatory obligations posed several challenges for a wastewater treatment facility. A detailed study identified rapid and cost-effective solutions to meet regulatory requirements.

A DESIGN-BUILD APPROACH LEADS TO SIGNIFICANT ENHANCEMENTS

Optimized construction techniques helped identify and prioritize different components of a project, saving the owner time and money.

PROJECT STATS

CLIENT
City of Hutchinson

LOCATION
Hutchinson, Kansas

PROJECT COMPLETION
December 2020

7%
UNDER BUDGET

0
PLANT SHUTDOWNS

6
MONTHS FROM DESIGN KICKOFF TO CRITICAL IMPROVEMENTS BEING OPERATIONAL

CHALLENGE

The City of Hutchinson, Kansas, maintains and operates 33 wastewater lift stations and one wastewater treatment facility. The plant treats approximately 5 million gallons of wastewater per day (MGD) and is permitted for 8.3 MGD. At the start of this project many components of the facility were more than 50 years old and reaching the end of their life expectancies, putting plant operations at risk. As is the case with many water and wastewater systems throughout the United States, the failure of critical infrastructure could result in expensive emergency repairs, increased operations and maintenance costs, and a failure to meet regulatory requirements. In turn, cash resources would be depleted on temporary repairs and pressure on operations staff would intensify.

SOLUTION

Burns & McDonnell developed a Facility Plan for Hutchinson in 2018 to identify necessary upgrades. The study included an infrastructure condition assessment and a regulatory evaluation to assess potential risks to plant operations from pending or projected regulatory requirements. Using this information, the project team performed a capital and operational cost analysis of potential alternatives to prioritize recommended improvements. Regulatory requirements and coordination, including those related to land application of biosolids, were an important part of the study.

Key upgrades identified in the facility planning study included improvements at the headworks, influent pump station, intermediate pump station, aeration basins, ultraviolet disinfection system, biosolids land application program and

digester structures. The intermediate pump station improvements were the most critical and included the installation of piping to allow for gravity flow from the primary clarifiers to the secondary treatment system splitter structure.

Based on the number of improvements needed, a schedule driven by failing infrastructure, and the city's desire to phase improvements based on budgetary constraints, the design-build method of project delivery proved to be the most advantageous to Hutchinson. The proposed approach included performing work at the intermediate pump station in two phases. The first phase included routing for the pipeline that allowed for gravity discharge from the primary clarifiers through a new 42-inch pipe to an existing 54-inch reinforced concrete pipe routed to a splitter box upstream of the activated sludge basins. New watertight manholes were installed at the connection points and were constructed to minimize disruption and bypass requirements.

Since the pump station was still required for conveyance of return activate sludge (RAS) to the secondary treatment process, the second phase of the design-build project included replacing the existing screw pumps with submersible units. Submersible pumps are much more commonly used in these types of applications and are less costly to maintain and replace.

RESULTS

The Burns & McDonnell design-build team was able to install the gravity pipeline early in the project prior to refocusing on design and construction efforts on the intermediate pump station improvements. This greatly reduced the risk of failure and reduced the criticality of pump station improvements by reducing flow rates needing to be pumped and increasing the ability to send raw wastewater through the secondary processes regardless of screw pump status.

Because the flows from the primary clarifiers are to be bypassed directly to the secondary treatment processes, the existing pump station's capacity was reduced. Only three pumps (versus the five original units) were required in the new pump station. The new 10 MGD pump station (originally 25 MGD) has excess capacity to accommodate return of extraneous and drain flows to the treatment system.

The design-build approach saved the project an estimated $130,000 by eliminating manholes and reusing existing infrastructure as opposed to performing high-risk demolition. This approach also resulted in significantly reducing schedule and minimizing negative impacts to plant staff while expediting positive benefits through infrastructure improvements. Construction activities were optimized to maximize the deployment of crews to the site, reducing frequency of ingress and egress.

Finally, the overall facility planning effort and subsequent design-build phases included replacement of a failing UV disinfection system and helps the city maintain compliance with future ammonia limitations, which were reduced over the previous permit issuance. Burns & McDonnell assisted the city in collaborating with the Kansas Department of Health and Environment (KDHE) to establish a compliance schedule for upcoming changes to its effluent discharge permit.

BURNS McDONNELL

burnsmcd.com | Offices Worldwide

22993-CHW-0721