PRODUCTS IN ACTION

Stoner Lifted Up to New Heights

By Steve London

New lift station is a strong contrast to its predecessor

Advanced deterioration and the increasing failure of aging pumps led the Department of Operational Services for the city of Shreveport, La., to replace the Stoner Lift Station.

Rated at 4-mgd, the facility is among the largest lift stations along the sanitary sewage system and one of the many recent projects in $86 million worth of improvements to the system's infrastructure. The design specifications and equipment underscore major advancements since the 1970s, when the Stoner Lift Station first entered service. The city's engineering group considers the replacement facility the most advanced in the city's system.

The sewage system serves approximately 200,000 residents along the Red River. Major elements include two returned activated sludge wastewater treatment plants with a combined capacity of 51.4 mgd, a Class A sludge treatment plant, 1,024 miles of mains up to 60 in. in diameter, the network of 115 lift stations and a modern effluent monitoring laboratory.

Innovative features

Balar designed the new station's building with masonry walls, a standing seam metal roof system and earth tone split-faced block that respond better to the higher aesthetics than the utilitarian character of the earlier structure. Inside the facility is a split wet/dry pit configuration to facilitate pump maintenance. The 44- x 15- x 15-ft footprint has a self-cleaning trench configuration.

The concrete on the 36,000-gal wetwell side was coated with Tnemec Series 120-5003 Vinester F&S, a vinyl ester novolac coating formulated to withstand organic and inorganic acids and sour crude. The trowel-grade liner provides corrosive splash, spillage and fume protection for the structural surfaces and secondary containment. The drypit side received a roller-applied XYPEX waterproofing system. The premium coatings are more durable than the tar-like material applied to the previous station.

A new stainless steel conveyor-type screen carries captured solids at the headworks up to a collection dumpster. This feature lessens the impact of solids arriving at the plant.

A biological odor control system was installed to pull air from the screen area and through the wetwell. This unit eliminates the offensive odors and prevents them from reaching one of the city's nearby recreational parks.

Four of ITT Flygt's Model CT 3356 submersible pumps were selected to serve the station's wetwell sump. The 200-hp units are vertically mounted on the dry side of the facility with the suction line extending into the wet-side trench.

The city equipped their variable frequency drives (VFDs) with a powerful, new custom SCADA system. The VFDs reduced the size of the wet well portion of the station and should reduce long-term wear and improve efficiency of the equipment. They also improve the peaking factor for the station that normally runs at 2,000 gpm but can reach 11- to 12-mgd capacity.

ARTICLE SUMMARY

Challenge: Shreveport officials had to cost-effectively repair the Stoner Lift Station due to odor control problems, pump failures and physical decay.

Solution: City officials decided to totally replace the system, complete with four new submersible pumps; a trench-type design; custom SCADA system; an odor control system; and new conveyor-type screen.

Conclusion: After the replacement, the city's engineering group considers the facility one of the most advanced and state-of-the-art in the city's system.

Mounting problems

Stoner Lift Station, located approximately eight miles upline from the 80-mgd Lucas WWTP was built in the 1970s. The dry pit-type station originally had four 200-hp vertical line-shaft pumps to serve a large drainage area that encompasses the commercial and casino district, low-income housing and older residential areas. Recurring problems emerged toward the end of the station's expected life cycle, according to Ali Mustapha, P.E., assistant engineer with the City of Shreveport.

"The station had recurring odor emissions, pump failures, and general physical deterioration," Mustapha said. "Pump failures, in particular, required a lot of maintenance and a basket screen at the intake hadn't worked for nearly 10 years. The wetwell, in fact, had enough concrete corrosion to expose the rebar."

As the city's engineers and outside consultants met to establish the needed scope of improvements at the Stoner facility, a total replacement emerged as the most logical investment. One deciding factor was the high cost associated with bypass pumping the influent around the existing facility and through the 36-in. force main to the treatment plant.

"Our study projected six to 10 months of bypass pumping during the rehabilitation would add several hundred thousands of dollars to the project," said Ben Rauschenbach, P.E., with Balar Associates, Inc., the city's engineering consultants. "Building a new station next to it would have cost more but the city would be better off in the long term to just replace it. In the process, they improved capacity, energy efficiency and now have the built-in redundancy to better handle contingencies, such as power losses."

Age not a factor

Replacing vertical line-shaft pumps with submersibles was a direct response to the city's positive experience with the reliable Flygt units, Mustapha said.

"This dry pit station is an innovation for us," he noted. "So is the trench-type design which is a first in Shreveport. Stoner Lift Station is our first of the big dry pit stations to apply submersibles but we are going to do another one using them, as well."

Max Foote Construction, a Louisana contractor, had to work fast and remain flexible in completing the changeover to the new station. The challenge was not just the amount of upline storage in the collection system, but also the amount of backflow confronting them once they cut the 36-in. force main from the pump station to the Lucas WWTP, according to Ralph Holloway, project manager.

"We planned to tie in the lines at the same time but had to change the original scheme and split the work into two phases," Holloway said. "We used a slide gate to isolate the new from the old station that had nine smaller stations upline from it. We drained down the old station as low as possible, then shut it off and backdrained into the old wetwell. It took an 11-man crew about nine hours to complete the changeover. Fortunately, we had a lot of collection line for storage above it to prevent overflowing."

"This station is our highest example of state-of-the-art," Mustapha said. WWD

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