

## Collaborative

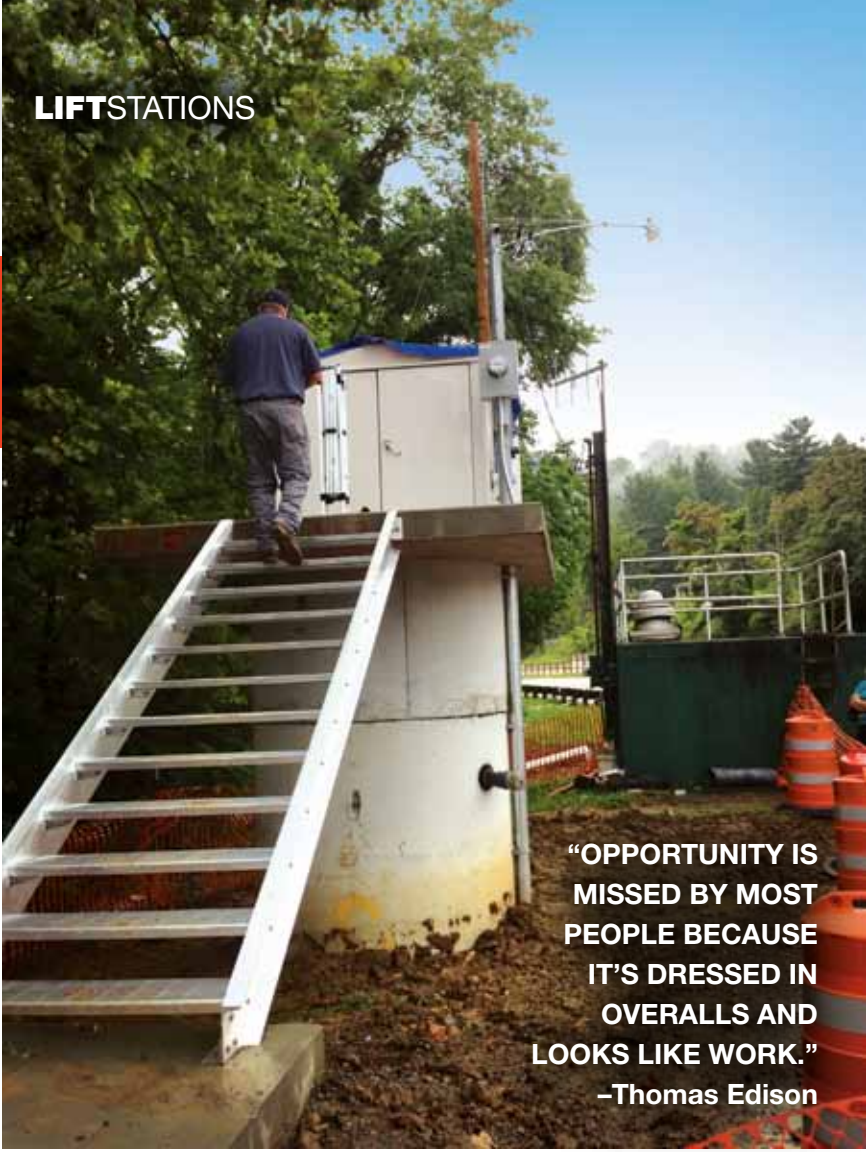
as an example.

“The Gilman Lift Station had been a replacement candidate due to its age,” Tucker said. “In fact, our Capital Improvement Plan calls for all 12 of our lift stations to undergo replacement or upgrades.”

The duplex station was designed as a prototype facility to gain higher capacity, reduce energy use and accept a cellular-based SCADA network. After identifying Flygt, a Xylem brand, as the preferred pump supplier, the manufacturer’s specialists assisted Marietta’s engineering department in reducing the pump horsepower ratings from 12 to 11 hp to keep the equipment within budget but still deliver the desired performance curve.

The Expor pumps are monitored and controlled by a Flygt SCADA system at a centralized station within the wastewater treatment plant (WWTP). The multi-tasking and remote analysis capabilities of the SCADA technology helps avoid unnecessary dispatching of maintenance crews to correct a problem indicated at the station. The SCADA was networked with a total of 11 lift stations coinciding with the completion of the replaced facility.

The second project involved significant process upgrades at the Marietta WWTP. Built in 1955 and upgraded in 1987, the activated sludge plant developed problems meeting increasingly stringent environmental regulations. It compiled a record of repeated—and costly—effluent violations during the past decade, setting the stage



**“OPPORTUNITY IS MISSED BY MOST PEOPLE BECAUSE IT’S DRESSED IN OVERALLS AND LOOKS LIKE WORK.”**

**—Thomas Edison**

**By Steven London**

Ohio city plant supports county with sewage treatment via creative lift station upgrade

**T**homas Edison’s quote inspires Joe Tucker, P.E., city engineer of Marietta, Ohio, and his staff to invest the necessary man-hours to fully explore alternative design and equipment for proposed utility projects before Tucker ever approves the formal specifications. In recent years, he also has become a champion of the Marietta Sustainability Program. The initiative’s goals are to conserve energy, increase revenue, improve water quality and reduce carbon footprint, all in lockstep with lower labor and other operating costs.

Two recent wastewater utility projects demonstrated the evaluations and cost analyses that Tucker has become known for during his nine years on the job. Consider the recent Gilman Avenue Lift Station

# Agreement Delivers Mutual Benefits

for the renovation.

When completed, improved disinfection and other changes will bring the discharge quality up to regulatory compliance levels. The upgrade also involved a capacity increase from 3.34 million gal per day (mgd) to 4 mgd. The upgrade program, with the final phase nearing design completion, should serve the city for the next 20 years, Tucker said.

The multi-phase WWTP renovation and capacity increase was influenced by a creative intergovernmental agreement (IGA) between the sewer utilities of the adjoining municipal and adjacent county jurisdictions. Tucker, city staff and Steve Elliott, wastewater superintendent, worked many hours to help negotiate the IGA, whereby the Marietta WWTP will treat 335,000 gal per day of sewage from additional areas to be sewered within the county and connected to the city plant.

“That flow from the county could increase with any action by the state to abandon septic tanks in favor of connecting to a county collection system,” Elliott said.

## Cutting O&M Costs

The work by Tucker’s engineering department at the Gilman Avenue Lift Station coincided with an earlier phase of the WWTP work and demonstrated the engineering staff’s capabilities in helping achieve improved infrastructure with maximum design and budget control.

The project increased the lift station facility’s capacity to

0.205 mgd and applied a new generation of pumps and controls engineered for energy savings and clog resistance. The station also is the first in the state to be connected to a Flygt SCADA system and communicating to the main plant via a cellular-based communications system with 4G modems. In addition to the remote monitoring and control of the pumps, Tucker expects the technology to help identify and address inflow and infiltration locations that impose not only environmental impacts but add to wastewater treatment costs. The controls are located in a Pumpcon Valve Vault mounted on a platform elevated 1 ft above the 100-year flood plain of the Muskingum River, which runs approximately 40 ft away from the station. The design reduced future risk to the controls and eliminated the cost of excavating and building another pit adjacent to the dry-pit pump installations.

Rather than engaging an independent consultant and incurring \$121,000 in design and consulting fees, the city of Marietta engineering department’s personnel designed the prototype facility upgrade. The station’s equipment could potentially apply to 11 other sewage pumping stations as they become candidates for retrofits. Added to upgraded reliability, the prototype’s standardization could improve training and reduce the city’s parts inventory.

Energy efficiency, clog-resistant features and adaptability to the other lift stations ranked high among the deciding features

favoring the recently introduced Exporior submersible pumps and the SCADA system’s initial installation at the Gilman Avenue facility.

“By designing the pump station with our own staff, we eliminated the consultant fees and got exactly what the city wanted in a prototype,” Tucker said. “Furthermore, the pumps we selected were supplied with the manufacturer’s guarantee of 25% energy savings that support our sustainability initiative.”

Elliott emphasized that the Flygt pumps have exceeded the desired energy efficiency.

“An eight-month comparison of our electric utility bills reveals a 58.9% average reduction in that operating cost since the new pumps entered service,” Elliott said. “As we replace the pumps at other stations with the prototype package, the savings should be very significant.”

The energy efficiency of the pumps derives from precisely matched hydraulics, motors and integrated controls that work seamlessly to deliver maximum functionality. Another engineering feature also favored selection of the high-performance pumps and companion SCADA for the prototype. The Flygt N-impeller design features an ability to move axially upward to relieve a clog. This “clog dodging” feature eases the passage of blockage material under even the most difficult conditions.

Once passed, the impeller reverts to its original operating alignment. This could become an important benefit because the Gilman Avenue Lift Station is near the Washington

County Jail, where inmates are known to flush bed sheets, clothing and other raggy material into the sewer lines. In daily operations, the engineering feature also eliminates the energy-consuming drag often imposed by stringy materials, cleaning wipes and other non-flushable material that can entangle conventional impellers.

"Thus far, we've experienced no plugging of the new pumps at the rebuilt station," Elliott said.

### Collaborative Agreement

The IGA signed with the county offered a joint opportunity.

"The 40-year agreement enables Washington County to take the first step in easing out of the sewage business," Tucker said. "The old packaged treatment plant that would have been cost-prohibitive for the financially stressed county to replace has been converted to a lift station that pumps the sewage from the areas now served with our connection. A flowmeter sets the monthly service charge, which runs the same rate as we charge customers within the city limits.

"A lifecycle cost analysis we developed during negotiations concluded that the agreement will save the county more than \$3.3 million in direct investment," Tucker added. "They retain responsibility for maintaining their lift stations but avoid the needed treatment facilities."

Marietta's IGA attracted the attention of the American Public Works Assn. (APWA), which invited Tucker to present "Making Financial and Environmental



**The lift station is the first in the state to be controlled by a Flygt SCADA system.**

Sustainability the Focus for WWTP Improvements" at the APWA Sustainability in Public Works Conference last year in San Diego. It was emphasized that Marietta's IGA ensured sufficient WWTP capacity for the next 20 years for the county and enough surplus capacity to contract treatment for other connections. The added influence from the county was carefully planned for in sizing both the Gilman Avenue facility and the WWTP upgrades.

Perhaps the most eye-opening opportunity for other sewerage jurisdictions emerges in the added revenue generated, which somewhat offsets the flat economic growth in Marietta. The added cash flow will equate to an 11.7% increase in wastewater revenue for the city starting in 2016.

"It will be a win-win result for both the city and the county," Tucker believes. "We financed the WWTP with a low-interest state loan we can more easily manage with the IGA contribution and the lift station by service charges to customers in our own service area."

Engineers would refer to the program as based on a best-value strategy. It appears to offer logical advantages to progressive engineering and wastewater managers elsewhere who serve small communities receptive to quality-based procurement.



**The city of Marietta's engineering department designed the facility upgrade.**

### Providing for the Future

Marietta was established in 1788 at the confluence of the Little Muskingum and Ohio rivers within the heart of what became Washington County. The settlement was the first in the Northwest Territory and opened the region up as an emerging nation. As Marietta matured, it developed a rich legacy and a stable economy for the riverboats loaded with settlers heading westward. Unfortunately, a large manufacturing base—and the jobs that would have come with it—failed to take root in this area of Ohio. In fact, the population of Marietta has hovered around a modest 14,000 residents in the 5,900 households. That may change with the likely development of energy resources within the region's Marcellus Shale.

The creative upgrades applied to Marietta's wastewater infrastructure present a model for other municipal utilities of similar size to consider. As Edison once tried to communicate, opportunities could arise for the far-sighted enough and willing to achieve them. **PS**

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