ms consultants, inc.
engineers, architects, planners

# SHARON WASTEWATER TREATMENT PLANT

## CHALLENGE

A PENNSYLVANIA CITY NEEDED IMPROVEMENTS TO BE MADE ON ITS WASTEWATER TREATMENT PLANT TO ENSURE GREATER EFFICIENCY, DECREASE OPERATION COSTS, AND MEET NATIONAL POLLUTION STANDARDS.

## SERVICES

- Electrical Engineering
- Environmental Engineering
- Sewage Collection, Treatment, & Disposal
- Structural Engineering

## SHARON WASTEWATER TREATMENT PLANT

ms consultants, inc. was appointed by the Sharon Sanitary Authority to improve the design of the city's Water Pollution Control Facility (WPCF). The goal of the project was to upgrade the facility to meet more of the strict requirements surrounding effluent limitations, laid out by the National Pollution Discharge Elimination System (NPDES).

In 2009, the Sharon Sanitary Authority seized control of all assets and operations of the wastewater treatment plant from the City of Sharon. The authority continues to enhance operations to ensure long-term viability and cost effectiveness of its operations.

## LOCATION AND AREAS OF SERVICE

The Sharon wastewater treatment plant is located on a triangular shaped, 7.5-acre tract bounded by U.S. 62 to the north, Norfolk Southern Railroad to the west, and the Shenango River to the southeast. The facility's service area is regional, and serves residents of the City of Sharon, a small portion of Brookfield Township, Ohio, and the USVWPCA. The USVWPCA consists of the Borough of Sharpsville, the City of Hermitage, and the west side of South Pymatuning Township.

## HOW DOES THE WASTEWATER TREATMENT PLANT WORK?

Wastewater from the city of Sharon collection system flows into a pump station that discharges to an influent building where the wastewater flow combines with another flow from the USVWPCA Orangeville Pump Station. Screening and grit removal is provided in the influent building as well as flow monitoring for compliance and billing purposes.

Wastewater flows are channeled through a division well into primary clarifiers. During high flow events, the flow is diverted to the equalization (EQ) basin, which functions as a primary clarifier/EQ basin. Primary clarifier effluent is discharged to a primary effluent pump station for conveyance to two trickling filters. This pump station also houses primary sludge pumps that discharge to four aerated sludge storage tanks.

Discharge from the trickling filters is channeled through two aeration/solids contact tanks. These tanks allow for:

- Recirculation back to the trickling filters through the primary effluent pump station during low flow periods
- Introduction of return activated sludge from the secondary clarifiers.

Effluent from the aeration/solids contact tanks is channeled to three secondary clarifiers. Secondary sludge removal is handled by a secondary sludge pump station capable of pumping return activated sludge to the aeration/ solids contact tanks and waste activated sludge to the aerated sludge holding tanks. Effluent from the secondary clarifiers enters an ultraviolet (UV) disinfection basin where non-potable water is also withdrawn for plant operations.

Effluent from the UV basin enters a Parshall flume for flow metering prior to cascade aeration and final discharge into the Shenango River.

A thickening centrifuge and a dewatering centrifuge perform solids handling duties. The thickening centrifuge is fed from the four aerated sludge storage tanks and stored in two aerated sludge storage tanks prior to dewatering for eventual disposal.

## DESIGNING THE PLANT

The electrical service of the Sharon Wastewater Treatment plant was designed by ms engineers as two 2,500 amp, 480-volt, three-phase systems and one 600-amp, 480-volt, three-phase system. Three generators provide standby emergency power throughout the treatment facility. The electrical distribution system required a 1,100-KW generator, a 1,000-KW generator, and a 400-KW generator respectively. The distribution system feeds 15 buildings with normal and emergency power from one of the three generators. Each process building was equipped with two motor control centers, one with normal power and the other with emergency power. Based on full load operations, emergency power can be provided for a minimum of 16 hours prior to refueling the diesel-fired engines.

Structure design was performed for 15 different tanks and buildings, ranging from retrofits of the existing screen/grit building to entirely new tanks and foundations supporting the trickling filters and secondary clarifiers. The Aeration/Solids Contact Tank was founded 28 feet below grade and was designed to resist supplemental earth pressure due to the adjacent US-62 Shenango Valley Expressway embankment.

## INNOVATIVE ENGINEERING

The trickling filter/solids contact process was chosen to meet anticipated future permit limits and provide for flexible operation at lower capital and operating costs. In addition, the trickling filter process permits the facility to adequately address higher organic loading excursions emanating from an industrial source while consistently meeting effluent limits and minimizing upsets to plant processes.

Dual use of the EQ basin as a primary clarifier/EQ basin allowed for the treatment facility to meet its requirements of 8.66 mgd and 26 mgd for average daily and peak hourly flows, respectively without incurring additional costs to expand primary clarification on a limited site footprint.

## WHAT MADE IT POSSIBLE

Improvements to the Sharon wastewater treatment system were funded by Guaranteed Sewer Revenue Bonds of $26,585,000 and a PENNVEST low interest loan for $15 million. The project was also financed, in part, by a $9 million H2O PA grant from the Commonwealth of Pennsylvania, Commonwealth Financing Authority, for which ms consultants was ordered to prepare and submit the application.