ms consultants, inc.
engineers, architects, planners

SHARON WASTEWATER TREATMENT PLANT

CHALLENGE

AN IMPROVED WASTEWATER TREATMENT SOLUTION WAS NEEDED IN A PENNSYLVANIA CITY TO CREATE GREATER EFFICIENCY, DECREASE OPERATION COSTS, AND MEET NATIONAL POLLUTION STANDARDS.

SERVICES

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

SHARON WASTEWATER TREATMENT PLANT

ms consultants, inc. was retained by the Sharon Sanitary Authority to design improvements to the city's Water Pollution Control Facility (WPCF). The goal of the expansion and upgrades were to enable the facility to meet more stringent National Pollution Discharge Elimination System (NPDES) effluent limitation requirements.

Effective January 1, 2009 the Sharon Sanitary Authority assumed all assets and operational control of the wastewater system from the City of Sharon. The authority continues to enhance operations to ensure long-term viability and cost effectiveness of its operations.

LOCATION AND SERVICE AREA

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

HOW DOES THE PLANT WORK?

Flow from the City of Sharon collection system enters an influent pump station that discharges to the influent building where the flow combines with the 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.

Flows are channeled through the division well into the primary clarifiers. During high flow events the flow is diverted to the equalization (EQ) basin that functions as a primary clarifier/EQ basin. Primary clarifier effluent is discharged to a primary effluent pump station for conveyance to two trickling filters. The primary effluent 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; and
- 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.

FACILITY DESIGN

The electrical service 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 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.

INNOVATION

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.

FUNDING

The improvements 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 retained to prepare and submit the application.