



CHALLENGE

SERVING THE AREA SINCE 1957, THE YOUNGSTOWN WASTEWATER TREATMENT PLANT NEEDED EFFICIENT, COST-EFFECTIVE, SUSTAINABLE, AND INNOVATIVE IMPROVEMENTS.

SERVICES

- Architecture
- Construction Administration
- Construction Inspection
- Electrical Engineering
- Environmental Engineering
- Geotechnical Engineering
- Mechanical Engineering
- Roadway Engineering
- Site Civil Engineering
- Structural Engineering

AWARDS

HONOR AWARD
American Council of Engineering
Companies (ACEC)



OUTSTANDING CIVIL
ENGINEERING ACHIEVEMENT
AWARD
American Society of Civil Engineers
(ASCE) of Ohio

YOUNGSTOWN WASTEWATER TREATMENT PLANT

ms consultants was commissioned by the city of Youngstown, Ohio, to provide an evaluation of the existing wastewater treatment plant and to conduct a planning effort for proposed major improvements to and to conduct value engineering and subsequent design services for the upgrade and expansion of the 35 mgd primary wastewater treatment facility that had been serving Youngstown and the greater Mahoning Valley since 1957.

The \$56 million upgrade and expansion combined two innovative sludge handling technologies that resulted in reduced capital costs, energy consumption savings for the entire plant, and a design that contained the project within the existing site. All contributed to the total of \$36 million saved through sound engineering techniques and value engineering determinations.

State-of-the-art design produced a dewatered sludge incineration system that routes exhaust gases through waste heat boilers providing a primary energy source for its own operation as well as the heat for the plant. Additional engineering innovation is implemented through the technique of splitting flows and providing treatment for flows above 35 mgd to 90 mgd through trickling filters and subsequent microscreens. This design offered the City increased flow management and treatment removal efficiency as well as eliminating the need for nearly \$3 million in land acquisitions that had been previously recommended. The process design that went up rather than out perfectly fit the site, containing the improvements within a 5-acre segment of the pre-existing site.

Both the sludge drying and the microscreen application processes received innovation/alternative rankings with the U.S. and Ohio EPA, meriting an increase to the existing project monies. Containing the project within existing site parameters required construction of a 55-foot-high, 1,500-foot-long tied back wall. Additional

savings for the City resulted when the earth removed during construction of a retaining wall was transported for use in an ongoing railroad abandonment and bridge restoration project in the Central Business District.

The improved facility, which serves a population of nearly 260,000 over an area of 65 square miles, has brought the city's waste water system in compliance with the Clean Water Act and upgraded the water quality of the receiving stream, the Mahoning River, by providing 97% pollutant removal efficiency.

In addition to process improvements, ms consultants provided complete architectural, structural, mechanical and electrical design modifications for the existing six structures plus the additional 13 new structures. Service roads were provided for access, and a security fence and landscaping were also provided.

In addition to design services, ms provided complete construction supervision for this project including providing liaison between parties, consent decree assistance, cost estimating, rate structure, development and rate agreement negotiation, construction sequences, specifications and contract documents, plan of operation, sole source documentation, bid assistance, pre-purchase of equipment documentation, construction engineering administration, material testing, shop drawings, software development, claim resolution, and as-built drawings. Additionally developed was an operations and maintenance manual including suggested shifting and scheduling with new job descriptions for the facility required by the EPA.

These efforts resulted in the upgrade of the Youngstown Wastewater Treatment Plant to include new primary and advanced secondary treatment systems with an average flow of 35 mgd to peak flows of 90 mgd.

PUMP STATIONS

ms consultants provided full environmental engineering design for upgrade from primary treatment process and addition of secondary treatment processes. ms renovated the influent pump station consisting of CSO

flows of 30 mgd to 90 mgd transistor-type variable speed drive to move energy efficient variable speed drive units and rehabilitated three pumps and motors and added one new pump for reliability.

Primary treatment effluent pump station consisted of a new station capable of pumping flow ranges from 30 to 90 mgd to pump secondary treatment. The discharge arrangement consisted of a four channel baffled weir arrangement that could split flows at equal amounts to four trickling filters.

Other pumps designed at the facility include:

- all primary and sludge pumping
- all chemical feed pumping for liquid stream and air pollution
- all sludge handling feed pumps

ms consultants provided primary power with emergency standby power for the existing six structure, plus 13 new structures to support the treatment plant. Also included were stormwater management, gas supply to all buildings, roadway improvements, major utility relocations and adjustments, and specialized short-listing of specialty contractors for wood lagged in the retaining wall structure.