

PROJECT Profile

INFRASTRUCTURE ENGINEERING

MUNICIPAL ENGINEERING CONSULTING

Sanitary Collection and Treatment System

Trenton, MI

The City of Trenton encompasses 4180 acres of heavy industrial, commercial and residential developments. The sewage drainage system is comprised of over 400,000 lineal feet of pipe ranging in diameter from 8" to 60", seven pump stations, four sanitary overflows, and a 14.6 MGD peak flow wastewater treatment plant. The sewer drainage system has been classified as a wet sanitary system with some combined industrial areas. The project goal was to evaluate alternatives for the handling of flows in the sewer drainage system once the existing bypasses to the Detroit River are removed as directed by MDEQ. A detailed Infiltration and Inflow (I/I) Study was conducted by Spalding DeDecker Associates, In. (SDA) in March 1997 and a Sanitary Sewer Evaluation Survey by SDA began in Spring 1997 and were both used to support the project design.

For the MDEQ approved I/I study, SDA established primary flow metering districts and a manageable flow monitoring program. Districts and Sub-Districts were created and a comprehensive AutoCad map was developed. Eighteen flow monitoring points were established using Isco Model 4150 Area velocity meters. The five Marsh-McBirney Model 302 Pump Station monitors were installed on the pump stations to further define sub-district flow measurements and to evaluate the performance of each station. Five tipping bucket rain gauges were installed to accurately quantify rainfall patterns within the three main flow districts.

Based on the results of the I/I Study, SDA performed an MDEQ approved and manageable Sewer System Evaluation Survey (SSES) program. As part of the in-depth physical inspection of the Wastewater Drainage System, over 1,500 manholes were physically inspected. Over 350,000 lineal feet of pipe, ranging in size from 6 inches to 36 inches in diameter, were smoke tested. Flood and dye testing was performed on selected defective manholes to quantify infiltration and inflow values. A downspout inspection program was also performed during the smoke testing to locate connections to underground sanitary drainage facilities. Pipes with high levels of infiltration were video inspected. SDA then designed a cost effective rehabilitation program to eliminate the greatest amount of excess flows.

Drawing of the data collected during these two studies, SDA designed and is administering the construction of the proposed improvements that would allow for the transport, storage, and treatment of wet weather flows up to and including flows from a 100 year – 24 hour

OWNER/CLIENT

City of Trenton

PROJECT START / END

March 1997 - 2004

CONSTRUCTION COST

\$19 Million

SDA KEY PERSONNEL

Maria Sedki, PE
Mustapha Hamood, PE
David Potter, PE

ROLE ON PROJECT

Prime Consultant

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design rain event. The proposed improvements consist of several projects in various stages of design and construction.

Drainage Retention Basin Enlargement — The enlarged drainage retention basin was designed to contain a 10 year – 24 hour rain event. The sizing of the basin was developed through the XP-SWMM Hydraulic Model developed by SDA for the City of Trenton. The enlargement of the retention basin consists of building an addition to the existing open top

basin and connecting them by a weir through the existing basin wall for a total volume of 2.65 mcft (19.8 mg). To comply with MDEQ standards the enlarged basin was designed to drain automatically after each storm event. A new drainage system was designed, which includes two drainage structures. The new basin was paved with bituminous, and both basins were lined with a HDPE geo-membrane. A system of water canons, hydrants, and a booster pump station were constructed to clean the basins after each use. Water from the chlorine contact chamber of the WWTP is being used to flush the new basin. This project is complete and the drainage retention basin is operational.

A new Drainage Retention Basin Pump Station was designed to lift the excess flows from the wastewater treatment plant to the enlarged drainage retention basin. The pump station was designed to lift flows using variable vertical turbine speed pumps ranging in speed from 4,500 to 13,500 gpm. Three pumps will be able to handle the excess wet-weather flows up to a 100 year – 24 hour rain event. The fourth pump will be a backup pump as per MDEQ guidelines. The pump station was designed to have a circular wet-well with an inside diameter of 25 ft. and a depth of approximately 35 ft. A SCADA system was used for automatic operation of the pump station. The pump station was designed to the Ten States Standards including proper ventilation and a gas detection system. The entire WWTP had new switchgear and a dual power source added for redundancy. Construction of this project is nearing completion.

The River North Interceptor project currently under construction consists of a new sanitary drainage interceptor sewer and a lift station. The interceptor ranges in size from 12-inches at its upstream end to 60-inches at the inlet to the lift station. The total length of the interceptor is over 20,900 lineal feet. The lift station was designed to lift flows using vertical turbine variable speed pumps and a total capacity of 13,500 gpm. Two pumps will be able to handle the excess wet-weather flows up to a 0-year - 24-hour rain event. The third pump will be a backup pump as per MDEQ guidelines. The lift station was designed to have a circular wet-well with an inside diameter of 17 ft. and a depth of approximately 46 ft. The second part of the project is 5,050 lineal feet of 42-inch interceptor from the lift station to the Wastewater Treatment Plant. The depth of cut on this project ranges from 17 to 34 feet. Ground conditions vary from firm clay to limestone rock. The limestone rock is connected via aquifer to the Detroit River channel bottom which is also limestone along Trenton. Miscellaneous utility relocations, new water mains to improve pressure and new street construction are all being designed as part of this project.

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The River South Interceptor project consists of constructing a new sanitary drainage interceptor sewer along Jefferson Ave. in the industrial part of the City. The interceptor ranges in size from 21" to 36". The total length of the interceptor is over 6,600 lineal feet. Because of the industrial sewage entering the interceptor, SDA had the sewage analyzed and designed the sanitary drainage interceptor using PVC pipe and fiberglass manholes, making this project unique to the industry. Traffic has been maintained in both directions of Jefferson Ave. at all times.

SDA used the latest in aerial mapping technology plus performed detailed grades, utility investigations, utility, paving and pump station design, and utility conflict resolution. SDA is also performing construction administration, inspection and layout for the system improvements.