Civil Engineers: Designers and Builders of the Quality of Life

Initiation of Wastewater Collection and Treatment for Minneapolis and Saint Paul, 1926-1938

by Robert Callery, P.E., M. ASCE, History & Heritage Committee, April 2014

The century since 1914 has seen the completion of many significant civil engineering projects. Perhaps none have been more so than the initiation of wastewater collection and treatment for Minneapolis and Saint Paul. This project is significant because of the gravity of the problem, the extensive nature of the planning, design, and construction, and the number of prominent civil engineers who were involved.

The Problem

The population of Minneapolis and St. Paul grew rapidly with an increase of 210,000 in the 1880s, 68,000 in the 1890s, and 151,000 in the 1900s, surpassing 500,000 before 1910. Much of the population was served by municipal sewers, but these provided conveyance only to discharge points on the Mississippi River. The River was left to handle the waste load, carrying it downstream through the Cities while providing "natural" treatment.

For a time, the river flow was sufficient to avoid many problems, except when the flow was low. With the growing population and accompanying commercial and industrial discharges, the pollution of the River became increasingly serious. Construction of the short-lived Meeker Island Dam in 1907 (see separate article) and the Twin City Lock and Dam in 1917 increased the pollution effects in the Cities. In 1919, the City of St. Paul closed the public swimming facilities at Harriet Island and the City of Minneapolis closed its beach near the Plymouth Avenue Bridge in 1925.

The Planning

The polluted condition of the River led to action by the Minnesota State Board of Health. City and State funds were raised for an investigation of the problem. The investigation in 1926 and 1927 was directed by the U.S. Public Health Service. The Minnesota legislature acted to create the Metropolitan Drainage Commission (MDC) in 1927. The MDC immediately began to measure wastewater flows and plan for sewers to intercept the flows and provide treatment. A total of 40 alternate projects and variations were analyzed. The selected project was for a single treatment plant located downstream from St. Paul. The MDC operated from 1927 to 1933.

The Engineering Design and Construction

The State legislature acted to create the Minneapolis-Saint Paul Sanitary District (MSSD) in 1933. In November, 1933, the MSSD supplanted the MDC. The MSSD designed and constructed the treatment plant and the large sewers that would carry the combined Minneapolis and St. Paul wastewater to the plant.

Nine men stand in the St. Peter Sandstone tunnel completed by the City of Minneapolis for a 10'-3" semi-elliptical section sewer that conveys Minneapolis flow from the west side of the Mississippi River from the siphon outlet chamber to the MSSD constructed junction chamber. The location is about 93' below West River Rd north of Marshall Ave in St Paul.

The furthest downstream tunnel constructed in the St Peter Sandstone exited St Paul's Dayton's Bluff north of Warner Rd east of its intersection with Childs Rd, which allowed entry of the vehicle. The Joint Interceptor section here is a 13'-10" circular sewer completed in 1935. About 1200' upstream from the location of this photo the sewer invert is 212' below the surface.

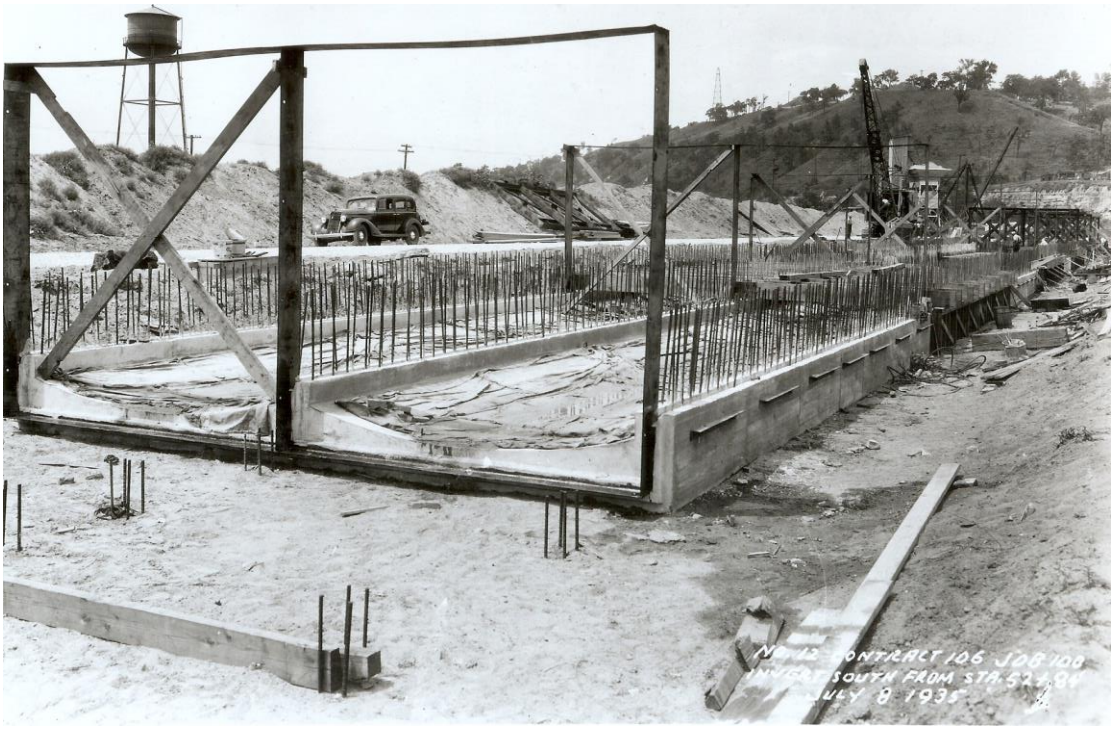
Each City designed and constructed the sewers to intercept the existing sewers and convey wastewater to the end of the MSSD interceptor near the Lake Street Bridge in St. Paul. Much of the new sewer construction involved tunnels in the St. Peter Sandstone formation. Fifty-two miles of sewers were constructed during 1934-1938.

The Minneapolis sewers were designed by the City and constructed as force account (with their own labor force) City projects. The jointly used sewers were designed by MSSD and constructed by private contractors in 18 separate projects. Eleven different contractors were used. The "Joint Interceptor" crosses St Paul from the Mississippi River to downtown St Paul at 11'-9.5" diameter, much of it over 200 feet deep. Further east it is 13'-10" diameter.

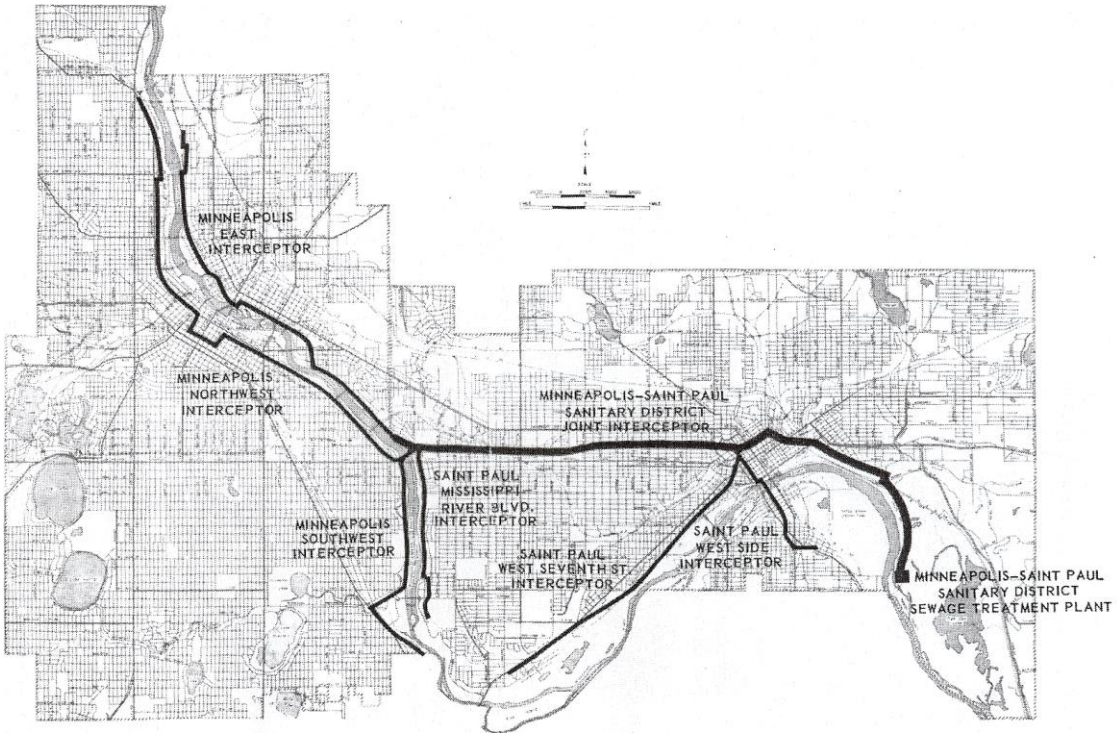
The treatment plant was designed by MSSD and constructed by private contractors during the same period. All facilities began operating in July 1938. The recovery of the Mississippi River in Minneapolis and St. Paul began immediately.

The treatment plant, now the Metropolitan Wastewater Treatment Plant, has been expanded in the intervening years to provide better and better treatment, but it and all of the sewers, constructed over 75 years ago, continue to provide vital service to the metropolitan area and the Mississippi River.

Seven workers are shown in the tunnel being constructed in the stream sediments of Glacial River Warren terrace east of downtown St Paul. At this location, about 112' below Lafayette Rd and Grove St, a 13'-3" semi-elliptical section of the Joint Interceptor sewer was constructed in 1935.



The last section of the Joint Interceptor is a 9'-6" x 10' double barrel sewer which extends about 6000' north from the treatment plant to the bluff shown on the right. The photo shows a section of completed pipe invert, supported by bearing piles. The location is along Childs Rd in St Paul, north of the Metropolitan Treatment Plant, sometimes known as the Pig's Eye Plant, because of its location on Pig's Eye Island.



Routes of principal intercepting sewers

The Civil Engineers Involved

An amazing number of Minnesota civil engineers had roles in this project. Some of them, their role in this project, and subsequent endeavors are cited below:

James A. Childs	State Board of Health Engineer MDC Chief Engineer and Secretary MSSD Sanitary Engineer Minnesota Section ASCE, President, 1928
George J. Schroepfer	MDC Assistant Chief Engineer, 1927-1933 MSSD Assistant Chief Engineer, 1933-1938 MSSD Chief Engineer & Superintendent, 1938-1945 University of Minnesota, Professor of Sanitary Engineering, 1945-1972 MN Section ASCE, President, 1941
George M. Shepard	MDC Vice Chairman, 1927-1933 St. Paul City Engineer, 1922-1965 MN Section ASCE, President, 1942
Fred T. Paul	Minneapolis City Engineer MN Section ASCE, President, 1944
Arndt J. Duvall	MSSD Design Engineer, 1936-1938 MSSD Plant Operator, 1938-1939 Toltz, King, Duvall, Anderson, Principal MN Section ASCE, President, 1939
Frederic Bass	MSSD Consulting Engineer, 1934-1935 MN Section ASCE, President, 1925
Arnold M. Steffes	MDC Assistant Engineer, 1933 Toltz, King, Duvall, Anderson, Engineer MN Board of Architecture, Engineering & Land Surveying, Board Member, 1954-1974

Construction photos are courtesy of the Metropolitan Council Environmental Services.
Engineers' portraits (following page) are courtesy of the Minnesota Historical Society (Childs, Shepard, and Bass) and the University of Minnesota (Schroepfer).

James A. Childs

George J. Schroepfer

George M. Shepard

Frederic Bass