

Civil Engineering NEWS

the interchange will be a 1,565 ft long, 44 ft wide structure with eight spans. As the fourth level of the interchange, this flyover will attain a height of roughly 75 ft above Sam Cooper Boulevard.

The second flyover, which will facilitate direct traffic flows along southbound I-40 from the northern leg to the eastern leg of the interchange, will be approximately 2,320 ft long and 43 ft wide and have 13 spans. Both flyovers will feature curved steel plate girders with a concrete deck superstructure supported by hammerhead piers on pile footings. Meanwhile, the replacement of the I-40 bridge over the Wolf River will be a 1,145 ft long, 11-span structure varying in width from 203 ft to approximately 208 ft. To be founded on pile bents, the bridge will consist of steel plate girders and prestressed-concrete beams and have a concrete deck superstructure.

Construction work on the interchange improvements will proceed in two stages, the first of which recently began and will conclude in the autumn of 2015. Along with the two flyover bridges, the first stage will include widening sections of I-240 and Sam Cooper Boulevard. To be completed by the summer of 2017, the project's second stage will entail replacing the I-40 bridge over the Wolf River, widening sections of I-40, and conducting final paving for the entire project.

—JAY LANDERS

WASTEWATER

Construction Begins On Disinfection Facilities at Two Chicago Treatment Plants

UNDER PRESSURE from the U.S. Environmental Protection Agency, the Metropolitan Water Reclamation District of Greater Chicago (MWRD) began examining in 2011 how best to reintroduce disinfection at its 354 mgd Calumet Water Reclamation Plant and its 333 mgd Terrence J. O'Brien Water Reclamation Plant (formerly known as the North Side Water Reclamation Plant). Initially expected to require 12 years to design and construct, the disinfection facilities are now on track to be completed by the end of 2015. Construction of the disinfection facilities is under way at both plants, marking a milestone in efforts to improve water quality within the roughly 100 mi of canals and modified streams that make up what is called the Chicago Area Waterway System.

This system of waterways was created more than a century ago to divert the flow of the Chicago and Calumet rivers from Lake Michigan, Chicago's source of drinking water. The system includes the North Shore Channel, the Chicago River and its south branch, the Chicago Sanitary and Ship Canal, the Little Calumet River, and the Calumet-Saganashkee (Cal-Sag) Channel (see map). For most of the 20th century the waterways were used primarily

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as industrial canals supporting barge traffic. However, recent decades have witnessed considerable efforts on the part of the MWRD and others to improve water quality within the Chicago Area Waterway System. Citing growing recreational use on several waterways within the system, the U.S. Environmental Protection Agency in 2011 informed the State of Illinois that water quality standards for certain sections of the system would have to be upgraded to support "primary contact" recreation, including swimming. The agency also indicated that disinfection would probably need to be resumed at the Calumet and O'Brien plants, a practice that the MWRD had discontinued in the 1980s. In June 2011 the MWRD's governing board approved a plan to begin the process of planning, designing, and constructing disinfection facilities at the two plants (see "Increased Recreation on Chicago Waterways Prompts Move toward Disinfection," *Civil Engineering*, August 2011, pages 24-26).

To expedite the process of design-

CITING GROWING RECREATIONAL use on several waterways within the system, the U.S. Environmental Protection Agency in 2011 informed the State of Illinois that water quality standards for certain sections of the system would have to be upgraded to support "primary contact" recreation, including swimming.

ing the disinfection facilities, an internal team at the MWRD conducted initial investigations and pre-engineering evaluations "to really tighten the scope so that these designs could move forward quickly," says David St. Pierre, P.E., the MWRD's executive director. The team evaluated a wide variety of disinfection options, assessing each in terms of its economic, social, and environmental benefits. For the O'Brien plant, the internal review team recommended the use of ultraviolet (UV) irradiation by means of low-pressure, high-output lamps. Meanwhile, the team called for the use of chlorination

and dechlorination at the Calumet plant. The presence of chlorine contact basins at the Calumet facility persuaded the team to select the chlorination and dechlorination process, St. Pierre says.

As part of efforts to assess the feasibility of using UV irradiation, the team also carried out collimated beam testing on effluent of varying strengths and flow conditions from both plants in order to develop more accurate estimates of the UV dosage required to meet certain performance targets. By indicating that a lower dosage than anticipated could be used at



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the O'Brien plant, the testing "resulted in quite a bit of savings," St. Pierre says.

In the spring of 2012, the MWRD awarded contracts to CH2M HILL, of Englewood, Colorado, to lead the design efforts for the chlorination and dechlorination system at the Calumet plant and to Greeley and Hansen, of Chicago, to lead the design of the UV system at the O'Brien plant. Both design teams completed their work this past spring. "We pushed [the design teams] to get these designs completed within a year," St. Pierre says. Thus far the MWRD has spent \$15 million on engineering and design work associated with determining disinfection options for the two plants. Of this amount, \$10 million was awarded to the MWRD in April 2012 by the State of Illinois as part of its Illinois Jobs Now! capital program.

Ground was broken for the disinfection facilities at the two treatment plants in mid-September. The start of construction followed the approval in early August by the MWRD's governing board of construction contracts for the two projects. For the Calumet project, the district awarded a \$32.5-million contract to IHC Construction Companies LLC, of Elgin, Illinois. For the O'Brien project, the MWRD awarded a nearly \$63-million contract to Walsh Construction, of Chicago. Totalling \$95.5 million, the contracts came in well below the MWRD's estimate of \$109 million.

Construction of both disinfection facilities is expected to be completed by December 2015, in time for the 2016 recreation season. However, the MWRD hopes to have the disinfection operations working at the Calumet plant as early as March, St. Pierre says. In 2016 the two plants will be required to meet fecal coliform limits of 200 colony-forming units per 100 mL

between March 1 and November 30, according to the terms of the permits that are being developed. These limits should be met handily by the new disinfection facilities, St. Pierre says. "We're expecting to have no detectable fecal coliform" levels in discharges from the two facilities during the disinfection season, he notes. Operations associated with the new disinfection facilities are expected to cost approximately \$3.5 million per year at the Calumet plant and roughly \$2 million per year at the O'Brien facility.

Another factor expected to boost water quality in the Cal-Sag Channel and its tributaries is the planned completion of the Thornton Composite Reservoir by December 2015. Part of the MWRD's massive Tunnel and Reservoir Plan, the Thornton Composite Reservoir is designed to hold 7.9 billion gal of storm water that then will be slowly released into the district's combined sewer system. In this way the reservoir will reduce combined sewer overflows, decrease flooding, and improve water quality within local waterways. Modeling shows that the reservoir will "go a long way to eliminating" sewer overflows into nearby waterways, St. Pierre says. The combination of disinfection at the Calumet plant and reduced overflows is expected to improve local water quality significantly. —JAY LANDERS

THE COMBINATION of disinfection at the Calumet plant and reduced overflows is expected to improve local water quality significantly.

