



Pre-welded Reinforcing Segments used for Humber Wastewater Treatment Plant Clarifiers

Toronto (Etobicoke), Ontario

Project:

Contract No. 04FS-47WP
Humber Treatment Plant,
Rehabilitation of Digesters 1-6
Toronto (Etobicoke), Ontario

Owner:

City of Toronto
Department of Works and Emergency
Services

Contractor:

Kenaidan Contracting Ltd.
Mississauga, Ontario

Consulting Engineers:

MacViro Consultants Inc.
Markham, Ontario
(prime consultant)
CH2MHILL
Toronto, Ontario
(structural engineering)

Product:

32 outer pre-welded mat segments
and 16 inner pre-welded mat
segments.



Pre-weld reinforcing segment lowered into clarifier.

StelCrete Industries is part of an innovative approach to supply and place reinforcing steel in segments to reduce the amount of field-placing time at the Humber Wastewater Treatment Plant in Toronto (Etobicoke), Ontario. The approach was accepted by Kenaidan Contracting Ltd., MacViro Consultants Inc. (the project's prime consultant) and CH2MHill, the project's structural consultant. Rehabilitation of the digesters is expected to be completed in 2008.

The supply and installation of the reinforcing steel for the concrete structures was sub-contracted to Salit Steel, parent company of StelCrete, located in Niagara Falls. The engineering design called for the deteriorated digester to be demolished to the slab base, leaving only the tank's exterior wall. The new design included structural updates to resist earthquake load-

ings stipulated in the National Building Code. In addition, a new stairwell had to be constructed in the pipe gallery to meet building codes and the rehabilitated clarifiers integrated into the facility's supervisory control and data acquisition (SCADA) system for gathering and analyzing real time data to monitor and control the digesters. All piping and electrical is being replaced between the digesters and the galleries.

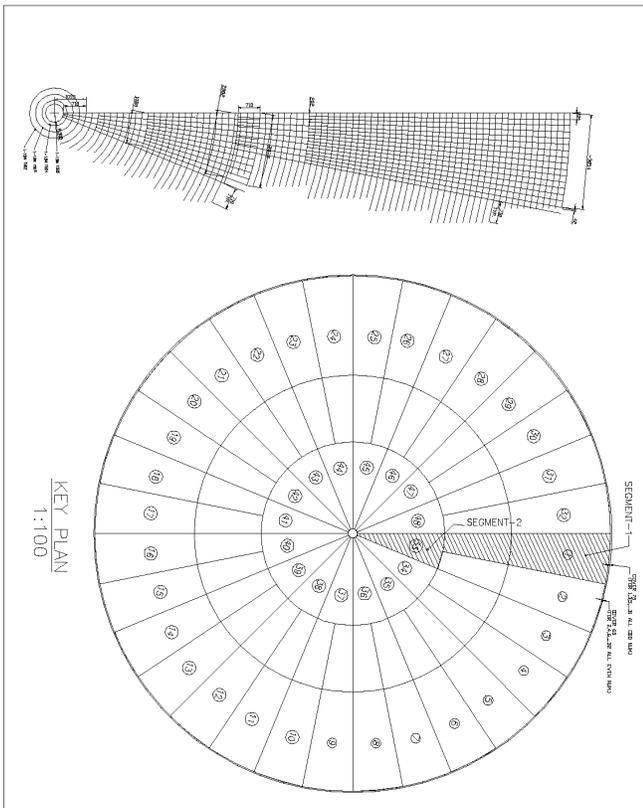
Once the existing slab base of the first digester was cleaned and the site ready for rehabilitation, the contractor drilled and installed rock anchors and rebar shear ties to ensure that the new 200 mm-thick base slab would be well secured on top of the existing base. The numerous tie downs and column dowels meant that it would be time consuming and hazard-

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ous to place and tie the 18.5 metric tonnes of rebar required for each digester base slab. This challenge to the schedule and funding for the project was overcome with the proposal from Salit Steel.

The typical reinforcing pattern for a large circular base is polar grid with radial bars projecting from the base's circle centre crossed by circumferential (circular) bars. The polar reinforcing pattern was accomplished with 32 outer segments and 16 inner segments. The plan diameter of the base slab is 32 metres. The maximum length of the circumferential bars was limited to 3580 mm. This was done to allow the pre-welded units to be trucked to the job site without requiring special wide-load hauling permits. Bars not supplied with sufficient lap length were field-spliced with loose bars. Only 10 bars were required for splicing the 32 outer segments and a small number required for the 1600 mm inner circle centre.



Reinforcing pattern comprised of polar grid with radial bars projecting from the base's circle centre crossed by circumferential (circular) bars.

Rehabilitation of the clarifiers is part of a planned maintenance program designed to extend the service life of the six digesters. The pre-welded segments were fabricated

under the strict material and welding specifications of CSA W186 M1990, "Welding of Reinforcing Bars in Concrete Construction."

Rehabilitation of the first of six digesters at the Humber Wastewater Treatment Plant in Toronto, Ontario commenced in February 2005 with the cleaning of the clarifier, demolition of the roof and supporting columns. The entire \$46 million project is being phased to allow the facility to keep operating without disrupting the city's wastewater treatment system.



Rock anchors and rebar shear ties to ensure that the new 200 mm-thick base slab would be well secured on top of the existing base. Pre-welded mat section lowered into position.



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