

Pre-Assembled Cages for Precast Concrete Box Culverts

The supply of large-sized precast concrete boxes for the construction of culverts on Highway 407 east of Toronto Ontario to convey tributaries of Oshawa Creek was accelerated by using pre-assembled rebar cages during production of the boxes. The cages were supplied by StelCrete Industries Limited, (<http://www.stelcrete.com/>) fully certified by the Canadian Welding Bureau (<http://eng.cwbgroupp.org/Pages/default.aspx>).

The boxes were produced by M Con Pipe & Products Inc. in Ayr, Ontario (www.mconproducts.com). Culverts (M51 - Oshawa Creek West Tributary and M56 - Oshawa Creek East Tributary) were specified originally as cast-in-place structures. Structure M-51 was designed as an 8000mm



Rebar cages from StelCrete, two cages per delivery, one stacked upon the other



Pre-welded cage being lowered into the mold jacket

Project:

Highway 407 East
Brock Road to Highway 35/115

Owner:

Ministry of Transportation Ontario

General Contactor

407 East Development
Group General Partnership

Culvert Installation Contractor

Brennan Paving & Construction
Limited

Product:

#30M to #35M reinforcing steel to reinforce
the thinner slab and wall design of the pre-
cast culvert sections

Production Period

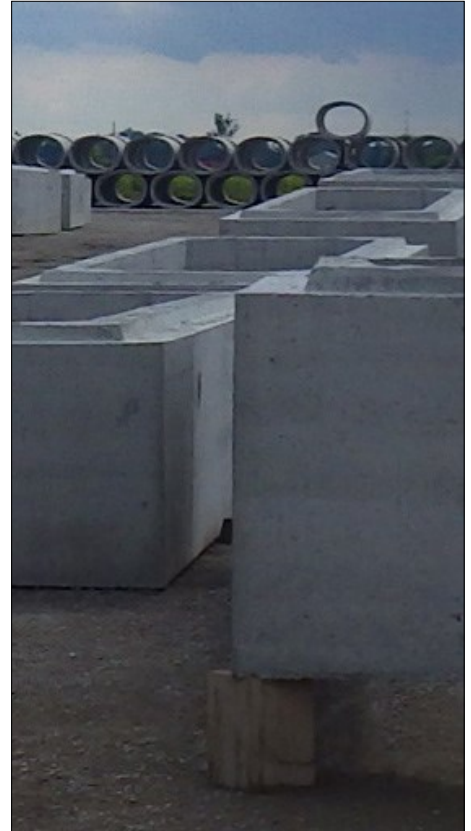
October 2013 to July 2014

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span x 2500mm rise culvert, and M56 an 8000mm x 2100mm culvert. Top and bottom slabs and walls were required to be 800mm thick. M Con provided a precast concrete design alternative for culverts M51 and M56 that included thinner walls and slabs to reduce the weight of each box for manufacturing, handling, shipping and installation. The boxes were manufactured with 500mm top and bottom slabs and a 500mm wall. The lay length for each culvert section was 1.205 metres. M Con produced 121 boxes for the M51 culvert and 72 boxes for the M56 culvert.

M Con was able to cast two box sections daily using pre-welded rebar assemblies from StelCrete. The design of the cages specified #30M to #35M reinforcing steel, compensating for the thinner slab and wall design of the precast culvert sections. This large size of rebar is rarely used to reinforce culverts and was the first time that it had been installed during production at M Con. The Stelcrete Production System (SPS) allows for tight tolerances to be maintained in both the bent rebar components as well as the final assembled cages. Chairing spacers were attached to the cages at the Stelcrete facility to create a product that was ready to be lowered into the form when it arrived at that M Con facility. Custom loading brackets were designed to assist with the loading and handling of the fully assembled rebar cages. Because of the size of the cages, only two could be loaded, transported and offloaded for each delivery. The use of the SPS ensured a continuous supply of quality pre-assembled cages to meet the M Con production requirements of two complete culverts per day.

Production of the box sections for the culvert over the Oshawa Creek West Tributary (M51) began in mid-October 2013. Shipment of sections with a total weight of 4,280 tonnes began in February, 2014. The contractor, Brennan Paving & Construction Limited (<http://www.millergroup.ca/index.html>) installed the sections in sequence based on the design of the earth cover. Production of the precast sections for the culvert for the Oshawa Creek East Tributary (M56) began in early April, 2014, with a completion in early July. The use of preassembled cages helped M Con meet the production schedule that was governed by the aggressive construction schedule of the owner.



8000mm x 2100mm x 1.205m precast concrete box sections ready for shipment to the job site

