



# CSP Sewer Reline for Busy Highway Intersections

<b>OWNER</b>	Ministry of Transportation, Ontario
<b>CONTRACTOR</b>	Underground Services Limited
<b>CONSULTANT</b>	Morrison Hershfield
<b>LOCATION</b>	Mississauga, ON

With over 320,000 vehicles per day the intersection of Highways 401, 403 and 410 in Mississauga, Ontario, is one of the busiest in North America. At the same location can be found the confluence of several drainage paths, all of which are channelled into one major storm drain, which then passes beneath the intersection through a single storm sewer pipe.

The owner, the Ministry of Transportation of Ontario recognized that the storm sewer had to be rehabilitated. Replacement was impractical, if not impossible, due to its location under one of the busiest highways in Canada.

Built in 1974, this 3050mm concrete storm sewer was showing severe signs of pre-mature deterioration. For several years, the concrete sewer had been cracking; joints had been separating and corrosion of the reinforcing steel and subsequent spalling of the concrete from the interior pipe walls was becoming a major concern. The owner, the Ministry of Transportation of Ontario recognized that the storm sewer had to be rehabilitated. Replacement was impractical, if not impossible, due to its location under one of the busiest highways in Canada.



## TECHNICAL DETAILS

3050mm concrete storm sewer relined with Corrugated Steel Pipe, 2850mm inside diameter employing a 125x25mm corrugation, manufactured from 4.2mm gauge galvanized steel.

Numerous options were examined that were all variations of Corrugated Steel Pipe. Multi-Plate®, Tunnel Liner Plate® and various corrugations, gauges and coatings of Hel-Cor® Corrugated Steel Pipe were considered. The objective was to find a solution that would meet the load and deflection requirements, maximize the inside diameter and satisfy the hydraulic conditions. Various solutions were eliminated on the basis of corrugation profile, physical properties, hydraulics, construction and cost. Meeting the required design life of the culvert added yet another dimension to the challenge.

### THE SOLUTION

The solution selected, which provided the required strength and durability, was a Corrugated Steel Pipe, 2850mm inside diameter employing a 125x25mm corrugation, manufactured from 4.2mm gauge galvanized steel. Due to the fact that the liner had to negotiate a curve in the sewer in order to reach its final location, the length of each pipe section was limited to 3150mm, with a total of 62 sections of pipe being supplied on the contract.

As added protection, a Coal Tar Epoxy coating was specified for the invert of the pipe and at the cut ends of each pipe section. To assist in drainage behind the pipe joints, Mirafi G100W high-performance drainage composite was installed.

A key component of the contract was the de-watering scheme, as the sewer could not be taken out of service. The contractor's innovative de-watering scheme was cost efficient and highly effective in accelerating the progress of the project.

The Corrugated Steel Pipe was installed piece by piece, each piece secured in place using factory-installed screw jacks and additional wedges. The short lengths eased the rapid passage of the relining pipe into the existing concrete pipe. After installation, the annulus between the deteriorating concrete sewer and the Corrugated Steel Pipe liner was grouted.

Originally scheduled to take place over two winters, the entire project was easily completed in the first winter, within the Ministry's budget.

**Find out how CSP can be used on your next project.**

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