

Quad Cell Box Culvert Provides Solutions for the Region of Waterloo

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For many years Townline Road in Cambridge was an out of the way, seldom used rural road that was originally constructed in the early 1900's. Today it has become a vital artery for traffic movement north and south from Highway 401 on the eastern edge of this growing community in the Region of Waterloo. With extensive housing developments encroaching from the west and major arteries of Franklin Boulevard and Hespeler Road already congested in central Cambridge, Townline Road is fast becoming a favorite route for many local residents to move north and south from Highway 401 to their homes and businesses in Cambridge and the surrounding areas of Brantford, Hamilton and Guelph.

The increase in traffic on the deteriorating southerly portion of Townline Road did not go unnoticed and in the year 2004 the Region of Waterloo selected a consulting engineer AECOM from Kitchener, Ontario to be the project manager for the infrastructure renewal project. With a consulting firm in place, the Environmental Assessment and submission could begin and by the end of 2008 the review was completed. The next year and a half would focus on design and in the fall of 2010 the tender for the contract for the Reconstruction of Townline Road was awarded to local contractor Bel Air Excavating and Grading Ltd.

This 2.8 km piece of rural road to be reconstructed with storm and sanitary sewer upgrades along with watermain installation was not however your typical road reconstruction. Townline Road is a unique area with environmentally sensitive bog locations, high water table and subsurface bedrock making the task at hand for Bel Air Excavating and Grading Ltd. very challenging.

For the Region of Waterloo and AECOM, one of the bog areas surrounding Townline Road, known as the Portuguese Bog, would require extensive remediation to allow for the equalization of water flow beneath the reconstructed roadway. As Duncaun McLeod P.Eng., Manager of Community Infrastructure Central Region for AECOM stated, "the reconstruction of this portion of Townline Road will allow us to raise the freeboard of the roadway surface to adequately manage water levels in an area that for many years during heavy rainfall events or even the annual spring thaw would become susceptible to localized flooding."

For service life, capacity considerations and road design limitations, the two small corrugated steel pipes currently in place were to be removed and replaced with a quad cell 2400mm x 1200mm precast concrete box culvert supplied by local producer M-Con Pipe and Products Inc. from Ayr, Ontario. With a minor increase in the road elevation coupled with the large waterway area of the quad cell box culvert, the equalization of the Portuguese Bog water levels will be realized ensuring localized flooding in this area would all but be eliminated. The project management team at AECOM led by Duncaun MacLeod, P.Eng. suggested, "the quad culvert design was selected over other alternatives because of the width and height restrictions the roadway design presented to us as well as the

volume of water the bog contained. As a result the quad cell box culvert installation became the most practical and cost effective solution to fulfill the one hundred year storm design."

From a construction standpoint, discussions with Senior Estimator and Project Manager Jim Hendricks, C.E.T. of Bel Air Excavating highlighted the difficult situation the location for the box culvert installation presented; "For us the preparation and dewatering of the area was the most challenging. Although the 100 metres of tight sheeting installed on either



M-Con concrete box culverts

side of Townline Road cut off the bog to the installation area, the dewatering and excavation of the peat material was quite extensive. Yet once we uncovered suitable native material and the area was readied, the box culvert installation was very straight forward." When asked on how the installation proceeded from a project management perspective once the culvert location was controlled, Mr. McLeod remarked, "the installation went quite well considering the winter conditions, with all four cells totalling 114 metres installed and backfilled over a two day period."

Road reconstruction, no matter what the circumstances, will always be challenging. For the Region of Waterloo and AECOM, the successful and cost effective reconstruction of Townline Road will be aided by the precast concrete quad cell box culvert installation. Although the cost and construction challenges of the installation cannot be underestimated, the result is an engineered structure that has reduced the risk of localized flooding in the area ensuring safe and dependable travel along this vital eastern artery with the Cambridge community for many decades to come.

PVC Pipe Removed from Durham Region Approved Manufacturers' Products List

PVC pipe produced in accordance with *CSA-B182.4 Profile PVC Sewer Pipe and Fittings* has been removed from the Approved Manufacturers' Products List of Durham Region, Ontario Canada. Reasons cited include:

- Poor pipe performance in places of poor compaction or improper bedding
- Difficulty in obtaining fittings
- Saddles could not be used to make connections due to the design of the outer pipe wall
- Difficulty when cutting in new connections into an existing pipe.

