It’s a Snap!

Ministry introduces new Oval Culvert Lining Solution to Ontario

To maximize the effectiveness and sustainability of corrugated steel pipe (CSP) culverts beneath Ontario’s roads and highways, the Ministry of Transportation Ontario (MTO) has tested a new culvert restoration technology. In the fall of 2012, MTO relined five elliptical-shaped steel culverts with oval high-density polyethylene (HDPE) pipe. Restorative installations took place on Highway 40, just North of Wallaceburg, Ontario, boasting the first application of the new elliptical culvert liners in Ontario. Ministry staff collaborated with Snap-Tite, the culvert rehabilitation division of ISCO Industries, to bring this new technology to the province.

Full culvert replacement typically results in costly traffic detouring and construction staging compared to less intrusive roadside culvert liner restoration methods. Since its first use in 1995, culvert relining has gained tremendous popularity with infrastructure owners and MTO. Since many Ontario highway culverts are oval, challenges arise when seeking an optimal culvert fit. Until recently, HDPE culverts liners were available as a round product only.

Oval HDPE Culvert Liner for Better Flow Capacity

Until the introduction of oval HDPE pipe, options were limited for repairing failing oval or elliptical steel culverts. The solutions available were to reline culverts with two round pipes or conduct a full replacement. While relining is typically the best option for repairing aging culverts, maintaining flow capacity is a significant concern. Relining oval-shaped pipes with two round pipes will result in a loss of flow capacity. Furthermore, two smaller pipes inside a larger pipe increase the risk of debris build-up and restricted flow. Introducing oval HDPE pipes to match culvert dimensions increases flow capacity of existing culverts making relining more desirable than replacing an existing steel culvert.

Installation

Most of the existing culverts for the Highway 40 project measured 838 mm x 1250 mm. The contractor, Provincial Underground Services Ltd. of Newmarket, Ontario, determined a 900 mm outside diameter solid wall pipe was the best product option for installation. The liner measured 762 mm x 1067 mm when formed to match the culvert pipe oval shape.

The custom formed oval pipe was shipped in 7.5 meter lengths and installed by the contractor. Ministry staff and representatives from nearby townships, municipalities and interested engineers were on-site to observe the process. Spectators and the contractor alike were impressed with the ease of installation. The project was slated for a three-week completion but since the product installed so easily, the work was completed one week ahead of schedule. Ministry professionals were extremely pleased with the early completion of the project that resulted in time and cost savings.
Ministry introduces new Oval Culvert Lining Solution to Ontario, continued

Results
“The oval pipe was easy to install in wet and muddy conditions, even with a smaller crew.” stated John Gawn, of Provincial Underground Services. “The pipe was flexible and we were able to guide it through despite some deflections in the host pipes; other pipe liners wouldn’t have been able to fit. The liner installed exactly as the manufacturer stated it would. I look forward to using it on other similar projects.”

The ministry will be assessing the performance of the oval liners at these sites over the next several years. In the meantime, the ministry will explore other opportunities to use oval culvert restoration technology. A pipe rehabilitation study on the effectiveness and benefits of this and other culvert restoration technologies is planned for 2014, with the intention of developing industry standards for culvert restoration.

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In summer and fall 2013, the Ministry of Transportation (MTO) tested a new lane-closing system called SwiftGate™. The system was temporarily installed at the Highway 401 eastbound to Highway 400 northbound interchange, to manage traffic during a bridge rehabilitation. This was the first time MTO used this system that allowed the closure of a lane by remote control.

The system consists of multiple gates with flashing arrows and reflective signs that swing out to guide traffic through a construction zone. The gates are solar powered, and take approximately 30 seconds to engage. The system requires little maintenance and parts, such as a new gate, are easy to replace. The gate’s high visibility improved safety for workers and motorists by effectively slowing traffic through the construction zone. MTO tested this technology to reduce the time it takes to close/open lanes, which typically involves a crash truck and workers placing and removing barrels nightly. The use of this product increased worker safety by limiting their exposure to traffic and introduced potential cost savings to the ministry.

The Highway 401 to Highway 400 interchange carries two lanes of traffic – one from the collector and one from express. The rehabilitation required a complex series of gate closures, depending on the time of the day and involved detailed operating procedures and coordination for the various lane configurations. This project provided an opportunity to try an innovative product that performed well. Along with its strong performance on the worksite, the system received praise from the public, with positive feedback highlighting its ease of navigation and visibility, especially at night. It also reduced queuing in the area during normal traffic operation under construction conditions.

The success of this trial demonstrates how the ministry seeks innovative methods for traffic management, further supporting employing new technology in Ontario.
In 2012, the Ministry of Transportation (MTO) constructed a new wildlife overpass to mitigate wildlife collisions in northern Ontario. The first of its kind in Ontario, the overpass was constructed as part of the four-laning of Highway 69 from Parry Sound to Sudbury. The overpass is located 1km north of Highway 637, in the Burwash area. Construction of this section of new highway also included 10 km of wildlife fencing designed to keep animals off the road and funnel them to safe passage opportunities. The intent of the mitigation is to reduce wildlife collisions in an area that has experienced a high rate of wildlife/vehicle collisions.

In Ontario there are approximately 14,000 wildlife/vehicle collisions reported each year with many more unreported. Historically, wildlife collisions are more frequent in northern Ontario and can account for as high as 50 per cent of the total number of collisions along some highways. MTO takes a proactive approach by developing initiatives that can potentially reduce these types of collisions. In cooperation with the Ministry of Natural Resources, the MTO started pilot projects adopting wildlife collision-mitigation features that were successful in Banff National Park, in western Canada.

MTO designed wildlife collision-mitigation initiatives for the Highway 69 new alignment including:

- one wildlife overpass
- one large wildlife underpass
- one creek-bridge pathway under Lovering Creek bridge
- 10km of wildlife exclusion fencing, including:
  - twenty-seven one-way escape gates for trapped animals
  - two Texas (ungulate) gates at the new Highway 69 and Highway 637 interchange from Makkynen Bridge to Lovering Creek bridge.

The wildlife overpass is strategically landscaped with trees, shrubs, brush, and rock piles providing a natural environment to encourage wildlife use. Since the project was completed and opened to traffic, a wide range of animals have used the mitigation features. Mounted cameras at the site have captured frequent overpass use by moose, and deer, with less frequent use by black bear, bobcat, and wolves.

The initial cost of the overpass was estimated at $5.7 million. To reduce construction costs the MTO used a Value Engineering (VE) process, which analyzes a project to ensure the best value on capital is achieved. Six VE proposals and four design suggestions were implemented resulting in approximately $3.4 million in cost savings/avoidance compared to the original design.

Highway 69 Animal Crossing a Wild Success

MTO Mitigates Collisions with Animals on Northern Highway

View of wildlife overpass from a distance.

Bobcats using Overpass.
MTO Mitigates Collisions with Animals on Northern Highway, continued

The ministry is conducting multi-year monitoring to determine the effectiveness of the mitigation measures at reducing wildlife/vehicle collisions and maintaining habitat connectivity. Initial results are positive as a variety of mammals are using the overpass and underpass, and being diverted from the highway by the mitigation features. In 2013, three new species were discovered using the overpass: coyote, raccoon, and rabbit.

The MTO continuously works to identify methods that improve driver safety while maintaining animal habitat connectivity. Additional measures being implemented include installing fencing along major highways, draining salty ponds near highways that attract wildlife, wildlife detection systems to alert drivers to the presence of animals, and removing roadside brush to improve roadside visibility.

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