Culvert reline at Mount Orford National Park

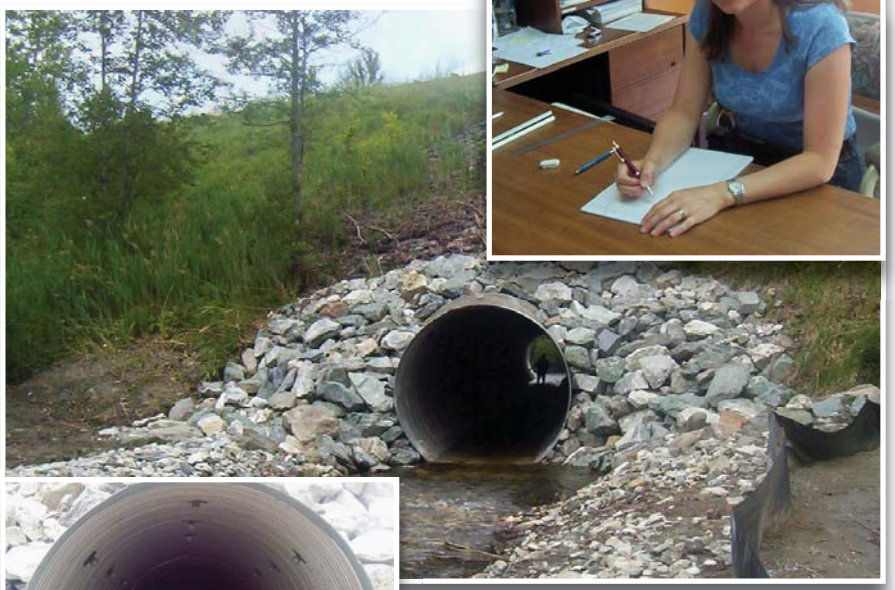
by David J. Penny

The innovation and ingenuity that is exhibited by some of Québec's highway and bridge engineers and contractors is as refreshing as the waters that tumble from the pristine parklands of Mount Orford National Park.

The stream under Ministry of Transportation (MTQ) Route 220 in Québec's Eastern Townships passes through a large culvert. The culvert that had already been extended once was now approaching the end of its design service life. It needed to be replaced or rehabilitated. With eight metres of fill over the existing culvert and an environmentally astute and involved local community, non-obtrusive rehabilitation was the most obvious choice.

A major challenge that MTQ designers faced was maintaining sufficient end area in the new liner to carry the mountain runoff. The original culvert with 5.7 metre span by 3.3 metre rise was 41 metres long and situated under the highest cover. It had been extended on both ends at some point in time with 8 and 9 metre lengths of 2970 mm diameter round pipe. It was calculated that a corrugated steel pipe (CSP) with a 2800 mm inside diameter, a length of 58 metres and 125 x 25 mm corrugations could be slipped inside, carry the flow and maintain barrel velocities that the natural fish population could navigate.

Dany Lambert



Challenges of eight metres of cover and a flowing stream. Inlet end of completed reline.

2800 mm diameter corrugated steel pipe liner in place showing capped grout fittings.

Madame Dany Lambert, owner and engineer of the highway and bridge contractor, Lambert & Grenier Inc., met with representatives of CSPI to discuss the project. Relining construction methods, tips and challenges that have been learned from many years of experience were reviewed. Like so many relining projects it became clear that this one had unique challenges that would require creative new solutions from the contractor.

The relatively large "inner chamber" would require large amounts of grout to fill the void between the host pipe and liner pipe. This introduced challenges for grout delivery as well as increased risks for excessive pressure, floatation, liner shifting and venting. The small entrance and exit portals were only 70 mm larger than the new liner pipe. This left little room for error and the inverts of the two host pipes were not fully aligned with one another. To add excitement, the fast-flowing stream could not be stopped or diverted. Generally operations would be carried out in wet conditions with the risk of flooding from mountain storms always a factor.

The pipe insertion took 18 hours and the grouting was completed a little faster than planned in just three days, in advance of an approaching summer rainstorm. The project was completed in 20 days.

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