



A tale of two

MANHOLE FIXES

Failing manholes in Edmonton and tiny Yukon community treated with Permacast and CentriPipe spray liners by AP/M Permaform

BY ANGUS W. STOCKING

Canadian contractors are cost-effectively rehabilitating failing manholes and sewers without excavation or barrel replacement using the Permacast and CentriPipe systems developed by AP/M Permaform (AP/M) and distributed by Martech, Inc. Edmonton-based OSCO Mudjacking & Shotcreting Ltd. applied Permacast on two manhole projects with widely varying challenges:

- A new 9-metre manhole installed as part of Edmonton's massive project converting the QE II Highway and 41 Avenue SW connection to a grade-separated interchange.
- Six failing manholes in remote Carmacks, a Yukon village.

Innovation in a tricky situation

To withstand increased loads from a new overpass being constructed as part

of the interchange project, a 145-metre section of existing 54-inch concrete sewer line had to be structurally rehabilitated. To facilitate this work, a new 9-metre (29.5-foot) manhole was installed to provide access at the section's midpoint.

The sewer was in reasonably good shape, but displayed microbiologically-induced corrosion (MIC) in the top half, where concrete was exposed to hydrogen sulphide produced by thiobacillus bacteria. OSCO used CentriPipe to create a new concrete pipe within the existing damaged pipe. After dewatering, the CentriPipe spincaster was inserted into the pipe through the newly installed manhole, pushed to end points within the pipe, and withdrawn while pumping an engineered fine aggregate concrete to the spincaster. The material used was AP/M Permaform's PL-8,000, mixed with ConmicShield, a concrete additive that inhibits microbial activity. Concrete treated with ConmicShield has been used for decades, and

permanently prevents MIC.

PL-8,000 is a fibre-reinforced cementitious mortar that adheres tightly to existing substrates – in this case, the original concrete sewer – so that no annular space is created for exterior water flow. In effect, a new smooth, structurally sound and waterproof concrete pipe is created within the old pipe. The fibre-reinforcement and other factors allow the use of thin layers, so sewer flow volume is only minimally affected. The compact spincaster enables cost-effective use of this solution in situations where other technologies, such as CIPP, are unworkable.

The installed manhole was a new concrete ring structure that didn't need rehabilitation. On the other hand, it is a large sewer installation that will remain important for access to a sensitive area, so the lead contractor asked OSCO to structurally reline this deep manhole to preserve it indefinitely.

For manhole rehabilitation, OSCO

employs the Permacast bi-directional spincaster, lowering it into the manhole and withdrawing it vertically. AP/M's MS-10,000 is used for manhole lining, also mixed with ConmicShield. "Using ConmicShield is a very good idea in any sanitary sewer, where organic material and turbulence lead to microbial damage," says OSCO owner Don Moroz. "It's a 'best practice', and we recommend it to greatly extend the lifespan of concrete sewer structures."

Surprisingly, the depth of the manhole was not really an issue. "Nine metres is unusually deep in this network," Moroz concedes. "But it's well within the capacities of the Permacast system. We set up over the manhole, lowered in the spincaster, and withdrew it while spraying on MS-10,000. Sewer flow was not affected at all." Two passes were required to build up an inch of thickness. As with the sewer rehabilitation, the process casts a new, joint-free pipe within the original manhole, and manhole diameter is not significantly reduced.

In addition to low cost and minimal disruption, another advantage of the spincasting solutions is speed; all told, OSCO spent just three days on site rebuilding 145 metres of sewer pipe and 9 metres of manhole chimney.

Remote location, difficult conditions

Carmacks, Yukon, is in some ways the opposite of Edmonton; it's remote, has a population of just 503 and its infrastructure is relatively undeveloped. "Basically, the sewer system is the only infrastructure – even water is trucked in," says Darrell Peters, project facilitator at Yukon Engineering Services, Inc.

As part of a review funded by the Yukon government, Peters identified six manhole barrels that were leaking badly and overwhelming the community's small wastewater treatment plant. "The system is near a big river, and main sewer lines are actually in the water table," Peters explains. "The manhole barrels were just part of the project, but they were a main source of infiltration. I could see water pouring in like a garden hose, and I had to dewater just to get a good look at the situation."

At the time, Peters installed plugs to temporarily fix poorly installed seals and cracked barrels. For a permanent solution, he decided to try Permacast, as offered by OSCO. "I thought it could work here at a relatively low cost, and would be a good choice given the remoteness of the location; the nearest source of supplies is White Horse, about 200 kilometres away."

For OSCO, the main challenge was weather; at time of rehabilitation, nighttime temperatures were -15 degrees C, with daytime temperatures climbing all the way up to 5 degrees C. Herman Nelson heaters were brought on site and connected to 12-inch hoses that brought manhole barrels up to workable temperatures. OSCO also had to contend with insulated frost lids, a unique feature of Yukon manholes used to prevent sewer freezing in winter.

Aside from those challenges, rehabilitation was routine. MS-10,000 mixed with ConmicShield was again used, and all six barrels, about 3 metres deep, were repaired in just two days.

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DON MOROZ, OWNER, OSCO

Peters considers the project a success, and says he is likely to use Permacast again. Given the extreme range of challenges successfully met by these two early projects, it's likely that the complimentary systems will be used routinely throughout Canada.

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