"Shaw Pipe also supplied this four section precast pedestrian bridge and railing, complete with precast curb and architectural veneer finish for the project. The 4300 span x 3600 rise structure serves two purposes. First, it allows pedestrians and maintenance vehicle access to the north side of the lake. Secondly, it permits the 1500mm trunk sewer to cross underneath the natural stream bed."




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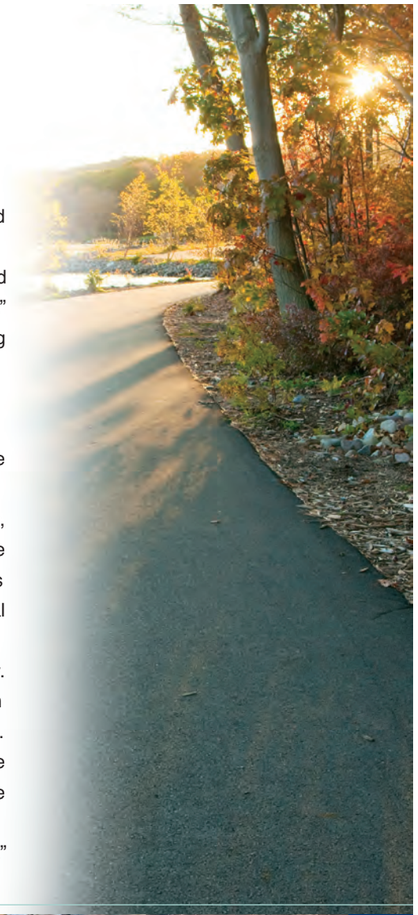
North Dartmouth

Trunk Sewer Phase Two

By Melanie Furlong, Special Features Writer

The finishing touches of the North Dartmouth Trunk Sewer Phase Two project were completed this June when 1600 shrubs and approximately 100 trees were planted along Lake Banook's new waterfront trail. The walking trail winds along half a kilometre of lake shore above the pipeline below. Phase two of the North Dartmouth Trunk Sewer handles wastewater from the new Dartmouth Crossing development and closes a gap that has existed since the 1960s when the trunk sewer was first built. "We had to either build a bigger pumping station or finish this trunk sewer along the shore," says Glenn Woodford, project manager for Terrain Group, the project's design engineers. "The city also wanted to have more walking trails around the lake and it offered us the ability to put the two projects together."

Although the original design report recommended high-density polyethylene (HDPE) pipe be used in the project, Woodford says they had concerns about its lightness and buoyancy among other things. "Because it's so close to the lake, it would float up and we'd have to have a complicated tie-down system," says Woodford. "We also worried about using it in cold temperatures and the difficulty in bending it to follow the shoreline as well as installing it in a wide, open trench." It was decided to use a specially designed concrete pipe, supplied from Shaw Pipe. "The water tightness of the trunk sewer was a major focus, we could not afford any chance of leaks in the pipeline" says Woodford. "The trunk sewer is in very close proximity to the large recreational lake, as well as the desire to eliminate unnecessary expenses of treating storm water. We put three different layers of protection on the pipe to eliminate any chance for leakage. We did a waterproof membrane on the outside of the pipe, added an admixture to the concrete to make it more impermeable and added a cement coating on the inside of the pipe, too."



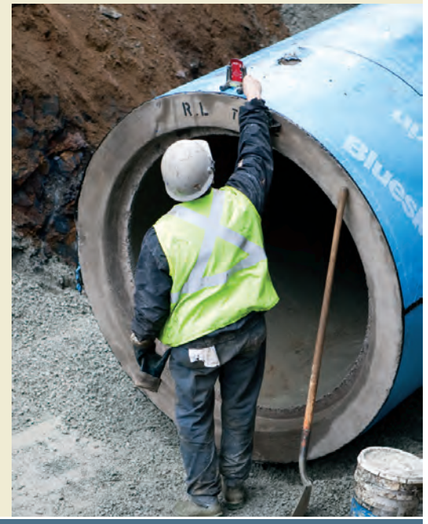
North Dartmouth
Trunk Sewer Phase Two

Rylan MacDow, sales manager for Shaw Pipe, says “a very complicated pipe design was required to meet the project requirements, including the manufacturing of the radius pipe, the additional weight requirements to eliminate buoyancy factors, and the special coating and admixtures, all contributed to a very special pipe.

The pipeline changes direction more than 10 times over a total length of more than 500 metres by using radius pipe sections and only one manhole in a serpentine pipeline installation. Custom pallet and headers were manufactured so that the 208 radius sections could be manufactured to meet the alignments required. Each pipe section was a specially manufactured “radius pipe section”. Each pipe was manufactured with a 125mm variance at the header, resulting in a 40 degree deflection at the spigot so that it could be installed on a curve and not compromise the integrity of the watertight O-Ring pipe gasket.

Consideration was also given to making the pipe heavier in some way so as to eliminate any possibility of buoyancy due to the high water table and close proximity to the lake. The wall thickness of the pipe was increased from a standard thickness of 140mm to 230mm in order to achieve the required 6260 kilograms per pipe section. By making the pipe substantially heavier, the project would not require expensive tie downs or anchor blocks to prevent the pipe from floating, as would have been the case with the HDPE pipe.

As mentioned, the imperviousness of the trunk sewer was of utmost importance, so three additional waterproofing processes were incorporated into the pipe design. First, a Xypex admixture was introduced into the mix. This Xypex admix was blended into the concrete mix at the time of batching to waterproof and protect the concrete from the start. Introducing it at the mixing station ensured that it became a truly integral part of the concrete matrix. The Xypex Admix C-500 consisted of portland cement, very fine treated silica sand and various active, proprietary chemicals. These active chemicals are designed to react with the moisture in fresh concrete and with the by-products of cement hydration to cause a catalytic reaction which generates a non-soluble crystalline formation throughout the pores and capillary tracts of the concrete. Thus the concrete becomes permanently sealed against the penetration of water or liquids from any direction. The concrete is also protected from deterioration due to harsh environmental conditions.



“ Steve Hogan, project manager for Dexter Construction, the project contractors, says pumping Lake Banook to lower the water level by two metres was the most challenging part of the job since it had to be done in the winter. ”

The next step was the application of Cem-Kote Flex ST to the inside of the pipe. Cem-Kote is a highly flexible, fibre-reinforced, breathable, cementitious slurry material. It was rolled on to the inside of every single pipe to a thickness of 63mm before delivery to the site. The Cem-Kote application was applied to provide for absolute positive and negative waterproofing of the concrete pipeline. The third and final waterproofing step in the manufacturing process that also took place before delivery was that a Bakor Blue Skin waterproofing membrane was applied to the exterior of every pipe section at the plant of manufacture. All of the steps above were done in a controlled plant environment, which was especially important as much of this pipe would be installed during the winter.

Steve Hogan, project manager for Dexter Construction, the project contractors, says pumping Lake Banook to lower the water level by two metres was the most challenging part of the job since it had to be done in the winter. “We used four 12-inch and two 10-inch diesel pumps to pump the water into Sullivan's Pond where there's a sluice way that runs from there into the harbour,” says Hogan. “We had to lower the water level to install the sewer pipe and we also performed the work at that time for the World Championship canoe course, including building some new anchors for their lane wire system.” Dexter Construction had to stop lowering the lake's water level by Christmas Eve so the lake would be at its natural level by this spring.

Phase Two of the Dartmouth North Trunk Sewer should last about 100 years and will soon connect to a regional trail going all the way to Shubie Park. The entire project was completed on schedule. The residents of Dartmouth can now enjoy their lake and trail system, and won’t have to give a second thought to the complicated pipeline just below their feet!