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Mastering Storm Water

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FOR MASTERING STORM WATER

CONSTRUCTION OF AN HDPE DETENTION SYSTEM UNDER THE SITE OF THE NEW DOWNTOWN CENTRE IN MONCTON.

A storage solution reducing the hydrological impacts of urbanization within the framework of the construction of a new multi-purpose centre.

As part of the Centre's new facilities in downtown Moncton, New Brunswick, the general contractor, Bird Construction, was to have a detention system built without groundwater replenishment (watertight) under the plaza of the complex, which was to open in the fall of 2018. This type of system allows for the temporary detention of large amounts of water to minimize the discharge in municipal storm sewer networks during heavy rain events, prior to discharge to an outlet. It was the advantages of the detention system using unperforated Solflo Max pipe that convinced Darryl Bonhower, an engineer with the City of Moncton, to rely on Soleno's polyethylene products and expertise.

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THE CONTEXT

The multi-purpose sports and entertainment centre in downtown Moncton, a \$104-million infrastructure investment project that has been hoped for during the past decade, finally became a reality. Construction began in the fall of 2016. Several surface features such as an outdoor skating rink, a permanent stage, a kiosk and a patio that can accommodate several seats are also planned on the plaza of the complex.

In order to restrict the flow of storm water leaving private property and hence to avoid overloading the storm sewers, the City of Moncton has adopted a by-law on the sound management of storm water. These regulations require that post-construction storm water volumes remain equal to what was originally the case. To meet regulatory requirements, proposed solutions usually include the construction of an open-air or underground detention system. Originally, two open-air basins were considered, but this type of structure requires a large footprint, while the space allocated was already limited and planned for other surface developments. In addition, due to past industrial land use and the high water table at that location, the installation of a watertight detention system was an important criterion in the selection of the solution.

THE SOLUTION

Bonhower therefore opted for an underground watertight detention system, composed of Solflo Max HDPE pipes with bells with integrated O-ring gaskets. In the spring of 2017, the sub-contractor, Carter Excavating Ltd. installed over 1,450 linear metres of 1,200-mm (48 in) diameter pipe in a trench 38 m (124 ft) wide by 3.85 m (12.6 ft) deep. This system, divided into 18 rows 80.6 m (264 ft) long, will store 1,600 m³ (56,503 ft³) of water for heavy rain events. More than 40 custom-made fittings and accessories were used to construct this system in a mere 8 weeks. It includes four access chimneys attached to the pipe for inspection and maintenance, two of which will be used solely for the complex, and a third will serve the plaza. A geotextile was installed over the entire excavated surface to form an envelope around the system and its fill composed of crushed stones.

THE INSTALLATION

Spread over 8 weeks, the installation of this detention system with Solflo Max pipe was a first for the contractors responsible for the project and for Bonhower, the City of Moncton engineer. Owing to the geotechnical characteristics of the soil and the planned developments on the pond surface, several additional precautions were taken throughout the construction of this system. In order to validate the load-bearing capacity of the soil intended to accommodate a detention system filled with water on which surface installations are installed, tests were carried out on the soil of the excavated and prepared trench before the installation began. These tests were then carried out throughout the installation, during the backfilling and compaction stages, in order to validate and confirm the adequate load-bearing capacity of this soil.

Usually, hydrostatic tests are also carried out to validate the watertightness of the installation. In this case, since the benefits associated with this test were less than the cost of the volume of drinking water that the test required for this 1,600 m³ (56,503 ft³) detention system, no test was performed. In return,



THE INSTALLATION (CONT'D)

a thorough inspection of each of the O-ring bells connecting the Solflo Max lines was carried out. Thanks to the proper installation of the pipes and the lack of ovalization of the pipes during installation and backfilling, it was assumed that the watertightness of the system was successful.

THE BENEFITS

According to Bonhower, the selection of the Solflo Max pipe detention system was based solely on watertightness. To ensure that the system is perfectly sealed, the manufacturer installed bells with O-rings on the male end of the 1,200-mm (48 in.) diameter Solflo Max pipe used for this project.

Furthermore, in order to meet the watertightness criteria required for this project, the number of joints had to be reduced to a minimum. To meet these requirements, two standard Solflo Max pipes, 3.3 m (10.8 ft) long for this diameter, were welded together at our McAdam plant to produce watertight pipes 6.4 m (21.6 ft) in length. *“HDPE pipes have the advantage that they can be welded together to obtain watertight lengths and thus reduce the number of joints to a minimum when project constraints require it. This same project built out of concrete would have required about 2.3 times more joints, increasing the risk of possible leaks”* explains Philippe Losier, engineer at Soleno.

Renowned for their durability, light weight and ease of handling and installation, Solflo Max pipes represent significant savings in time, labour and heavy equipment. Moreover, HDPE is resistant to corrosion, abrasion, de-icing salts and vibration, ensuring the sustainability of infrastructure. The use of a high-density polyethylene (HDPE) detention system, a light, high-performance and durable material, allows the City of Moncton to ensure the durability of the infrastructure and perfect watertightness.

Mr. Bonhower also highlighted the involvement of the Soleno team in this project: *“The engineer Philippe Losier, along with Robert Burt, engineer and plant manager at the McAdam plant, provided a constant presence and remarkable support during the design phase and throughout the installation.”*

From the design stage, the diameter of the pipes is specifically adapted to the soil and its characteristics, making it possible to design a tailor-made underground detention system that complies with the ground topography. The use of an underground detention system thus ensures the full potential of development, making it possible to satisfy the requirements of planned developments on the surface. Compared to an open-air basin, the underground detention system is safe and requires little maintenance. Access chimneys installed in the pipes facilitate inspection and maintenance, an important criterion for the City of Moncton.



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