

STACKING THE ODDS

Storm water chambers enable retail development in Toronto

By Dirk Fischbach

Engineers from Terrafix Geosynthetics needed a high-strength, high-volume underground storm water management system to support construction of a 600,000-sq-ft retail center in Toronto. The Stockyards development will be home to a host of premier retailers, serving more than 186,000 residents in the primary trade area and 447,000 within 5 km when it opens in the fall of 2013.

Along with handling and storing site runoff efficiently, the system also needed to protect municipal storm sewers.

The project demanded a small storm water footprint with enough capacity to store the runoff from the shopping area and parking lots. Additionally, a system flexible enough to work with the existing site infrastructure, including a storage tank and large-diameter

underground pipe, was needed.

An added challenge was posed by the fact that the system would need to be strong enough to be buried 24 ft below a surface loading dock.

Selection and Solution

Consultation between Triton Stormwater Solutions' engineering staff and Terrafix Geosynthetics led to the selection of the double-stack configuration. Triton's underground chambers are independently tested and approved for such a stacked configuration, allowing engineers to dramatically increase the amount of storage without expanding the project site. In the case of the Stockyards project, the small-footprint system was able to achieve 22,000 cu meters of storage in just a 20-by-70-meter area.

The system's flexibility also was critical to the project's success. The challenge presented by the large-diameter inlet pipe was turned into an advantage—project engineers used the pipe as a preliminary main header row. Water was gathered in the large pipe and then fed to smaller main header rows ahead of each distribution row.

By doing this, not only were initial project costs contained within budget, but the innovative system design also will save money down the road. Because the Triton main header row design could be used, the advantages it offers were preserved. Storm water sediments will be able to settle out on the specially designed main header row floor for easy removal through integral maintenance ports, protecting the distribution rows from debris buildup and the resultant



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sediment clogs that cause drainage problems—and added expense.

The project also featured a special oil separator as part of the inflow, allowing the system to be used to remove hydrocarbons from the incoming storm water. This will help protect downstream water quality without costly post-storage mitigation. The ability of the system to work with a wide range of pre-treatment devices makes it a good choice for areas with strict water quality regulations or specific environmental concerns.

The Installation

After initial site preparation, the double stack of nearly 2,000 chambers was placed in a day and a half by a crew from Topsite Contracting Ltd. A PVC non-molded liner and non-woven geotext fabric, along with layers of 2-in. crushed stone, were used to support the storage and drainage at the site.

The combination of the chambers and the impervious fabric layer served as a low-cost alternative to the originally proposed concrete holding reservoir. Water will be held instead in the storage area and pumped out intermittently to maintain the desired outflow from the site and to protect the city's storm sewers.

"The Triton system was a cost-effective solution," said Rob Hughes of TerraFix. "The chambers were extremely lightweight and could be set in place by hand, without any mechanical assistance. The installation was easy and ran smoothly."

Because of the chambers' strength, the crushed stone could be quickly spread with rock-slinger trucks, reducing the time needed for this phase of the installation by nearly half.

"Working with the Triton chambers and staff was a good experience," Hughes said. "Everything stayed on schedule, and that kept the client happy." **[SWS]**

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