

application **Subgrade Stabilization**
 location **Markham, Ontario, Canada**
 product **Geolon® HP 370 and BasXgrid® 12**

THE CHALLENGE

As part of, its ongoing commitment to meet the growing need for electrical supply in the Greater Toronto Area, (GTA) Hydro One, Ontario's electricity distributor acquired a 170 acre (69 ha) parcel of land from the Town of Markham to construct a new electricity transmission facility. The \$170 million project involves the construction of a new 4.0 mile (6.5 km) transmission line and the Parkway Transformer Station. The Parkway TS will include two 500/230 kV autotransformers along with 500 kV and 230kV switching facilities.

In early 2004, Hydro One tendered the site development portion of the project with B. Gottardo Ltd. being the low bidder. Upon start of the project in April 2004, B. Gottardo, who had planned to use earth scrapers to remove the 400,000 yd³ (300,000 m³) of overburden, found the site conditions to be significantly different from what they had anticipated. The native soil, a sandy silt material had become fully saturated due to the unseasonably wet winter and spring. At normal moisture content this would have been a straight forward earthworks project. However with such a high moisture content, the silty sand material turned into quicksand when disturbed. This meant that the project would have to be completed using excavators and off-road dump trucks, if the project was to be completed on schedule.

THE DESIGN

Hydro One's design engineers turned to Mirafi® Construction Products for a geosynthetic solution. The geosynthetic solution needed to provide separation between the native soil and the 36 in (900 mm) of granular material that was to be

placed on top of the geosynthetic. The geosynthetic would also require a high modulus in order to carry the heavy wheel loads over the low strength soils. High permeability was also required in order to reduce pore water pressures in the subgrade soils.

Both biaxial geogrids and high strength geotextiles were considered. Although both would allow a reduction in the aggregate base thickness, it was determined that a geogrid would not provide separation and would require multiple lifts to provide the same strength as a high strength geotextile. Mirafi's® Geolon® HP 370 geotextile was chosen for its separation, strength and permeability characteristics. In the main driveway, where there would be a high concentration of heavy wheel loads a combination of HP370 and Mirafi® BasXgrid® 12 was used. The HP 370 was installed at the subgrade elevation with BasXgrid® placed within the top 12 in (300mm) of the granular base material. Reinforcement and separation would be provided by the HP 370 while confinement of the upper aggregate zone would be provided by the BasXgrid®

CONSTRUCTION

To enable excavation to proceed, a series of roads were built in a grid pattern throughout the site to provide access for the off-road trucks. Back hoes worked within this grid system removing the overlying soil. As each quadrant, was excavated HP 370 was installed with a 36 in (900 mm) overlap. The specified depth of granular was then placed and compacted. This was done throughout the entire site. In total, 66

acres (27 ha) were covered with the HP 370 and granular fill.

PERFORMANCE

The HP 370 enabled the contractor to complete the site development portion of the contract on time and as designed. Since its completion, the TS station granular pad has been subject to heavy crane loads and construction traffic while providing a stable working platform. The Parkway Transformer Station is due to come on line in early 2006.

Job Owner: Hydro One

Engineer: Hydro One

Contractor: B. Gottardo Ltd.

Distributor: Armtec Ltd.

