Colonel Danforth Trail Project

A section of Toronto, Canada's scenic Colonel Danforth Park recently underwent a major slope restoration project after a large section of an adjoining 1.5h:lv slope failed. The slope had eroded to the asphalt edge of a neighborhood road (Colonel Danforth Trail) situated at the slope's crest, making it dangerous for vehicles to travel on the road. Quick action had to be taken if the road were to remain passable.

Ensuring the permanent stability of the slope was the critical factor in engineering the solution. Return repair trips to the site would be expensive and laborious, since access to the slope for large equipment was difficult. Although secondary, minimizing impact to the environment was also a consideration as the site is part of a scenic park setting. Once restored, the slope would need to withstand continual erosive forces, as well as blend in naturally with the surrounding area.

The job was further complicated by the reinforced slope's hard granular composition. The slope, by itself, would not be able to sustain the vegetation needed to blend in with the rest of the park, and the slope's steep face prevented topsoil from simply being distributed down the slope.

The solution to these concerns was a geosynthetic-reinforced steepened slope with a cellular confinement system surface protection. Presto Products' perforated cellular confinement system was chosen to provide the slope cover. The system's proven in-ground performance on other critical structures and seam strength, supported by an IS0 9002 quality certification, satisfied all design criteria. The perforated system is an expandable honeycomb-like structure designed to confine and control downslope movement of infill materials. The pattern of perforations increases root lock-up with vegetated systems, and allows the cell-to-cell passage of water and soil-organisms for a healthy soil environment.

"It has been used throughout Ontario on similar steep slope projects with great success," explains Mike Walsh of AGS Canada, Presto's Canadian distributor. "In fact, it has been used on slopes as steep as lh:1v with positive results."

The 150 mm (6 in.) of topsoil required to grow vegetation on the 1.5h:1v reinforced granular slope creates high down-slope forces. Historically, J-pin anchors (straight pins with a hook at one end) would be used to anchor the system to the slope face. The large quantity of anchors required and the potential difficulties of driving the anchors in the densely compacted granular material made this approach impractical.

InterSol Engineering, Presto's Consulting Engineer, recommended Presto's new ATRA™ Clip system to Geo Canada, the project's Consulting Engineer, in place of J-pins to provide an efficient, stable means of anchoring the sections on the slope. The high-strength polyethylene Clip, inserted on the end of each 15 mm x 800 mm (5/8 in x 31 in) rebar forms an ATRA™ Anchor. When the anchor is driven into the ground, the Clip arm attaches over the cell wall holding the section securely in place.

"These Clips were ideal for this installation," comments Mike Walsh. "Given the steepness of the slope and its hard granular make up, installing J-pins would have been very labor intensive. The in-line driving surface of the Anchors allowed the use of pneumatic hammers, as well as the potential savings in material and labor costs normally required to custom bend the 3,200-plus stakes needed for the project."

The slope was nearly two-thirds complete before the contractor started installing the Geoweb system. The sections were expanded down the slope and adjacent sections connected with a pneumatic stapler. Once all sections were connected, the Anchors were installed at the design density. Topsoil was then placed from the top of the slope with a track excavator at the excavator's maximum reach and allowed to descend down the slope.

"The cells filled on their own, each cell acting as a check dam collecting the falling topsoil," explained Andrew Lister, InterSol Engineering. Once filled, the contractor dragged a steel drive track over the filled sections to help compact the topsoil in the cells. The slope was initially seeded with the specified seed mixture and will receive final seeding this Spring. The total area of the 1.5h:lv reinforced slope measured 1760 m2 (19,000 sf); approximately 32m x 55m (105 ft x 180 ft) and was completed in November of 1997.

The perforated slope protection system will provide this steep slope and vegetation with the long term stability to sustain itself and resist erosion in this harsh environment. **L&W**

For more information, contact Andrew Lister, Presto Products Company, (905)875-4533.