

# Downslope Remedy

Drainage conveyance and erosion control system saves a Canadian highway slope

By Michael J. Livermore

Along the western side of the St. Lawrence River in Quebec, Ontario, Canada, runs one of the oldest major highways—Échangeur Rte. 138. On a recent construction project, the Ministry of Transportation for the province of Quebec required a drainage system to convey water down one of its slopes, which was unstable. At the top of the plateau's slope, a subdivision created

storm water runoff that, over time, was causing severe erosion.

The project engineer for the Ministry, Frédéric Pellerin, worked with consulting engineer firm Génivar to research many ways to stabilize the slope. They determined that the best method was to use multiple products to form a drainage conveyance and erosion control system.

## Customized Conveyance

The key to stabilizing the 2:1 slope was to collect the water before the slope became fully saturated or sheet flows reached a critical velocity, causing scouring of the hillside. The engineer's design stabilized the top apex of the slope with vegetation and geocomposite membranes.

In conjunction with the membranes, a 24-in. trapezoidal SmartDitch system was installed laterally along the slope. The high-density polyethylene (HDPE) channel/ditch-lining system collects water from the subdivision as it flows over the edge of the hill and down the slope. Two runs were benched on the slope—one approximately one-third of the way down the slope and the other about two-thirds of the way down. The top run collects the water and conveys it to sections of a 24-in. semicircular SmartDitch that acts as a downchute.

For this project, the manufacturer developed a new fitting to transition from the trapezoidal to the semicircular sections. In addition to the transition, the semicircular sections were installed on saddles to allow them to cross over large boulders on the slope's surface.

To prevent lateral-flow erosion along the sides of the conveyance systems' sections, local supplier Innovex developed a way to weld the geocomposite membranes to the top shoulder of the trapezoidal sections. Utilizing this product-combination approach provided a stable method for transitioning the water flow from the slope and into the rip-rap-lined ditches at the bottom of the hill along the highway.



*A subdivision at the top of a roadside slope in Quebec generated erosive storm water runoff, requiring the province's Ministry of Transportation to implement a drainage solution.*

An HDPE channel/ditch-lining system conveyed runoff downslope, eliminating excess soil saturation.



## Selection & Installation

The HDPE channel/ditch-lining system was chosen by the consultant and approved by the Ministry of Transportation because it:

- Allowed storm water runoff to be conveyed down the slope in a controlled manner without erosion occurring;
- Eliminated excess soil saturation that could cause a mudslide; and
- Could be used in conjunction with geotextile products, thus providing not only drainage but also the opportunity for vegetation establishment.

The contractor liked using the system on the job site because its sections proved to be lightweight and easy to move around on the slope. The installation required smaller equipment and fewer men than more conventional methods, and the work was completed quickly, efficiently and profitably. **SWS**

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