By Pat Stelter

Kressview Springs Puts Condominiums on a Firmer Footing

Unstable soils, steep embankments, limited right-of-way and site access, and other adverse site conditions can make design and construction decisions difficult and the outcome costly. The developer of a condominium project was faced with unique construction challenges during construction in the winter of 1989.

Situated on the side of a relatively steep river valley, the Kressview Springs project site in Cambridge, ON, required constructing a 260-m- (850-ft.-) long driveway embankment rising from grade level at the site entrance to a maximum height of 11 m (36 ft.) near the condominium building. Peat deposits up to 2.5 m (8 ft.) in depth under a 30-m (100-ft.) section of the proposed site created an unstable area. Removal of the peat and replacement with good-quality foundation materials would have added significantly to construction costs and caused destruction of several large willow trees along the streambank.

Any system chosen for stabilizing the driveway embankment would be required to conform to the steep, contoured landscape; tolerate differential settlements as great as 600 mm (2 ft.); and support heavy vehicles during construction. A vegetated fascia was desired in order to blend naturally with the surroundings. Presto's Geoweb cellular confinement system was selected to meet all these restrictive construction requirements.

The Geoweb cellular confinement system successfully used at the Kressview Springs condominium project.

The Solution

The three-dimensional, honeycomblike product is manufactured from polyethylene material resistant to penetration by chemicals and water. The material eliminates any potential for cracking, spoiling, or corrosion that typically affects concrete, steel, and timber-based earth-retention systems. Incorporation of integral, high-strength polymeric tendons provides additional anchoring on embankments and steeper slopes or when a geomembrane underlay or naturally hard soil/rock surface prevents anchoring with stakes. Perforated cell walls provide infill/cell lockup and lateral drainage through the system, thereby enhancing performance of the system in saturated conditions. Additionally, colored fascia panels allow the material to blend with the environment.

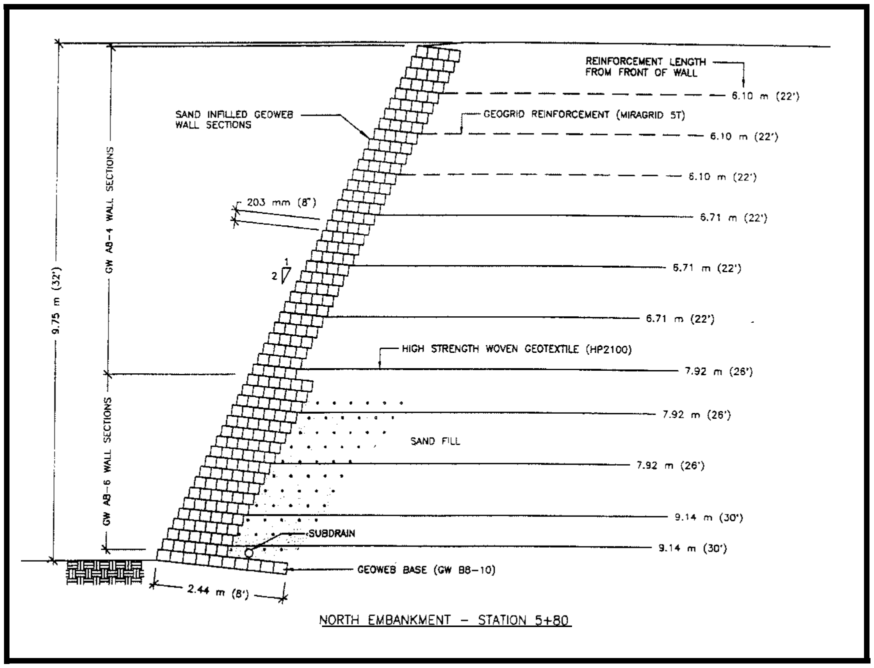
Construction

Construction of the embankment was divided into different sections based on varying construction requirements. The Geoweb system was chosen to provide the fascia of the north embankment's steepened slope, as well as the south embankment's earth-retention structure and construction access road. The system confines noncohesive infill material, creating a stable composite and allowing the infill to reach its full compressive strength with little strain. It also supports vegetation by allowing topsoil to be placed within the outside face cells.

The embankment site was prepared by excavating and proof-rolling the existing subgrade. The fascia was set on a 2.4-m-wide Geoweb spreadfooting. This footing was seated on a geotextile encapsulated stone bedding to provide drainage. Each specially sized 203-mm- (8-in.-) deep section was expanded, positioned in place, and infilled with sand to a level slightly above the top of the cell walls. The infill was then compacted with a double-drum vibrating roller.

Subsequent layers were stacked on top of the preceding layer with a minimum 25-mm (l-in.) setback until the wall height was

FIGURE 1.



achieved. At required design intervals, a polymeric geogrid or high-strength woven geotextile was sandwiched between the layers for soil reinforcement. The completed embankment totaled 238 m (780 ft.) in length and 11 m (36 ft.) in height, with a total wall surface of 1,400 face m². Wall face batter for the total structure varied from 2: 1 to as great as 8:l.

The earth-retention structure provides a very steep or vertical surface that minimizes erosion and is structurally stable under its self-weight and known externally imposed loads. The near-vertical change in grade requires that earth materials be higher and steeper than their internal shear-strength properties will permit. Nearly eight years after construction, the system has performed as expected. **EC**

Pat Stelter *is with the Geosystems division of Presto Products in Appleton, WI.*