

Earth Retention System Stacks Up Against Construction Restrictions



The Geoweb system's steep embankment conforms to a contoured landscape and space constraints, allowing the preservation of several willow trees.

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 the Kressview Springs condominium project in Cambridge, Ontario, Canada was faced with a series of these unique construction challenges during construction in the Winter of 1989.

Situated on the side of a relatively steep river valley, the project required constructing a 260 m long driveway embankment rising from grade level at the site entrance to a maximum height of 11 m near the condominium building. Peat deposits up to 2.5 m in depth under a 30 m section of the proposed site created an unstable area. Removal of the peat and replacing it with good quality foundation materials would have added to construction costs and caused

destruction of several large willow trees along the stream bank.

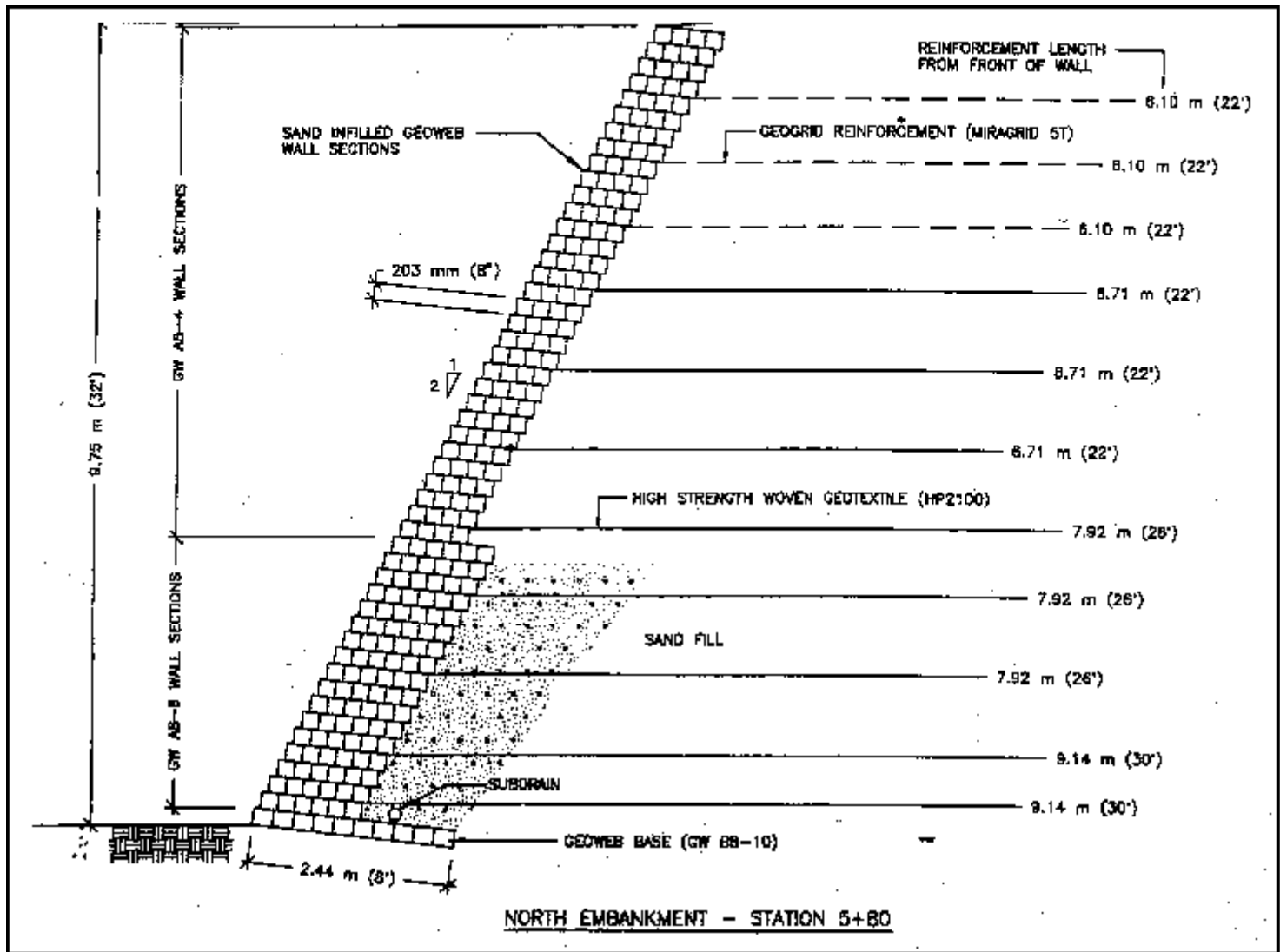
Therefore, any system chosen for stabilizing the driveway embankment would be required to conform to the steep, contoured landscape, tolerate differential settlements as great as 600 mm, and support heavy vehicles during construction. A vegetated facia was desired in order to blend naturally with the surroundings. Presto's GEOWEB® cellular confinement system successfully met all of these restrictive construction requirements.

The Geoweb system is manufactured from polyethylene material that is resistant to penetration by chemicals and water. The material eliminates any potential for cracking, spalling, or corrosion that typically affects concrete, steel and timber-based systems.

Construction of the embankment was

divided into different sections based on varying construction requirements. The Geoweb system was chosen to provide the facia of the north embankment's steepened slope, as well as the south embankment's earth retention structure and construction access road. Constructed of polyethylene, the three-dimensional honeycomb-like structure confines non-cohesive infill material, creating a stable composite. The Geoweb-soil composite allows the infill to reach its full compressive strength with little strain. Results are an effective earth retention system. The Geoweb system 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 facia was set on a 2.4 m wide Geoweb spreadfooting. This footing was seated on a geotextile encapsulated stone



A cross section diagram of the Geoweb system.

bedding to provide drainage. Each specially sized 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 of the system were stacked on top of the preceding layer with a minimum 2.5 mm set-back until the wall height was achieved. At required design intervals, a polymeric geogrid or high strength woven geotextile was sandwiched between the Geoweb layers for soil reinforcement. The completed Geoweb embankment totaled 238 m in length and 11 m in height, with a total wall surface of 1,400 face square meters. Wall face batter for the total structure varied from 1 h to as great as 8v:1h.

The Geoweb earth retention structure provides a very steep or vertical surface which 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.

Presto pioneered cellular confinement technology in cooperation with the Army Corps of Engineers in the late 1970s and has made many product enhancements since. These enhancements include incorporating integral, high-strength polymeric tendons to provide additional anchoring on embankments and steeper slopes, or when a geomembrane underlay or naturally hard soil/rock surface prevents anchoring with stakes. New perforated cell walls provide better infill/cell lockup and

lateral drainage through the system, thereby enhancing performance of the system in saturated conditions. Optional coloured facia panels allow better blending with the environment.

Nearly eight years after construction, the Geoweb earth retention system has performed as expected. With over 15 years of in-ground experience, the Geoweb system has proven its unique flexibility to withstand large differential settlements, provide load support to limited access areas, conform to a contoured landscape, and support natural vegetation while resisting erosion. Presto's qualified engineering team works closely with designers/engineers to ensure system longevity and performance in earth retention, load support, channel and slope protection applications.