

PRESTO



GEO SYSTEMS

The GEOWEB® Slope Protection System Permeable Stabilization for Embankments Case Study Summary 1

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Project photos courtesy Shannon & Wilson, Inc. and Transportation Resources, Inc.

CASE STUDY 1: Castle Rock, Washington October 2000

Project Scope:

Slope repair of a 60-100 foot embankment adjacent to a Burlington Northern Santa Fe Railroad and Amtrak passenger double rail line. Slope failure resulted from an accumulation of record rainfalls and saturated, embankment soils.

The Solution:

The perforated Geoweb® Slope Protection System with tendon anchoring and aggregate infill provided a permeable weather-proofing cover.

The Problem

After years of receiving record rainfall events and continuously saturated soils, severe surface slope failure occurred on a railroad embankment. All vegetation, including large trees, was part of a resulting mudslide that covered and blocked a critical section of track between Portland, Oregon and Seattle, Washington. An immediate repair was critical since track closure for any length of time would be very costly to the railroad.

The Permeable Solution

After considering all potential options, the railroad and engineering consultants, Shannon Wilson, chose the perforated Geoweb® slope protection system with tendon anchoring and aggregate infill to stabilize the slope surface. To facilitate slope drainage, a permeable system was required at this site.

The Installation

Property restrictions, limited site access, track proximity, slope length, and saturated soils with insufficient strength to support heavy equipment presented construction challenges.

A spider excavator was utilized to repair and finish-grade the slope face prior to placement of the nonwoven geotextile and Geoweb® materials. Eighty-foot mobile manlift units were employed so construction crews could staple tendoned Geoweb sections together and position and drive anchor stakes. Aggregate was placed in the sections using a concrete conveyor with a 100-foot boom.

The Results

Slope rehabilitation, including excavation, slope refacing, and geosynthetic material and infill placement was completed in 45 days. Property owners and railroad officials were very pleased with the newly secured slope.

CASE STUDY 2:

Washington Metropolitan Area Transit Authority (WMATA)
Southern Ave. Station, Washington, D.C., August 2000

Project Scope:

Implement a slope protection system that would 1) prevent the degradation of a slope that cannot be vegetated and 2) prevent groundwater replenishment and control surface discharge of groundwater.

The Solution:

The perforated Geoweb® system with aggregate infill placed over a geomembrane and a catch drain system at the toe of the slope provided the best solution.



The Problem

Constant ground water drainage from a low pH soil layer in a cut slope prevented the growth of vegetation on the lower two-thirds of the 2h:1v embankment at WMATA's Southern Avenue Station. Without the root lock-up of healthy vegetation in these areas, the ground water flow caused significant surface instability and erosion. A solution was sought that would stabilize the slope surface while allowing ground water to drain naturally plus limit groundwater replenishment of the underlying low pH soils.

The Permeable Solution

Presto's representative, Transportation Resources, Inc. and consultant, InterSol Engineering provided the preliminary design—a collaboration based on practical experience and sound engineering principles. The plan was to place the perforated Geoweb slope protection system with aggregate infill over a geomembrane liner to create the watershed.

The impervious liner, placed directly over the natural slope surface, created a barrier layer between the low pH soil and Geoweb layer, protecting the natural soils from direct infiltration of rainwater. Instead of welding the geomembrane seams, however, they were overlapped to allow a route for groundwater drainage.

The aggregate-infilled Geoweb system provided a stable slope cover that minimizes surface erosion and creates a permeable weatherproofing cover, allowing rain water to flow through the upper stabilized aggregate layer to a catch drain system. Watershed rates, area permeability, drainage system capacity, and proper aggregate size were carefully determined in order to avoid overcharging the drain system during a heavy rainfall event.

The Installation

Workers used harnesses and safety tether lines anchored at the crest of the slope to install the liner and Geoweb sections on the embankment. Glass-fiber ATRA® anchors, chosen for their corrosion-resistance, were used to secure the Geoweb sections. Holes created in the liner by these anchors allowed acceptable groundwater drainage to occur from underneath the slope protection system.



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The Results

The permeability of the aggregate-filled Geoweb system over a geomembrane created a cover that prevents surface erosion while creating a stable surface watershed. This solution provided resistance to heavy rainfall events, while allowing drainage of the embankment soils through the overlapped sections of the impermeable liner.