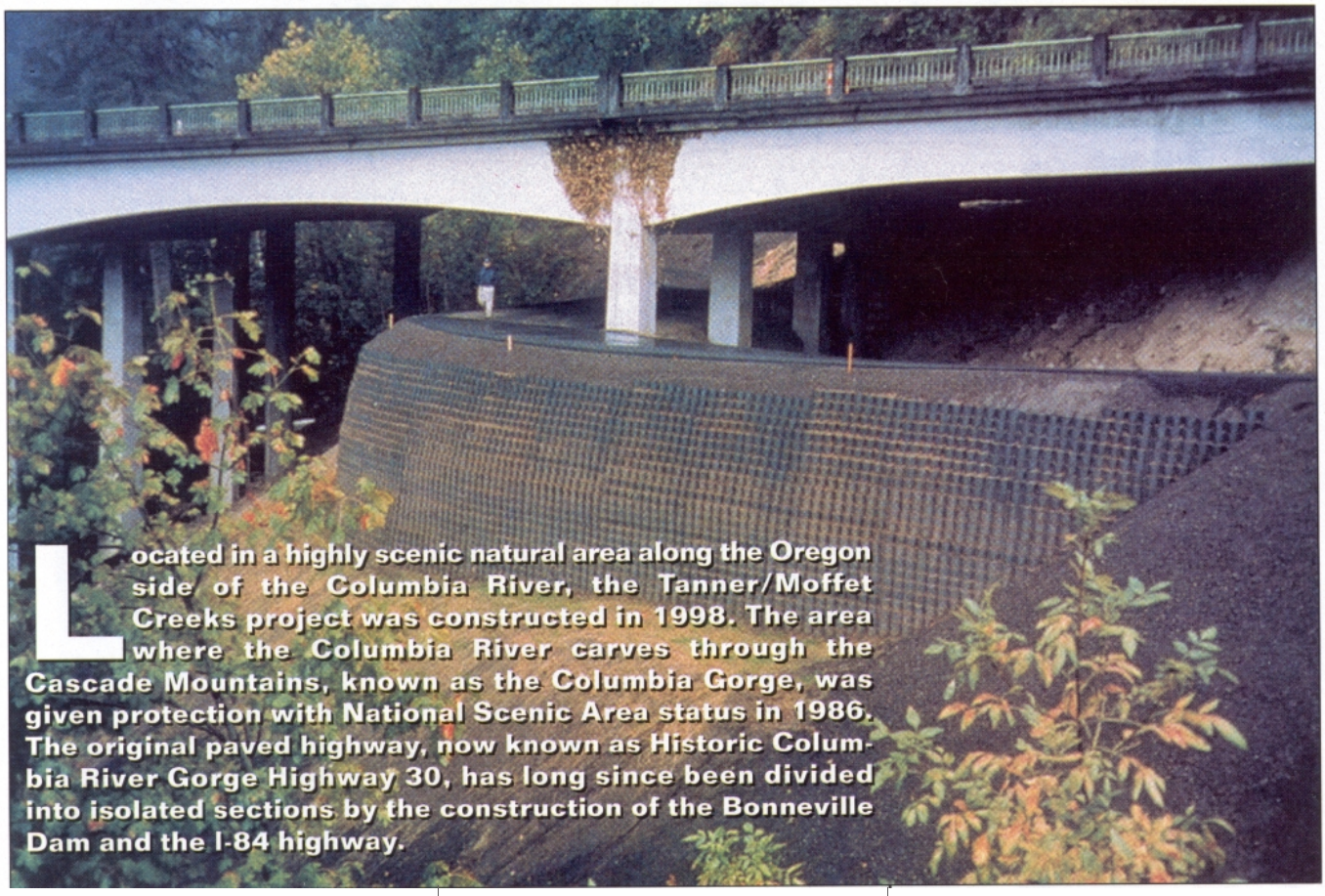
RETAINING WALLS SUPPORT

BIKE PATH in Scenic Area



Located in a highly scenic natural area along the Oregon side of the Columbia River, the Tanner/Moffet Creeks project was constructed in 1998. The area where the Columbia River carves through the Cascade Mountains, known as the Columbia Gorge, was given protection with National Scenic Area status in 1986. The original paved highway, now known as Historic Columbia River Gorge Highway 30, has long since been divided into isolated sections by the construction of the Bonneville Dam and the I-84 highway.

When a plan was proposed to connect two sections of Highway 30 by constructing one mile of highway from Tanner Creek to Moffet Creek, the Oregon Department of Transportation (ODOT) took on both the engineering design and public relations challenges in coordinating the involvement of multiple public agencies. The plan included a bike and pedestrian pathway that will eventually become part of a 100-mile trail extending from Portland to The Dalles. Since the scenic corridor encompasses forests, creeks, waterfalls, and shoreline visible from both the Washington and Oregon sides of the Columbia River, ODOT engineering design staff had to coordinate input from numerous agencies-Washington Department of Transportation, Federal Highway Administration, U.S. Forest Service, and local county and city governments - while addressing the environmental and aesthetic requirements of the Historic Columbia River Highway Advisory Committee (HCRHAC) and the Columbia Gorge Commission.

DESIGN CHALLENGES

One of the greatest challenges during this phase was the design of a series of switchbacks to gradually bring the bike path from highway level down to the level of the creek at the point where Tanner Creek passes under the bridge. The site provides a spectacular view of the river and the Cascades. Retaining wall structures were necessary to keep the newly steepened side slopes in place, and needed to be attractive and natural to fit the environment.

"This part of the Gorge is a extremely lush area, so a decision was made by the project team, an approved by the HCRHAC, to design a wall that could be vegetated with native vegetation," said Larry Bush, design engineer for ODOT.

The wall had to meet strict criteria for fitting in with local colors and supporting native species.

A geocell cellular confinement system with a vegetated fascia was selected. Final design was supplied by ODOT, and the geocell retaining walls were constructed as an FHWA Experimental Feature Project in recognition that this was the state's first experience with a geocomposite wall design of this nature.

GREEN WALL ACCEPTANCE

The project was subject to the regulatory review and approval of numerous public agencies. Their acceptance of this recently completed geocomposite earth retention project along the Columbia Gorge highlights an increasing trend toward application of fully vegetated repair and protection systems with cellular confinement systems.

Six wall structures were ultimately required, one over 16 ft high. All were constructed with high strength woven geotextile fabric for soil reinforcement and the Geoweb® earth retention system (Presto Products Company, Appleton, Wisconsin) as the fascia system. The Geoweb system was specified with textured, colored outer face panels in a natural green to harmonize with the surrounding landscape. The exposed outer cells form horizontal terraces where vegetation can flourish. The open-celled system captures rainwater and controls groundwater evaporation, creating a more natural environment for vegetation.

"This was a great environment in which to demonstrate some of the features of the system because project requirements included strict criteria for conforming to the planned topography of the winding trail and 'fitting in' with local colors and supporting growth of native plant species," said Samuel Randolph, geosystems manager for Soil Stabilization Products Company, Merced, California (SSPCo), the Presto distributor for the project.

CONSTRUCTION GLITCH SOLVED

ODOT discovered the existence of a substantial natural spring behind one of the walls after construction was completed. Soils were being washed from the face of the system as the water source behind the wall penetrated the earth retention system and washed the topsoil fill out.

This discovery, left unchecked, could have caused serious saturation of the backfill material, and potential for wall failure. Fortunately the perforated interior cell walls provide a natural, built-in drainage feature. To drain the increase of water behind the wall, ODOT removed the non-perforated outer fascia panels along the toe of the wall, exposing the interior perforated cells. An underground drainage pipe system was then installed to drain the water. The drainage system reduced the potential for hydraulic and hydrostatic pressure buildup, and protected the slope below from erosion problems caused by concentrated water flow.

The path descends from highway level down to creek level, where it passes under the bridge.

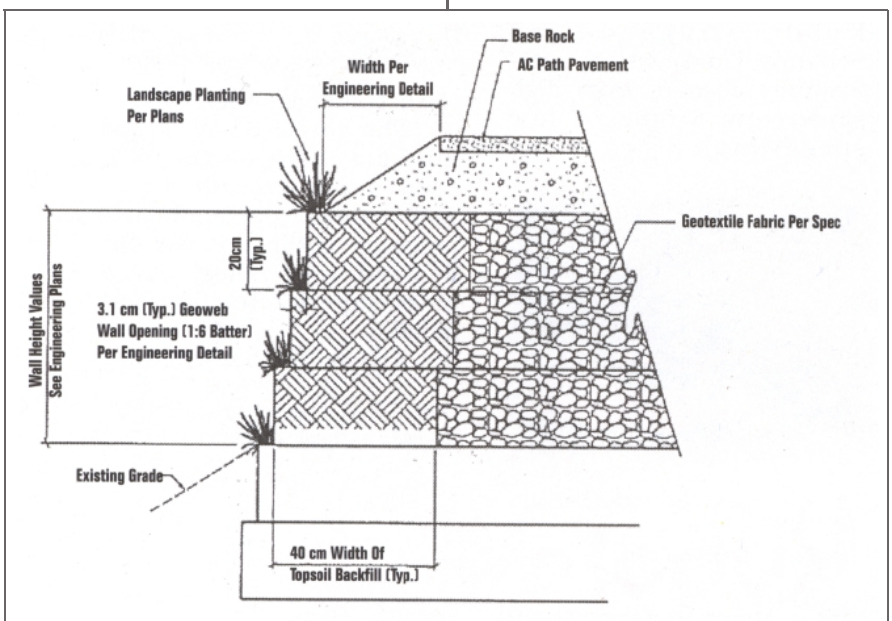
As a result, repair crews simply excavated down at the toe of the wall in the impacted area and then installed a drain line to capture and reroute the excess water across the bike trail and then downhill. To establish vegetative cover quickly for these green wall structures, ODOT hydroseeded the completed walls.

"This repair was done at minimal cost," said Randolph. "The Geoweb system has the ability to accommodate field mandated changes that often arise after a design has been completed. Without this kind of flexibility, those awkward last-minute design revisions and change orders can be expensive and time consuming."

PROJECT UPDATE

Reporting on the status of the walls in January 2000, Larry Bush stated, "The vegetation has established itself, and the walls are blending into the natural environment very well. The HCRHAC and the general public are pleased with the result."

This project was awarded the 1999 first place Award of Excellence from the Industrial Fabrics Association International, Geosynthetics Category as part of the International Achievement Awards honoring manufacturers' latest advancements in design and manufacture in the industrial fabrics industry. PW



MSE RETAINING WALL PLANTING SECTION