

Flexterra® FGM and Terra-Tubes™ Case Study: Highway 290, South Carolina Roadway Project

Imposing highway challenges solved with new innovations



Situation

Environmentally sensitive wetlands, steep slopes and erosion-prone water channels were the challenges facing the South Carolina Department of Transportation when building Highway 290, a new, four-lane highway near Spartanburg, South Carolina. With strict NPDES Phase II regulations mandating minimal sediment leaving construction sites, more traditional methods of erosion control, such as tacked straw, were deemed inappropriate to handle the 2H:1V slopes. In order to stay within the tight NPDES Phase II tolerances, highway officials needed to find alternative solutions for the challenging project.

Problem

Highway 290 abuts an environmentally sensitive area known for its small ponds, gentle waterfalls, herds of deer and a piedmont stream. Piedmont streams typically meander across their flood plains and move with time often forming oxbows—u-shaped bends in the streams. Oxbows can eventually be cut off by excessive sedimentation, creating oxbow lakes or ponds.

Contractors also had to create a bridge across this piedmont stream – a tricky feat given the soft sediment bordering the stream.

Contractors knew they needed to create stability for the soft soil banks of the stream. They knew they would also need to implement careful erosion control measures to ensure there was no soil runoff from the steep slopes to compromise the flow of the stream. They were aware that solutions for both considerations called for products that would help keep the soil in place while quickly establishing vegetation.

“Any project that has fills that are 30 to 50 feet high pose a challenge in preventing erosion of material off the slopes,” said Ray Vaughan, South Carolina DOT Storm Water Manager.

Flexterra® FGM

TERRA-TUBES™
Fiber Filtration Tubes

Solutions

To find solutions to these challenges, the South Carolina DOT worked with erosion control experts to determine what products would work best to stabilize the slopes while minimizing the impact to the surrounding wildlife and waterways. Vaughn called upon Faulkner for assistance who, in turn, called Profile Products' manager of market development, Steve Zwilling, to discuss the best solutions for the project.

"Given the varying and different elements affecting slope stabilization, we knew we needed to use products that could handle the exceptional nature of the construction," said Zwilling.

All three agreed that Profile's Flexterra® FGM, a Flexible Growth Medium, and the industry's new Terra-Tubes™ Fiber Filtration Tubes would provide the optimum solutions for stabilizing Highway 290's slopes and adjoining riverbed.

"We had tried the Flexterra product on another project with good success," said Vaughan. "I had also seen a demonstration of Terra-Tubes and thought they would work well on this project. The Terra-Tubes provided a slope break and, with the Flexterra, we knew we'd have success stabilizing the slopes with minimal soil loss."

Rated at 99 percent effective for controlling erosion on steep slopes, Flexterra FGM is a hydraulically applied matrix that requires no cure time to develop intimate soil contact. Terra-Tubes are engineered composites of wood fibers, man-made fibers and performance-enhancing polymers encased in heavy-duty, knitted tubes. Terra-Tubes have been proven through independent testing to be the construction industry's most effective storm water treatment device and are designed to effectively trap, filter and treat sediment-laden runoff.

In February 2005, Four Seasons Environmental began installing the Terra-Tubes as slope interruption devices at parallel intervals of 25 to 50 feet to disperse water runoff. Shortly after the Terra-Tubes were in place, Four Seasons began hydraulically applying Flexterra at approximately 3,500 pounds per acre over the 200 foot long, 2H:1V slopes. Despite being applied under cold, wet and wintry conditions, the combined technologies quickly created a stabilized environment for growing vegetation.

The Results

The slopes demonstrated dramatic growth establishment when springtime arrived. With the dense vegetation on a now-stable surface, project managers have been very pleased with the performance.

"Both products have performed excellently," said John Faulkner, Vice President of Four Seasons Environmental. "Had we gone with blankets, we would have had a lot of 'tenting,' especially with all the rubble on the slopes. With Flexterra, we got 100 percent contact with the ground using the hydraulic application – even over hard-to-reach spots such as the crests of hills."

The South Carolina DOT was also aware that the use of netted erosion control blankets could endanger wildlife, possibly entrapping animals with the cumbersome nets. With no nets, Flexterra eliminated this danger. Further, the use of Flexterra and Terra-Tubes resulted in a savings of over \$1,000 per acre versus the use of erosion control blankets.

Faulkner went on to say that the use of Flexterra to provide soil stabilization on the slopes of Highway 290 proved to be so successful that the South Carolina DOT has written Flexterra into its standard construction specifications as an equal to double-sided blankets for applications on slopes up to 2H:1V.

"Flexterra and Terra-Tubes are versatile products that are designed to help overcome various challenges," said Profile's Zwilling. "In the case of Highway 290, combining these products provided contractors with a unique and efficient erosion control solution."

Key Product Properties

Flexterra® FGM Flexible Growth Medium

Extensive documentation from independent laboratory tests combined with jobsite reports show that Flexterra can be more efficient and cost effective in situations where:

- A stronger mechanical and chemical bond is needed to withstand greater surface flow and/or severe slopes.
- Immediate erosion protection is required to eliminate risk from impending weather conditions.
- Faster, more complete germination is needed. Tests show Flexterra can provide up to 20 percent better germination when compared with excelsior blankets and straw blankets.

Terra-Tubes™ Fiber Filtration Tubes

Terra-Tubes Fiber Filtration Tubes have been proven through independent testing to be the industry's most effective storm water treatment device.

- Terra-Tubes are designed to effectively trap, filter and treat sediment-laden runoff while reducing hydraulic energy.
- Terra-Tubes are highly versatile and ideal for treating water in low-flow channels and across slopes. Terra Tubes also offer efficient water treatment around detention ponds and drainage inlet structures.
- No other product delivers Terra-Tubes' three primary functions of flow, filtration and flocculation to effectively control sediment loss and treat storm water.



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