Panama Canal Expansion Project calls on PROFILE Products LLC for Erosion Control Solutions

Initial stages

Vast areas of steep, terraced slopes containing exposed weathered lateritic soils along the Canal were in desperate need of erosion control. Failure to grow vegetation would trigger a costly environmental cleanup effort. In the early erosion control stages, a two-step process was utilized that included hydroseeding with Conwed Fibers® Hydro Mulch® 2000—a Thermally Refined® wood fiber mulch with tackifier, followed by the installation of Turf Reinforcement Mats (TRMs). This combination helped to ensure vegetative establishment, but came with a pretty high price tag.

In order to offer a more cost effective solution for the Panama Canal Authority in subsequent phases, Profile® recommended Flexterra® Flexible Growth Medium™ (FGM™). The material was tested on bare slopes in September of 2008.

The Flexterra FGM worked well—even in an area that averages 3300 millimeters of rain annually.

A project of epic proportions

The Panama Canal expansion project, which began in earnest on September 3, 2007, set out to double the capacity of the canal by 2014. When completed, the expanded canal will allow more and larger ships to transit. The expansion effort consists of the construction of two new sets of locks—one on either side of the 78-kilometer waterway connecting the Atlantic Ocean with the Pacific Ocean. The project also entails the widening and deepening of existing navigational channels in Gatun Lake and the widening of Corte Culebra—the narrowest portion of the Panama Canal.

"It's one of the largest engineering projects in the world in terms of moving soil," said Paul Gonzalez, manager of international business for PROFILE Products LLC, and vice president of the Iberoamerican chapter of the International Erosion Control Association (IECA).

To be exact, 49 million cubic meters of dry material along the 6.1 kilometer Pacific Access Channel will be excavated over the duration of the project.

Just how big is the Panama Canal Expansion Project?

- The project requires the dry excavation of approximately 49 million cubic meters of material along the 6.1 kilometer Pacific Access Channel.
- As of August 31, 2010, contracts for the amount of $4.2 billion had already been awarded.
- An estimated 16,000 jobs will be created by the end of the expansion project.
- Total cost of the expansion project is estimated to be $5.2 billion upon completion.
- The Panama Canal Authority estimates a 35 percent increase in cargo volume through 2025—which equates to additional toll revenues of $10 billion.

The project is so massive, in fact, that the expansion and widening effort was treated as five separate construction projects, each individually bid to contractors. In addition to the phased expansion project, the Panama Canal, controlled by the Panama Canal Authority, also known as the Autoridad del Canal de Panamá (ACP), oversees an ongoing maintenance program to continually keep the canal operating smoothly.

Erosion control techniques

The ACP, which operates the canal and acts as the specifier for the expansion project, specified TRMs for the first two phases of the work and Flexible Growth Medium (FGM) for the other phases. The goal was to establish vegetation along the 30-degree slopes that line the Panama Canal to prevent sediment from flowing into the canal during periods of heavy rain.

Not surprisingly, the Panama Canal is subject to strict environmental oversight. Sediment runoff into the canal is not allowed because it can lead to costly maintenance issues.

"It was important to stabilize the surface of the excavated slopes quickly to prevent erosion and sediment that could have ultimately affected the Canal water areas," said Maximiliano De Puy, ACP Geotechnical Section general manager. "Had the slopes not been stabilized, the slopes would have simply eroded, creating gullies. The sediment would have settled in the Canal waters."

Flexterra® High Performance-Flexible Growth Medium™ proves its worth in the harshest of environments

For the first two phases of the canal-widening project, ACP put up with spotty erosion control results. Yared Cruz, senior geotechnical engineer for ACP, said they turned to hydroseeding for the third project phase and hoped for better results. It's exactly what they found in Flexterra HP-FGM.

"We noticed through testing that hydroseeding was giving better results, so we specified this methodology for the final three phases of the project."

The project erosion control sub-contractor for the third phase, Grasstech Corp., was allowed to test its product of choice, Flexterra HP-FGM, in a demonstration at Corte Culebra, where the worst sediment runoff was occurring.

"They gave us one of the most challenging slopes to test on. It was already eroded with a lot of deep crevices," Gonzalez said. "Their thinking was, if you can succeed here without a TRM, you can succeed anywhere along the Canal."

For the demonstration, Grasstech Corp. hydroseeded with Flexterra HP-FGM.

Flexterra HP-FGM bonds instantly to soil—no cure time required—and it has a functional longevity of 18 months. It's like a spray-on blanket as it bonds directly to soil to simultaneously prevent soil erosion and ensure quality seed-to-soil contact.

Flexterra HP-FGM's non-toxic elements and 100 percent biodegradability pleased project officials, who were dealing with strict environmental guidelines. It delivers a nearly perfect balance between three fundamental pillars of performance—erosion control effectiveness, growth establishment and functional longevity—to create the highest performing hydraulically applied medium.

Result changes mindset in Panama

ACP officials were impressed with the job Flexterra HP-FGM did at the site where intermediate slopes routinely reached 45 degrees, or ratios of 1 to 1, or more.

Maricela Cordoba, senior geotechnical engineer for ACP, said Flexterra HP-FGM was cost-effective and labor efficient—something that can't always be said of the alternatives.

"Hydroseeding can be applied to any surface or type of soil and it's easy to apply," Cordoba said. "On the other hand, TRMs and blankets require more labor, soil preparation and more time for installation."

Gonzalez said in a country like Panama, the trust ACP put in Flexterra HP-FGM is noteworthy.

"Conventional thinking in Panama was that you had to have something anchored to the ground to work," Gonzalez said. "To be able to so convincingly prove otherwise to the ACP speaks volumes for Profile and Flexterra HP-FGM. Flexterra HP-FGM is such a high quality product that even if you have a very hard rain, it holds—that's it."

Before

After

KEY PRODUCT PROPERTIES

Flexterra® High Performance-Flexible Growth Medium™ (HP-FGM™)

Extensive documentation from independent laboratory tests combined with job site reports show that Flexterra HP-FGM 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 HP-FGM can provide up to 200 percent better germination and growth when compared with rolled excelsior and straw blankets.
- Flexterra HP-FGM takes the near-perfect performance of original FGM to a higher level by retaining more than 99% of soil, reducing turbidity of runoff for up to 18 months.

Profile®
Solutions for your Environment™

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