

Flexterra® FGM and Terra-Tubes® Case Study: An Environmental “Burden” Lifted

Flexterra FGM and Terra-Tubes FFT eliminate runoff from quarry slope



Situation

Lafarge’s Woodstock, Ontario quarry is an open-pit operation that supplies limestone for Lafarge’s cement production. In 2001, officials realized erosion control measures were not working on an accumulation of mined “overburden” in one of the quarry’s stockpiles. Overburden is a mixture of clay, sand and rock material that has no topsoil, making it very susceptible to erosion and extremely difficult to revegetate. Unless an effective control method could be found, runoff from erosion of the stockpile could eventually affect water quality in nearby streams.

Problem

Acceptable cover had been established on the stockpile’s western face that drains into the quarry. However, the eastern face was not able to sustain similar vegetative cover. This face has a slope gradient of approximately 2.5H:1V, is about 300 feet from top to bottom and totals about 10 acres. Corrective action was needed when rain and snowmelt had begun creating sizeable rills and movement of sediment down the unstable mixture of materials.

Lafarge contracted with a company to have topsoil hauled up the slope, graded in and then hydroseeded.

“We tried this method twice, with little success,” said Michael Bart, environmental engineer for the Lafarge Woodstock operation. “The combination of rain, snow, freezing and thawing would wash out the topsoil we’d graded in and create large gullies. The only evidence of growth was in a few areas where the soil hadn’t eroded away.

“It was not only discouraging, it was costly,” Bart continued. “As a result, we were unwilling to make further investments until someone could demonstrate an effective technique on this site.”

Flexterra® FGM

TERRA-TUBES®
Fiber Filtration Tubes

Solution

In the spring of 2003, John Reynolds of Mulch-It, located in Putnam, Ontario, and Dwight Johnson, regional manager for Profile Products, met with officials at the Woodstock operation. Aware that Lafarge needed proof before they'd make further investments in erosion control, Reynolds and Johnson proposed applying Flexterra FGM to a 30-foot wide test strip down the problematic east-facing slope. Lafarge accepted.

Flexterra features patented technology that combines Thermally Refined™ wood fibers; crimped, interlocking, man-made fibers; and performance enhancing additives to provide erosion protection and seed germination on slopes. With greater than 99 percent effectiveness in controlling soil loss, Flexterra is proven to outperform rolled erosion control blanket (ECB) and bonded fiber matrix (BFM) products. Flexterra requires no cure time, providing immediate protection against erosion upon application. It creates an intimate bond with the soil surface to form a continuous, porous and erosion resistant blanket that allows for rapid germination and accelerated plant growth. Flexterra also absorbs and holds fifteen times its weight in water, delivering more moisture to the seedbed for faster vegetation establishment.

Work on the test site began in October 2003. Future Green, an erosion control contractor located in Schomburg, Ontario, was hired to apply the FGM. The area was graded with a bulldozer to smooth out the numerous rills. Next, the area was track-packed by a bulldozer with the cleat marks running horizontally across the slope to act as a basic erosion retardant. Finally, a mixture of Flexterra, seed and fertilizer, which included a slow-release nitrogen, was hydraulically applied at the rate of 3,500 pounds per acre.

This combination was quickly tested. Heavy rains fell the day after the installation was completed.

"We observed very little erosion," Bart said. "But we wanted to see how the test area would hold up over a winter of snow, freezing and thawing."

In the spring of 2004, Bart said the strip stood out like a "beacon of green." Lafarge continued to monitor the area and, in the fall of 2005, decided to have Mulch-It and Future Green rehabilitate the entire eastern slope of the stockpile—an area of about ten acres.

"They were pleased with how the Flexterra performed," Reynolds said. "However, over nearly two years, there had been some minor rilling in the test area. To ensure a permanent solution, we incorporated Terra-Tubes as a slope interruption device in conjunction with Flexterra."

Terra-Tubes utilize an engineered composite of thermally processed wood fibers, man-made fibers and performance-enhancing polymers encased in heavy-duty, knitted tubes. They have been proven through independent testing to be a highly effective storm water treatment device designed to effectively trap, filter and treat sediment-laden runoff.

Four rows of six-inch diameter Terra-Tubes were placed along the face of the 2.5H:1V slope, each spaced about 75 feet apart. Next, the previously evaluated mixture of Flexterra, seed and fertilizer was hydraulically applied at the rate of 3,500 pounds per acre. The project, beginning from initial grading to placement of the Terra-Tubes, was completed in two weeks.

The Result

The winter of 2005-06 was, according to Bart, "tough to the 'nth' degree." The winter brought numerous rain, snow and freeze/thaw events and temperatures were as low as zero degrees Fahrenheit in November. Circumstances didn't improve much in the spring of 2006, which ushered in cold and wet conditions.

"Because of the unfavorable weather, we didn't see much germination and growth until late May," Bart said. "But then it seemed that the vegetation literally exploded out of the ground."

During the spring and summer of 2006, Bart said he made frequent trips to inspect and photograph the project. "It was apparent that we had achieved a good, stable cover," he said. "We were able to find only one minor rill in the entire 10-plus acres, which we believe was caused by an unforeseen flow pattern. However, by the end of August, the rill was fully grown in and virtually indiscernible."

"Combining Flexterra and Terra-Tubes is becoming well-established as a 'Best Management Practice' (BMP) for controlling erosion and improving water quality in slope management," said Stephen Zwilling, market development manager for Profile Products.

A good indication of this BMP establishment is the fact that Lafarge, Mulch-it, Inc. and Future Green are consulting on future applications of Flexterra and Terra-Tubes in progressive restoration of other stockpiles at the Woodstock quarry.

In using Profile's technology, officials stabilized the erosion-prone slope and returned the stockpile to a natural appearance. As a result, Lafarge had a secure, established slope and, even more importantly, a blueprint for handling similar challenges in the future.

Key Product Properties

Flexterra® 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 improve 2-3 times the germination and growth establishment rate of 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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