

APPLICATIONS

By Bruce Wright

Of dinosaurs and water flows

Dinosaur Provincial Park, in southern Alberta, Canada, is one of the most fossil-rich areas in the world. Recognized as a World Heritage Site by the United Nations, the park attracts hundreds of researchers and many tourists each year to visit, study and excavate. Last summer, the park also attracted some engineers bent on solving an erosion problem.

Decades of erosion had carved out a 3-m (9.84-ft) drop along a 180-m (196.9-yd) stretch of the Red Deer River's bank, which cuts through the park. The eroded section also is directly adjacent to a picnic and recreation area. As the park's popularity and visitor traffic have grown, the sharp drop-off posed a safety concern that required the slope to be rebuilt.

The slope's design needed to meet three criteria: The slope had to be safe, it had to blend in naturally with the rest of the park, and it had to survive a one-in-10-year flood event. "One of our main concerns was safety," said Dick Vogelsang, capital-projects coordinator for the Alberta Environmental Protection's Natural Resources Service, Vulcan, Alberta. "Yet you've got to have something that looks nice. A standard retaining wall of concrete and large rock would not have been very appealing."

The park had several alternatives for solving the erosion problem. The first was to line the slope with riprap. This idea was discarded after assessing pricing and transportation logistics--the cost of transporting the riprap 150 km (93 miles) to the park made this alternative too expensive.

Erosion-control blankets also were considered. Although a river bank lined with erosion-control blankets would have been sufficiently durable and would have met the project's aesthetic criterion, this idea was rejected because the project's engineers feared the blankets might be washed away before they could become secured to the bank.

An engineered cellular-confinement system was presented as a solution by Tim Nelson of Armtex Construction Products' Lethbridge, Alberta, branch. Cellular confinement provides structural support to the soil veneer and ensures that a uniform soil thickness is established and maintained on the slope face. Nelson's engineering of the site called for a combination of riprap and a perforated cellular-confinement system. Once the geocells (manufactured by Presto Products Co., Appleton, Wis.) were filled with top soil, this system would provide the needed safety and durability, as well as maintaining the natural look of the slope.

Well-established vegetation is an effective and attractive form of protection for slopes that are exposed to mild to moderate surface erosion. The geocells increase the vegetation's natural resistance to erosive forces and protect the root zone from soil loss. A confinement system, such as the one used in Dinosaur Provincial Park, allows the slope to appear completely natural, while effectively protecting the slope. Moreover, a perforated cellular-confinement system drains laterally, minimizing erosion; thus, it is an ideal material for use in heavily saturated areas such as the Red Deer River bank.

"The system was the answer to all of the project's needs," says the project's engineer, Ron Hust of MPE Engineering Ltd., Lethbridge, Alberta. "It provided for a slope that could withstand the expected flooding, as well as blend in naturally with the rest of the park."

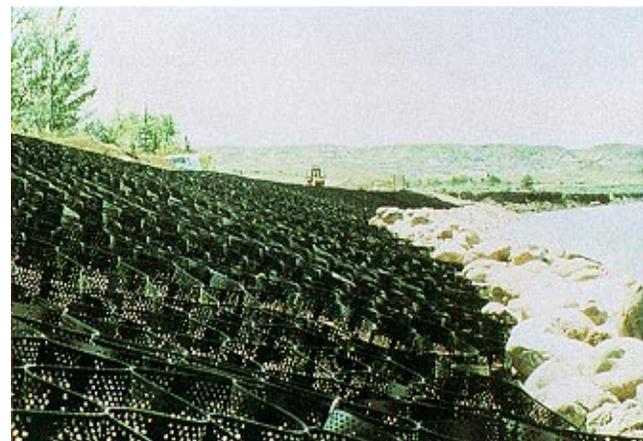
Installation began in April 1996 and took about 10 days. The river bank was regraded from a sharp drop-off to a 4:1 slope. A gravel bed was then placed on the bottom two-thirds of the bank.



This sharp drop-off, carved out by decades of erosion, caused officials at Dinosaur Provincial Park in Alberta, Canada to be concerned about visitor safety.



After discarding other alternatives, park officials decided to install a cellular-confinement system. It took just one afternoon for a three-man crew to install the 75 geocell sections needed for this project.



The erosion protection started with a layer of riprap 0.6 m (1.97 ft) thick that was installed from the riverbed up the slope. A riprap apron 1 m (3.28 ft) thick was extended approximately 2 m (6.56 ft) into the channel and 1 m (3.28 ft.) above the normal water elevations. Then the geocell system was installed on the remaining section of the slope.

Vogelsang, assisted by Armtec's Tim Nelson and Rick Lorincz, was able to install the 75 geocell sections needed for this project in one afternoon. After installation, the geocells were filled with topsoil and seeded with a native grass mixture.

Data supplied by the Alberta Environmental Protection agency indicates that the reconstructed bank will survive the expected floods. "So far, we're very happy," says Vogelsang. "The real test will come this spring, when we'll have the best chance for more flooding."

For more information, contact Pat Stelter, Presto Products Co., Appleton, Wis., at 920/738-1336.

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