

FEATURE

Anchor Diamond Pro® Tall Wall Stands Firm with Proper Soil Improvement

In the segmental retaining wall industry, there are tall walls, and then there are tall walls constructed under very tricky conditions. The Kline Plaza project in Harrisburg, Pennsylvania fits into the latter category. The wall was proposed to make way for more parking with an expanded access road at an existing shopping center. However, this exceedingly tall wall — 42 feet (12.8 meters) high and nearly 900 feet (274.3 meters) long — had to be built on top of an existing 1.5 horizontal to 1.0 vertical slope of questionable soil. If the wall was constructed on the unreliable foundation, it could push out at the bottom of the wall, creating a bearing capacity or slope stability failure, a potential outcome no one wanted to see happen.

Selecting the right product and engineering

At the start of the project, a competing product was specified. Joe Powers of Easton Block, the wall manufacturer and installer, recalls, "That product was dropped because it wasn't supported by adequate engineering to substantiate a wall of this magnitude. We recommended the Anchor Diamond Pro™ retaining wall block as the right product for the job."



The 42-foot (12.8 meters) high Kline Plaza retaining wall rises through the trees on top of a 1.5 horizontal to 1.0 vertical slope.

Because of its size and proposed location, the wall required highly specialized engineering. Soil Reinforcement Design Inc. (SRDI), a group of geotechnical engineers in Atlanta, Georgia, were consulted for this purpose. SRDI specializes in the design of large and challenging mechanically stabilized earth structures throughout the United States. Thomas Rainey, SRDI engineer, says "The project required extensive site coordination among everyone involved to manage extensive global stability and foundation bearing capacity issues."

Addressing soil quality with reinforcement

SRDI quickly confirmed that the site for the wall, which had been filled in some 20 years ago but never compacted adequately, needed serious help. The solution was to over excavate the soil at the bottom of the wall and replace it with a reinforced mat foundation. The mat consisted of a series of reinforcing fabric layers and soil to create a stable bearing surface capable of supporting the 42-foot (12.8 meters) high wall. SRDI engineers specified Mirafi HS 1000 geotextile with a working strength of 12,000 pounds per

Just how much reinforcement goes into a wall like this?

Here are the figures for the Kline Plaza project:

- Approximately 16,000 square yards (13,379 square meters) of Mirafi HS 1000 geotextile were laid in the foundation soils
- 11,313 square yards (9,467 square meters) of Mirafi 8 XT geogrid were laid in the lower third of the wall.
- 11,371 square yards (9,506 square meters) of Mirafi 5 XT geogrid were laid in the middle third of the wall.
- 7,220 square yards (6,021 square meters) of Mirafi 3 XT geogrid were laid in the upper third of the wall.

foot (175 kN/m). The geotextile was placed on two-foot (600mm) vertical lifts in the foundation beginning 13 feet (4 meters) below the proposed bottom of the wall. The 13-foot (4 meter) deep mat extended in places 19 feet (5.79 meters) in front of and 26 feet (7.89 meters) behind the wall location to provide adequate global stability and foundation bearing.

The wall itself was constructed using Mirafi 8 XT, 5 XT and 3 XT geogrid placed on 8-to-24 inch (203–700 mm) spacing. Large immovable rock outcrops added to the challenge of placing the reinforcement behind the wall. This required the installers to incorporate the rock with the reinforcement to maintain a cohesive and stable foundation for the retaining wall.

A successful outcome all the way around

In the beginning, it seemed unlikely that a wall this tall could be constructed atop a 1.5 horizontal to 1.0 vertical slope of poorly compacted fill. Yet with proper reinforcement and soil compaction under the guidance of experienced engineers and installers, the soils at Kline Plaza were transformed into stable ground for the Anchor Diamond Pro™ structure.

The effort was extensive but still a bargain given the magnitude of the job and the alternatives. Says Powers, "Even with a price tag approaching a million dollars, the project was a cost saver compared to other choices. The block that had been chosen initially or a reinforced cast-in-place concrete wall would have cost another 30 percent more than the final bill on this job." That's significant savings for a wall of any size. 