

## Case Study

**application** Reinforced Retaining Wall  
**location** Eagan, MN  
**product** Miragrid® 7XT

**job owner** Dino Xykis  
**engineer** Civil Solutions Group  
**contractor** Structures Hardscapes Specialists

TenCate™ develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

### THE CHALLENGE

A residential timber retaining wall was in failure mode as a result of excessive pressures and improper construction. In addition, superficial surface failures had periodically occurred over the previous few years on the reinforced slope, which varied from 1:5:1 to 1:1 along the top of the wall. The wall was approximately 22 m (73 ft) across the backside of the property, and then turned upwards toward the house.

The existing timber wall had been constructed using a lower strength Miragrid® geogrid to reinforce the mass directly behind the wall. A 1.8 m (6 ft) section of the wall along the backside of property was measured and found to be leaning outward 0.9 m (3 ft) from top to bottom. This section would have been originally construction setting back approximately 23 cm (9 in), indicating that the wall had rotated approximately 30 cm (12 in) from front to back over time, placing the wall in an unsafe condition.

The engineer initially proposed anchoring the wall into place and constructing a new wall in front of the existing wall.

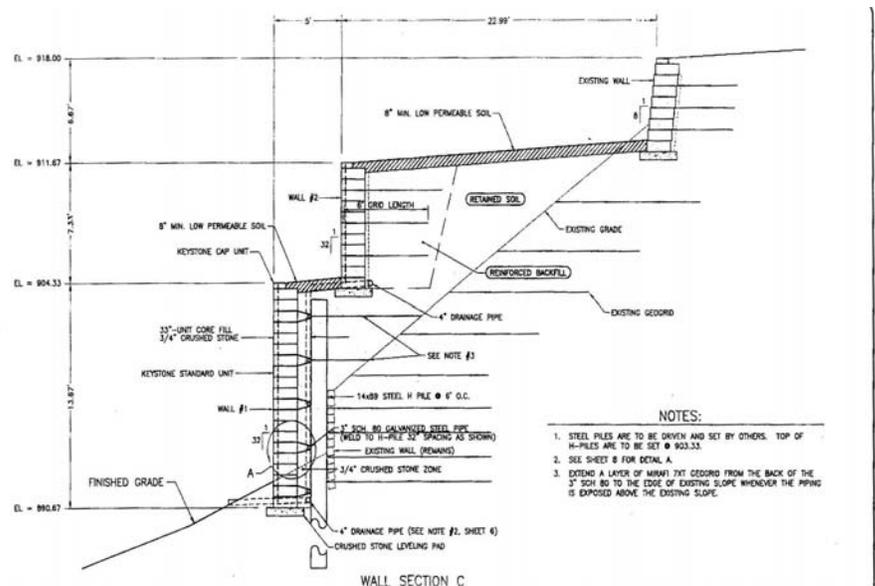
### THE DESIGN

When the existing wall was surveyed it was found to be extending approximately 1.2 m (4 ft) into the City of Eagan parkland. It was determined that this was dedicated parkland in which it was impermissible to issue an easement. The City of Eagan then required the homeowner to remove the existing wall from the parkland as part of the resolution. The engineer implemented a secondary design

using h-piles to stabilize the existing soil mass while a new Keystone® modular wall was constructed behind the timber wall. Excavating into the soil was not feasible due to the slope stability, massive soil excavation, and the location of the house footing. Miragrid® 7XT was used to reinforced the wall. The walls along the sides of the property were to be removed and replaced with geogrid reinforcement modular walls. A second Miragrid® reinforced wall was to be constructed above the lower wall to provide for a more level surface and eliminate the erosion problem. This also created useable property for the homeowner in lieu of the existing steep slope. The h-piles were designed to accommodate the additional loading from the upper wall which was to be set back 1.5 m (5 ft) from the lower wall.

### THE CONSTRUCTION

At the approval of the City of Eagan, specific trees along the lower section of the wall were to be removed to allow for the installation for the h-piles. After the trees were removed, the h-piles were set in place. The structures subsequently removed the retaining wall both in front and behind the h-piles and along the property lines. The lower wall was constructed in front of the h-piles. Crushed stone was placed between the wall and the h-piles, and the wall was secured to the 8 cm (3 in) schedule 80 galvanized piping at the design elevations. The soil embankment along the sides of the existing timber walls was excavated back to the minimum design depths required for the geogrid reinforced walls when the lower wall construction reached the base of the side walls. The excavation for side walls was deferred until this point due to the steep slope above the walls and the likelihood of excessive runoff into the parkland.



Five layers of Mirafi® BXG geogrid were installed to create a stabilized geogrid reinforced platform.

The wall construction was completed in approximately one week after the installation of the piles. The grass in the parkland was resodded, and erosion control matting w/seed was placed along the slopes adjacent to the side walls.

**THE PERFORMANCE**

All parties involved were completely satisfied with the design, construction and final result of the project. The replacement of the timber wall and the adjacent slope with the Keystone wall has created a very impressive and aesthetically pleasing structure along the parkland.



Miragrid® 7XT was used to reinforce this Keystone® retaining wall.



TenCate™ Geosynthetics North America assumes no liability for the accuracy or completeness of this information or for the ultimate use by the purchaser. TenCate™ Geosynthetics North America disclaims any and all express, implied, or statutory standards, warranties or guarantees, including without limitation any implied warranty as to merchantability or fitness for a particular purpose or arising from a course of dealing or usage of trade as to any equipment, materials, or information furnished herewith. This document should not be construed as engineering advice.

Mirafi® is a registered trademark of Nicolon Corporation.

© 2010 TenCate Geosynthetics North America

03.10

365 South Holland Drive    Tel 800 685 9990    Fax 706 693 4400  
Pendergrass, GA 30567    Tel 706 693 2226    www.mirafi.com

