



Case Study

application Segmental Retaining Wall
location Metrolink, St. Louis, MO
product Mirafi® Miragrids®, 500X, 600X, 140NL, & HP-Series

job owner Bi-State Development Agency
engineer S.T.V. Booker, Mark Harrison
contractor Keely/Keller Joint Venture

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

The Bi-State Development Agency constructed a light rail (the Metrolink) transportation system to serve the St. Louis area. The rail system consists of 35 miles of track; a \$339 million project for the St. Clair County expansion. The bulk of the project was 42 Keystone Retaining Walls, totalling 169,00 ft².

THE DESIGN

The design of the walls required global stability calculations, foundation analysis, seismic calculations, AASHTO design methods, and AREA surcharge loadings. Many walls had poor soils below the walls. In some cases the foundation stabilization treatments extended to 4.57m (15ft) below the base of the wall.

Many of the walls were anticipated to settle significantly during and after construction due to the weight of the new fill. The MSE wall system is well suited for settlement. However, this settlement posed a significant problem at locations where hard surfaces, such as box culverts, meant that there would be differential settlement that could break the blocks.

A design innovation to allow the settlement without slowing construction or stressing the blocks was to saw-cut a settlement joint at the edge of the structure. The blocks moved differentially, but from a distance it did not detract from the appearance of the wall.

The very soft foundations required improvement to support the proposed retaining walls. The options were to over-excavate into the water table or utilize high strength fabrics to provide load support. This particular location uses one layer of Mirafi® 500X and one layer of HP-Series

to develop the strengths need for a safe design. Many of the retaining walls are located on a slope and close to a creek which is composed of soft soils. The slope at the toe of the wall combined with the soft soils and high surcharge loading required that a global stability design review several options to provide a safe structure. A combination of lengthening the Mirafi® geogrids and improving the foundation soils provided the most economical solution for the contractor.

THE CONSTRUCTION

The construction cost was reduced by optimizing the geogrid strengths and number of layers in the design process, reviewing the foundation options, and in some cases using high strength geotextiles. Mirafi® 500X and 600X are in the parking lots to extend the pavement life. Mirafi® HP fabrics stabilize soft wall foundations.



TENCATE Mirafi

Mirafi® N-Series nonwovens are used in subsurface drains and under rip rap. Miragrids® are used to reinforce the retaining structures.

Miragrids® are an important component in constructing the Metrolink retaining walls. The walls are critical structures that support the rail traffic, many of them as bridge approaches. Several walls are +9m (30ft) tall. Miragrid® 3XT to 10XT was shipped to the jobsite in custom cut lengths to speed construction.

THE PERFORMANCE

This project is a unique large project with difficult design requirements that utilize Mirafi® products to meet the challenges. Mirafi® products were instrumental in constructing this successful, critical transportation project.



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