



Case Study

application MSE Retaining Walls in Lime Treated Soil
location San Clemente, CA
product Verdura Wall 40,000 SF wall face with Miragrid® 8XT (50,000 SY)

job owner
engineer
contractor
date of installation

Target
NMG Geotechnical
Soil Retention Systems
January 2011

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

Target has constructed a new store in the beachside community of San Clemente, California. The store is located at the corner of Avenida Vista Hermosa and Avenida La Pata. The city of San Clemente is located in southern California on a narrow strip of land between landslide prone hillsides and ocean-front cliffs. In order to prepare the site, mass grading of a steep hillside was required. The hillside was composed of highly expansive soil with an Expansion Index (ASTM D4829) of 120. Large MSE retaining walls up to 26 feet in height, were needed to support the parking area. A parking structure was considered but more costly compared to MSE retaining walls. The design solution of using lime treatment of the MSE wall backfill was used to reduce the

expansion potential of the soils. Lime treatment also improved the soil strength parameters.

THE DESIGN

Verdura MSE Retaining Walls by Soil Retention Systems are typically used to support large building pads in southern California. The cost of the near vertical MSE retaining wall, compared to a fill slope, is justified by the high real estate value provided by the additional usable land. This project was no different. However, the use of lime treated MSE structural backfill raised questions in designing the MSE retaining walls. The lime treatment design called for 6 percent lime added to the native fill resulting in a soil pH of 12. TenCate Geosynthetics was able to provide the necessary test reports and documentation to allow the use of Miragrid® 8XT coated polyester geogrid in the design of the MSE retaining walls. In order to compensate for the high pH soil (pH = 12) the typical Miragrid® Reduction Factor for Durability of 1.1 was increased to

1.25 based on test reports. This increase in durability provided the necessary design life for the structure.

THE CONSTRUCTION

The native soil was cut from the hillside and spread in rows one equipment width wide over a prepared staging area. Then, pure powder lime imported from Nevada was spread from a truck onto the native soil. While spraying with water, the soil was processed with two passes of a soil mixing machine. The soil was cured for 24 – 48 hours and then mixed again. The result was a six percent lime treated structural backfill with a pH of 12 and reduced soil expansion potential of EI=20 in accordance with ASTM D4829. TenCate had the soil pH tested at GMU, an independent lab. Miragrid® 8XT was installed in the lime treated soil in the construction of the Verdura MSE Walls. In the hardscape areas, the upper two feet of fill did not receive lime treatment.



Lime treatment soil mixer.



Scraper bringing lime treated soil to MSE Wall.

THE PERFORMANCE

The use of Verdura MSE Retaining Walls constructed with Miragrid® 8XT provided a cost effective, large building pad for a new Target store. The existing onsite soils were not favorable for use in construction of the MSE retaining walls due to the high expansion potential. The solution of lime treating the native soil and installing Miragrid® 8XT soil reinforcement in the construction of the MSE retaining walls was beneficial to completing the project without excessive design requirements or cost overruns to the owner. A guaranteed store opening date is important to Target. The use of Verdura MSE Retaining Walls with Miragrid® geogrid allowed scrapers to be used in the backfill operation, increasing time savings. Soil Retention Systems constructed 20,000 SF of wall in just 12 days, keeping the project on its fast paced schedule.



Miragrid® 8XT in lime treated soil.



Verdura Wall positive connection



Verdura Wall supporting the Target Store site.

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