

Case Study

application MSE Rockery Walls and Slopes
location SeaTac, WA
product Miragrid® 7XT & 10XT

job owner
engineer

Scoccolo Properties
Earth Solutions Northwest
Rock Works Construction
November 2015

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

Standing on a hillside facing East above an existing subdivision on 39th Way South in SeaTac, Washington, one can experience an amazing view of a snow covered Mt Rainer. Its glacier covered slopes rise in stark contrast above the existing forested hills as shown in Figure 1. The volcano summit reaches 14,417 ft making it the fifth highest mountain in the lower 48 states. This beautiful view inspired the development of a private access road with custom built homes.

THE DESIGN

Given the steep grade and limited access, a combination of MSE walls and slopes were required to develop the site. Rockery Boulder Walls are popular in the area due to their excess availability and aesthetics. However, rockery boulders stacked alone do not provide the necessary lateral restraint to offer adequate factors of safety to overturning and sliding. This is especially true in tiered walls and when seismic loads are applied. The solution selected was the design of TenCate's Miragrid® geogrid wrapped MSE walls to meet the lateral earth loads with rockery boulders used only as the MSE wall facing as shown in Figure 2. A 1.5:1 steepened slope was also designed using Miragrid® geogrid soil reinforcement.



Figure 1. View of Mt Rainer in Seattle, Washington.



Figure 2. MSE Rockery Wall with Miragrid® soil reinforcement.

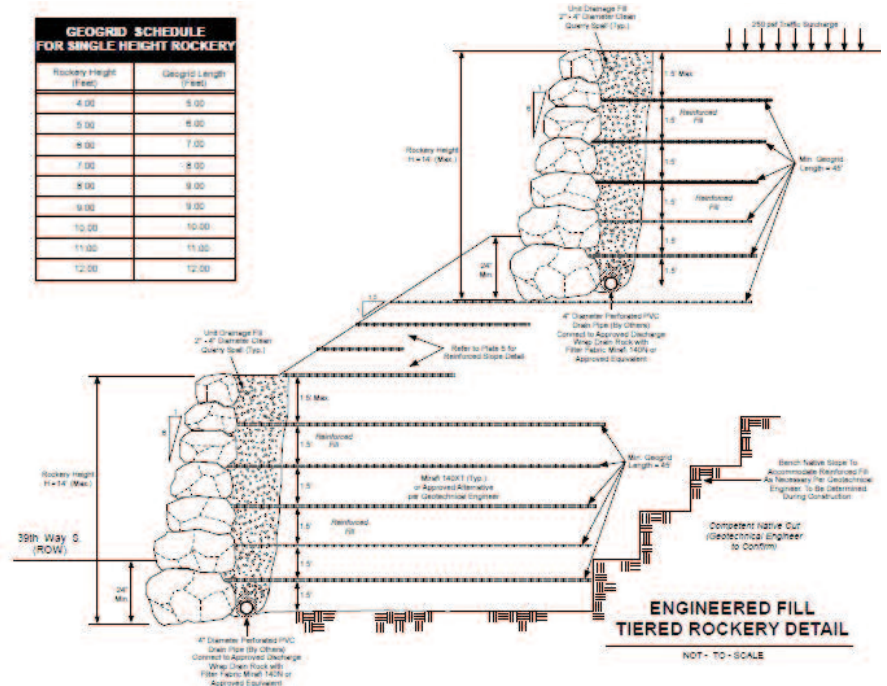


Figure 3. Section of Tiered MSE Rockery walls and slope.

The complete MSE structure consists of a 14ft high rockery MSE wall with a 30ft high steepened slope above and another 14 ft high rockery MSE wall on top as shown in Figure 3.

THE CONSTRUCTION

In a stepped construction process, rockery boulders are stacked while Miragrid® geogrid is placed horizontally in the fill and wrapped up inside the boulder face and embedded back 4ft into the fill. A vertical layer of 2 to 4 inch size cobbles are placed between the wrapped geogrid face and the back of the rockery boulders as filler material. Although the MSE backfill consisted of smaller size well graded granular soil, no separation fabric was used in the geogrid wrap as shown in Figure 4.

Construction of the MSE slope was conducted using an overbuild process to ensure compaction at the final slope face as shown in Figure 5. In this process the contractor pushes fill beyond the finished slope face and the embankment fill is constructed as an oversteepened slope. The contractor places the geogrid about four inches inside the finished slope face to avoid unnecessary geogrid damage during the trimming process. As the slope increases in height, the contractor trims back the oversteepened slope face to the finished slope surface grade.

If any geogrid is encountered in the trimming process, the geogrid will easily trim off from contact with the construction trimming equipment without pulling out of the soil face. After the slope is completed any exposed geogrid pieces may be hand cut and removed if needed for slope aesthetics.

THE PERFORMANCE

Using Miragrid® geogrid soil reinforcement solutions, a multitiered MSE structure was completed. The structure consists of rockery faced Miragrid® geogrid wrapped MSE walls separated with a Miragrid® geogrid reinforced steepened slope. The complete MSE structure offers a private access drive on a steep hillside to custom homes built with a commanding view of Mt Rainer in the distance.



Figure 4: Miragrid® geogrid wrap at rockery face without separation fabric.

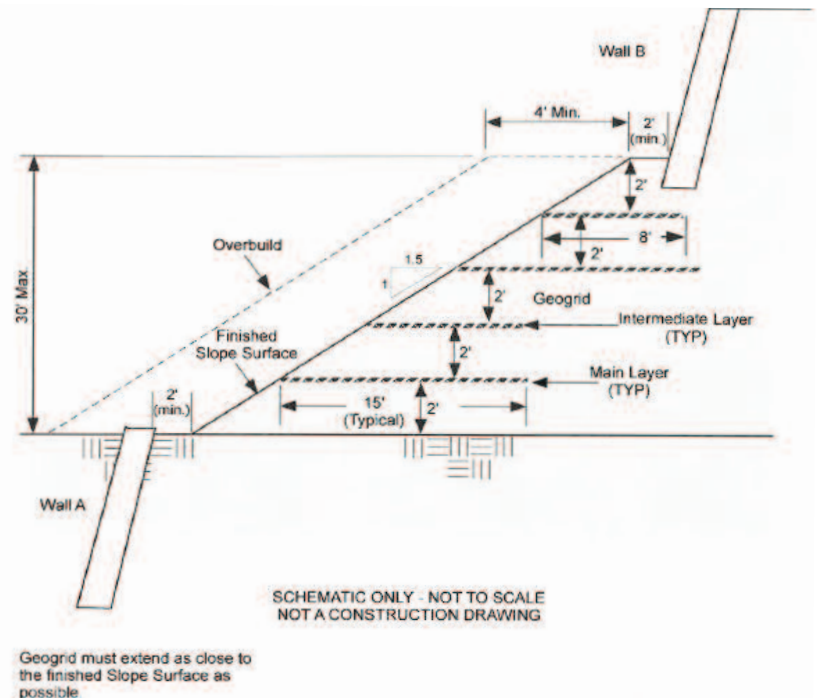


Figure 5: Construction detail showing overbuild process for geogrid reinforced slope.

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