

Secugrid®

Reinforced soil structure for a grain terminal in the Philippines

Project name
Golden Bay Grain Terminal, Philippines

Products
Secugrid® 80/20 R6
Secugrid® 200/40 R6
Secutex® 201 GRK 3C





Fig. 1: Secugrid® installation for reinforced wall construction



Fig. 2: Naue Wrap facing system in 85° slope angle

Problem

The Golden Bay Grain Terminal (GBGT) is a grain storage facility with a capacity of 150,000 megatons and a total of 8 silos. It also has two warehouses with a capacity of 100,000 tons each. The GBGT has been in operation since 2013 to enable grain delivery from cargo ships. A total investment of 2.5 billion Pesos (US \$49 million) has been made by the owner, San Miguel Purefoods Co. Inc. for the development of GBGT.

Prior to the GBGT development, the original topography of Mabini, Batangas was an undulating hilly terrain. The hilly morphology was considered unsuitable for the foundation of the proposed terminal complex. Hence, there was a need to backfill the area and create a plateau for the proper development of the GBGT. In order to achieve maximum land utility of the new terminal, a steep slope was designed at the front part, which is facing the Batangas bay. However, a steep slope without any reinforcement is considered unstable under the given boundary conditions.

Solution

In the original design, a reinforced concrete retaining wall was proposed, but later on rejected due to the enormous lateral earth pressure and the huge number of tie-back anchors required. As a more

economical alternative solution, the consultant proposed to construct a geogrid reinforced soil structure (GRS) using 2 types of uniaxial laid and welded Secugrid® R6 geogrids. Secugrid® R6 is a geogrid made of stretched, monolithic polyester (PET) flat bars with welded joints. The main characteristic of Secugrid® is its ability to absorb high strength mobilisation at low strain with immediate force absorption. It adapts perfectly to the project conditions to provide reinforcement to the backfill soil. Secugrid® provides interlocking of the granular fill material and friction on both sides to increase the shear resistance. Manufactured of PET flat bars, Secugrid® R6 has low creep tendency, which ensures the stability of the structure over the projected design life.

A total height of 18m is achieved for the final construction of the Secugrid® GRS. In total 34,200m² of Secugrid® 200/40 R6 were installed for the lower layers and 25,650m² of Secugrid® 80/20 R6 for the upper section. The Naue Wrap system was chosen as facing system for the 85° inclined slope face. To protect the fill against erosion a separation geotextile Secutex® was installed inside every Secugrid® wrap. With the success of the proposed Secugrid® solution, the slope stability was economically ensured and the operation of Golden Bay Grain Terminal has been secured.



Fig. 3: Typical cross-section