MECHANICALLY STABALISED EARTH WALLS

Product: Paramesh System

Problem
Exxaro Coal required a 12.5m high tip wall to accommodate 130 tonne CAT 777 tipper trucks carrying coal deposits, which imposed a very high design criteria of 250Kpa pressure on the wall. Two primary crushers were planned, one crusher was to be constructed immediately after the completion of the MSE structure and the other at a later stage.

Since all the soils utilised in the construction of the wall were overburden coal residue, the wall had to be designed for,

- High PH's making the materials susceptible to chemical attack.
- Differential settlement

LSL Consulting (PTY) LTD, Consulting Engineers and Project Managers approached Maccaferri SA for retaining wall solutions.

Solution
The initial design done by the Consultants was for a traditional cantilever reinforced concrete wall. Maccaferri proposed a vertical 12.5m high, 120m long Paramesh System which was accepted by all of the Consultants and designed utilising Maccaferri's in house Macstars W software programme for slope stability.

The Paramesh system consists of,
1. Terramesh™ baskets, sizes 3x2x1 and 3x2x0.5, each 3m long of double twist mesh type 80 tails. The wire was protected with Galfan (Zn95Al5) type galvanising and coated with 0.5mm PVC.
2. Paralink™ 300 geosynthetic soil reinforcement grids providing 300 KN/m tensile strength
3. Mactex N 20.2 non-woven double needle punched geotextile, utilised for its excellent filtration and separation properties

The backfill material was G6 structural fill compacted to 95% MOD AASHTO

Maccaferri's specific quality control procedures were followed by Civcon and managed on a daily basis by Exxaro Resources (Pty.) Ltd. in order to ensure the structure was built in accordance with the design on this high risk category 3 wall.
Benefits

- The overall cost of the Paramesh System was lower than a traditional cantilever reinforced concrete wall
- The flexibility of the Paramesh System allows for settlement and consolidation without major deformation and structural implications
- Galvanic coating the wire instead of traditional Galvanising provided the required corrosion control for the harsh soils
- The PVC coating provided additional protection to the wires degradation from environmental factors
- The Paralink™300 has a core of high tenacity polyester yarns tendons encased in a polyethylene sheath, making it unsuceptible to corrosion
- No pioneer layer was required as the lengthened Paralink™ grids reduced the bearing pressures by evenly distributing the high imposed loads
- No specialised equipment was required for lifting units into position during constructing as all of the materials supplied are compact and not excessive in weight
- Backfill soil material was available on site, reducing transport costs involved with importing material
- The system is labour intensive as local unskilled persons were utilised to fill the single skin gabion face
- Terramesh™ units are supplied in standard lengths requiring no cuts on site, saving time
- The continuous 3m mesh tail on the Terramesh™ baskets provide both secondary reinforcement and the connection of the facing units to the reinforced soil structure, eliminating the need for any other connections.