GEOTECHNICAL ENGINEERING / REINFORCED SOIL SLOPES

Product: Paramesh system with integrated stormwater management

Problem
At km12.00 on Road D1043 between Hazyview and Graskop evidence of pavement cracking and severe erosion against the road edge was visible indicating the possibility of a slip failure.

Stability analysis revealed a deep seated global stability failure of the road embankment. The possible cause of this problem was the surface run-off water from both sides of the road and stormwater from the side drain and previously constructed chutes discharging directly on the fill material, causing the collapse. The problem was aggravated by the loose clayey in situ material, which is easily erodible.

Solution
This problem required the construction of a 25m high reinforced soil structure in conjunction with storm water systems to re-establish the safety of the embankment, stormwater management and road safety.

The preliminary proposal, aimed to protect the slope from failure and further erosion, comprised of a reinforced soil structure, using a combination of gabion rock face and vegetative face and using geosynthetic reinforcement material for stability. Stormwater management was addressed by a stepped weir constructed in gabions to be interrelated with the overall solution.

Upon site establishment the contractor undertook a survey and a geotechnical investigation was done. This revealed the size of the structure and that the in situ soil was classified as a G9, with a internal friction angle of 22.4° and cohesion of 22kPa. The preliminary design was then reviewed and altered as it was established that deep seated global stability failure could re-occur.

Client name:
Department of Public Works, Roads & Transport, MPU

Main contractor name:
Quality Plant Hire

Consultant:
Masetlaoka Scott Wilson

Product used:
PARAMESH, GABIONS, MACMAT®

Construction info:
Construction date: November 2011
Completion date: August 2012
A mass of fill, acting as a toe to support the slope, was considered however the extent of the boundary area would not allow for a natural slope to be built due to the low in situ properties allowing a slope of only 1:3.5. Therefore the reinforced soil structure, designed as a revetment to prevent erosion, became a structural element in order to avoid global stability failure.

For the stability of the slope, the top structure was moved 11m away from the road which allowed the stormwater system to gently converge on the weirs and channels. An SPT test was performed in order to determine the bearing capacity for the wall structure, which showed capacity below what was required. To resolve this, a bearing capacity improvement using 300kN/m geogrids for basal reinforcement was designed.

In January 2011 a rain storm registered 250mm in 24 hours with another 500mm over the next 7 days. This caused devastating erosion on site and already constructed materials were damaged. This resulted in a vast delay to the construction programme and a revision of the design due to the new shape of the in situ area.

**Benefits**

- The soil reinforced structure allowed for the integration of a stormwater system.
- Ease of construction.
- The Green Terramesh® allowed for a green solution in a forestry area.
- Good Teamwork between all resulted in a successful project.

As part of the ISO 9001 Management Systems, guided research and development programmes, information contained herein is continuously updated. Please confirm with Maccaferri SA (Pty) Ltd the latest version of the Product’s Specification available.