

IMPROVEMENTS TO MAIN ROAD P728
 UMGABABA, KWA-ZULU NATAL, SOUTH AFRICA

RETAINING WALLS & SOIL REINFORCEMENT

Product: Terramesh[®], ParaGrid[®], MacTex[®], MacDrain[®]

Problem

Umgababa is a rural coastal community to the south of Durban, South Africa. It is becoming increasingly popular for tourists as investment into this beautiful area is increasing. The eThekweni Municipality required improvements to the main road P728 which was being upgraded. A significant 270m long and 9m high retaining wall was required to support the improved highway, through the hilly terrain in the Umgababa area.

Solution

Various solutions were considered and Maccaferri were approached by project engineer, Simani Consulting to offer a proposal for the design, supply and project construction support. Although the ground to be retained was of good quality and there were no phreatic surfaces within the vicinity of the wall, the presence of slopes above and at the foot of the wall placed an emphasis on the overall stability of the structure. Surcharge loads of 12kN/m² were to be considered as the highway live load on top of the structure.

Maccaferri proposed a Terramesh[®] System from 3m to 9m high, founded to depths of up to 2m. Terramesh[®] consists of a modular gabion fascia element, with an integral steel wire woven mesh geogrid tail. The geogrid is sandwiched between layers of compacted structural backfill, reinforcing it. This enables the soils to stand steeper, accommodate greater loads and settle less than an unreinforced soil.

On the taller reinforced soil structures and where the geotechnical forces are far higher, the Terramesh[®] units provided secondary soil reinforcement only. Primary soil reinforcement was provided by ParaGrid[®] geogrids. ParaGrid[®] is engineered from polyester fibres encased within an ultra-tough polyethylene sheathing. Available in strengths up to 200kN/m, it is ideal for use in these infrastructure applications to provide cost effective, soil reinforcement.

The Terramesh[®] units had 3m long geogrid tails (including a fascia basket width of 0.8m) and were supplemented by Paragrid[®] 80/05 geogrids with 5-10m lengths for the soil reinforcement. The solution was designed using the MacSTARS mechanically stabilised earth wall software.

The wall was to be vertical to reduce the footprint of the structure.

Client:

DEPARTMENT OF TRANSPORT (KZN)

Main contractor:

CHRIS AFRICA CIVILS

Designer:

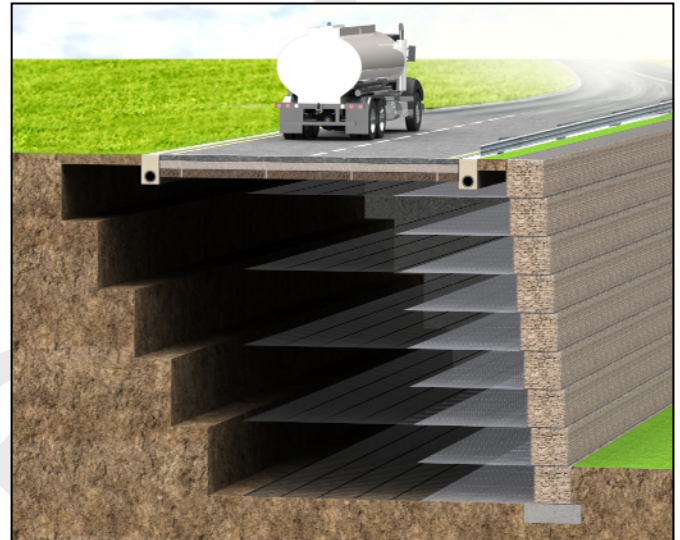
SAMANI CONSULTING

Products used:

PARAGRID[®] 80/05, TERRAMESH[®], MACTEX[®] N20.2, MACDRAIN[®]

Date of construction

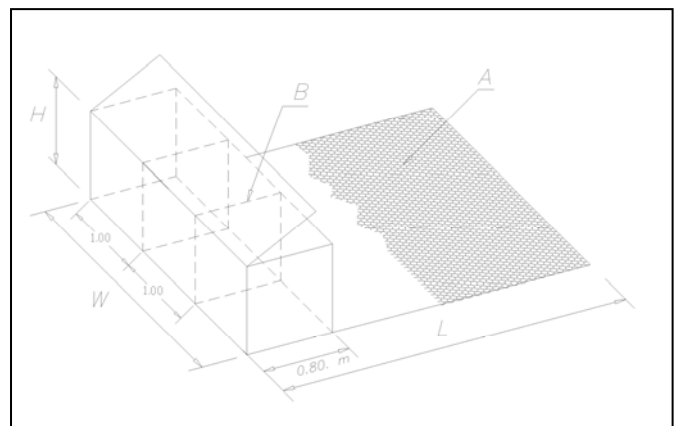
March - June 2013



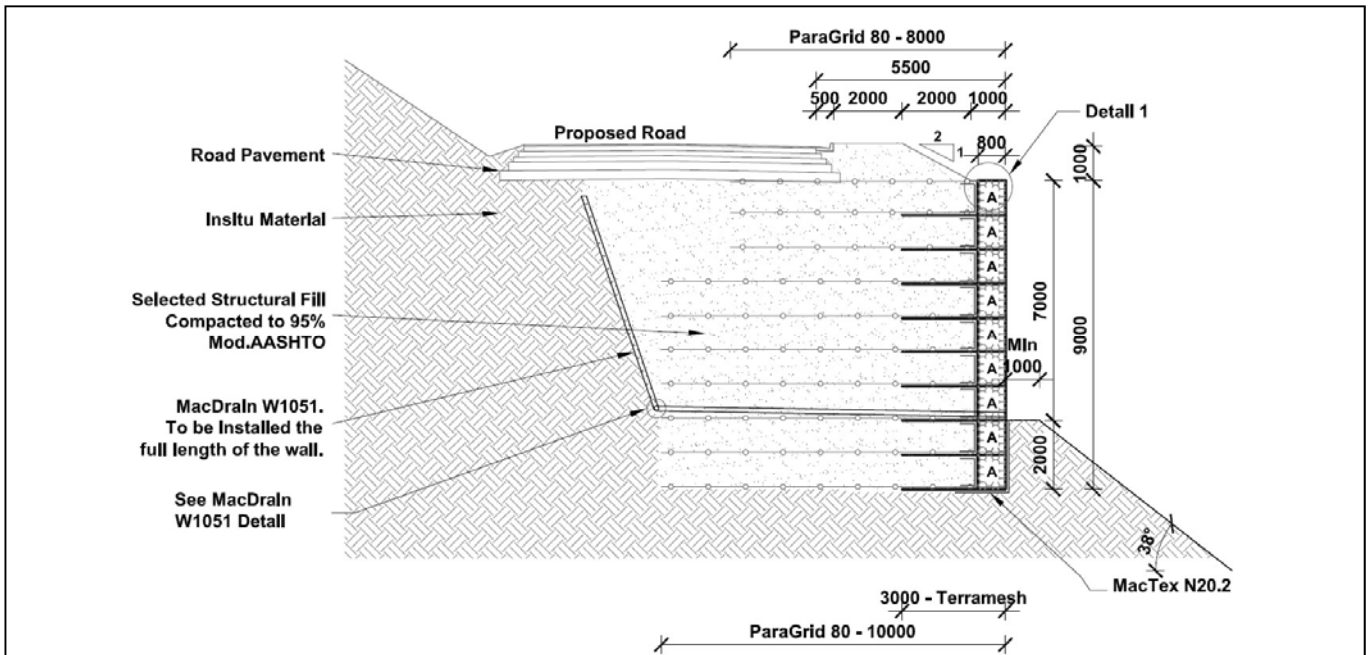
Schematic of Terramesh reinforced soil structure



Excavation to foundation level



Schematic of a Terramesh unit



Typical cross section through Terramesh reinforced soil wall

The selection of the Terramesh® and ParaGrid® hybrid solution was not only based upon technical performance; it offered numerous other benefits for this project.

- Due to the remote location of the project Terramesh® has an added advantage of being easily transported and stored on site
- Easy to install - The assembly and installation of the Terramesh® units requires minimal skilled labour
- The use of Terramesh® promotes the creation of employment with the use of unskilled labour. This supports the South African government strategy of job creation within the Expanded Public Works Programme (EPWP)
- Cost effective: Terramesh requires significantly less rock fill than other solutions, including gabions
- The ParaGrid® geogrid can be used with most types of backfills, including marginal fills. This often enables the re-use of site-won materials as structural backfill, which reduces the amount of imported materials, saving project cost and time.
- Terramesh® System is a flexible structure which is able to withstand the loads and vibrations that may be present during and after construction of the road

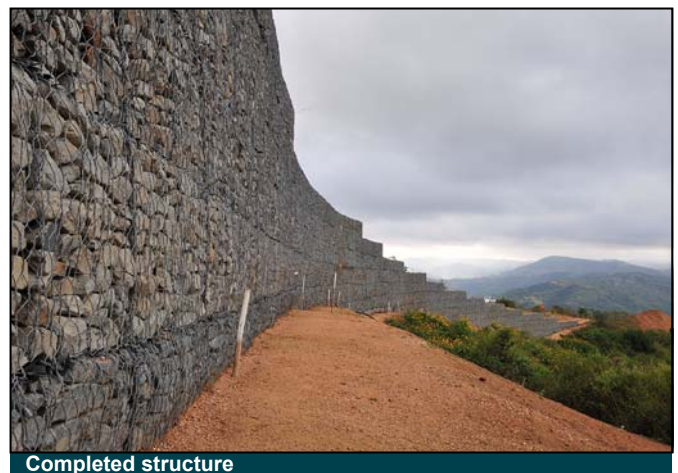
Under storm events, the project engineer wanted to prevent the structural backfill becoming saturated and weakened by static water within it. Accordingly, Maccaferri proposed the inclusion of the drainage geocomposite MacDrain® as a chimney drain and subsoil drainage within the reinforced soil mass.

Construction monitoring was implemented by the project team to ensure that compaction of the structural fill did not disturb the final verticality of the front face of the wall.

Structural backfill complied with SANS 207.



Filling the Terramesh fascia units with stone



Completed structure

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