



KAYTECH CASE STUDY

COMPOSITE GEOGRID SOLUTION FOR EFFICIENT ROAD EMBANKMENT CONSTRUCTION

GEOSYNTHETICS USED

RockGrid® PC is a high-strength, composite geogrid offering high modulus characteristics for reinforcement resulting in minimal structural deformation.

RockGrid® PC 100/100 provides the following functions;

- Reinforcement
- Separation
- Filtration



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PROJECT DESCRIPTION

The Baden Powell Road leading to Stellenbosch underwent significant upgrades, including converting a single carriage-way to a dual carriage-way along the Spier route (R310) to Polkadraai (M12) and widening the bridge near Vlottenburg Road turnoff.

A BETTER SOLUTION

Widening the Vlottenburg bridge on a busy road posed a significant challenge. It required an innovative approach to construct a lateral support system that would stabilise the road embankment's earth mass. Traditional methods, such as sheet piling, soil anchoring, and soil nailing, were not only time-consuming but also increasingly expensive. To overcome these challenges, Baseline Construction took a different approach, working with PeraGage Consulting Engineers to use composite geogrid technology to improve the stability of the site.

The alternative Kaytech solution comprised a wrap-around system utilising RockGrid® PC 100x100kN/m, designed in accordance with SANS 8006-1:2018. The composite geogrid's function is to resist driving forces caused by the self-weight of the soil and applied surcharges. Many academics highlight that composite geogrids excel in distributing loads and reinforcing the soil mass, creating a composite soil mass with greater shear strength and stiffness than soil alone.

The stability of the composite soil mass is enhanced through mechanisms such as lateral restraint, increased shear strength, stress redistribution, reduction of lateral earth pressure and frictional interaction between soil and the composite geogrid. Composite geogrids provide effective lateral support and stress redistribution, making them ideal for embankment stability in high-load applications.

A wrap-around wall system using a composite geogrid, designed per SANS 8006-1:2018, includes checks for overall stability against sliding, overturning, and bearing capacity failure. Internal stability analysis also includes assessments of tensile failure and pull-out resistance. The RockGrid® PC wrap-around wall at Vlotenburg was designed to remain stable and safe throughout its design life under various loading and environmental conditions, demonstrating the long-term reliability of composite geogrids.

In summary, RockGrid® PC offered a cost-effective and versatile alternative to traditional methods. By reducing construction labour hours, excessive import material expenses and in totality construction time. RockGrid® PC significantly contributed to project savings while its durability minimises maintenance needs, enhancing long-term cost efficiency. Its adaptability to various site conditions and project requirements ensures flexibility in design and implementation, underscoring the essential role of composite geogrids in modern infrastructure projects.



Excavation taking place near the RockGrid® PC wrap-around system.



Side view of the RockGrid® wrap-around system.



Behind the RockGrid® wrap-around system.



Excavation work with soil nails and shotcrete stabilisation in progress.

Did you know?



Permanent Solution

Although initially planned as a temporary measure, the RockGrid® PC 100/100's exceptional reinforcement properties allowed it to become a permanent feature, improving the road embankment design.



Cost Savings

The RockGrid® PC wrap-around system saved costs by eliminating the need to remove temporary works before each lane construction, unlike traditional methods.



Construction Efficiency

The RockGrid® PC system integrated smoothly into the permanent structure, reducing construction time and removing redundant steps.