

CASE STUDY

EnviroROCK® 3PL composite geosynthetic soft wrapped-wall coastal erosion protection system

Oct 2017

Client Situ Island Resort

Product EnviroROCK® 3PL geocontainer composite Rep Julian Maastrecht

Situ Island Resort is situated in the most southern section of the spectacular Quirimbas National Park, Mozambique. Situ Island forms part of the Quirimbas Archipelago – 28 islands of which 11 are coral islands between the towns of Pemba in the south and Palma in the north. The resort is located in a protected cove on the northern shore of Situ Island and within the sheltered bay of Baia do Quipaco. The rustic clubhouse and 8 chalets are situated along the sandy beach, within a few metres of spring high tide reach. The chalets are linked to the clubhouse through a concrete walkway between the water's edge and structures.



Problem

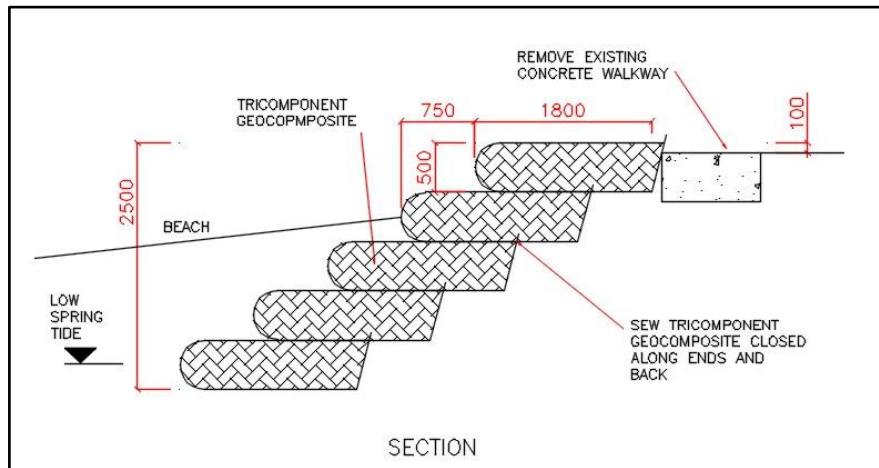
The beach was slowly being eroded by strong currents resulting from a spring tide that ranges up to 4m. The concrete walkway was undermined and had collapsed forward towards the sea. Efforts were made to reinstate the walkway using round boulders, but material was limited as all rock had to be brought in by boat from the mainland. The resort needed another solution that would limit the requirement of imported materials. EnviroROCK® 3PL geocontainers provided the ideal solution as they are sand-filled and sand is abundant on the island. However, there are no roads or vehicles on the island, so filling and placing the 3 ton EnviroROCK® 3PL geocontainers was not possible. Another solution was required.

Solution:

The answer was to construct the EnviroROCK® 3PL geocontainers in-situ, using hand labour only. The EnviroROCK® 3PL wrapped-wall system consisted of 5 layers, 500mm thick to a height of 2.5m. EnviroROCK® 3PL was supplied in 4.6m wide by 50m rolls. Each layer was set back 750mm with a width of 1.8m. EnviroROCK® 3PL was hand-sewn closed along the edges and the back. Using a soldering iron, holes were burned 25mm from the edge at 25mm c/c for the sewing closure, creating long geocontainers. EnviroROCK® 3PL geocomposite was preferred for this system to ensure the holes formed for sewing do not stretch open under load. The final location of the EnviroROCK® 3PL sea wall was marked out, using long bamboo survey poles.



CASE STUDY



Typical section of EnviroROCK® 3PL geo-tube system



Excavation of foundation



making holes for stitching



Placing of EnviroRock 3PL in position



hand filling tubes

CASE STUDY



sewing the back closed

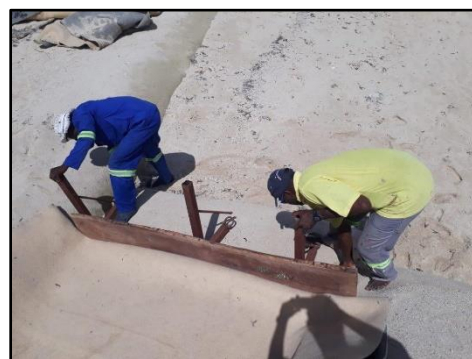


Sewing edges and filling corners

A 1.8m wide by 50m long foundation was excavated to low spring level during the dropping tide, EnviroROCK® 3PL placed into position and rapidly filled by spade and wheelbarrow. This was water compacted before pulling the EnviroROCK® 3PL geocomposite cover layer over and hand-sewn along the sides and back. All work had to be completed 3 hours before the high tide. Subsequent layers were then contained within a frontal formwork. The rear of the structure was sand-filled to level, providing support for the formwork. However, this was not possible along the sea-facing frontage. Vertical stakes were not feasible as formwork supports as the EnviroROCK® 3PL tubes were set back, overlying the EnviroROCK® 3PL tubes beneath. There was also insufficient support within the soft saturated sand to accommodate long props placed along the sloping beach in front of the EnviroROCK® structure. The solution was to use support brackets with an underlying long flat section, placed at regular intervals between the overlying and underlying EnviroROCK® 3PL tubes. These were easily pulled out once the EnviroROCK® 3PL geocontainer had been filled and sewn closed.



Formwork support brackets



Placing formwork and brackets under EnviroROCK®

CASE STUDY

Outcome:

The final finish is multiple layers of a nonwoven, coarse, beige, soft, rounded tubes. The coarse outer layer of EnviroROCK® 3PL entraps 2 to 3 kg sand/m² for added UV and damage protection. The system is flexible and blends into the natural features of the coastal environment. Wave energy is absorbed; minimising scour and wave bounce back, which is a threat to beach users. EnviroROCK® 3PL is not affected by pedestrian traffic and provides a soft, but firm structure for seating. The system has performed above expectations and in July 2020 the shareholders extended the seawall using the same technique. 7 years later the distinct line of protection can be clearly seen on Google Earth, while on the ground it is barely visible as a bump in the sand.



July 2020

