

GEOWEB®

FLEXIBLE HARD-ARMOR SHORELINE PROTECTION

Solimões River, Brazil

PROJECT TEAM:

PROJECT OWNER
Petrobrás

PROJECT ENGINEER
Roma Engenharia e
Consultoria Ltda.

CONTRACTOR
Tenenge/CNO-JPE

MATERIAL SUPPLIER
Mexichem Bidim



Top Photo: Lifting the flexible GEOWEB sections after the concrete is cured in preparation to transport.

Bottom Photo: Completed concrete-infilled GEOWEB system covers the shoreline slope.



CONCRETE GEOCELL COVER PROTECTS SHORELINE SLOPES

PROJECT LOCATION

Coari, Amazonas, Brazil

PROJECT CHALLENGES

Downstream from the Petrobrás oil storage yard on the bank of the Solimões River in Brazil, a shoreline embankment 1,200 ft. long and 80 ft. tall was exposed to very intense and prolonged erosion. Width variations of up to 3,000 ft. were observed at some points of the river.

The erosion was due to the variation of the water level of more than 40 ft., the sand content of the local soil, and waves up to 3 ft. high caused by the wake of passing boats. Fearing this erosive process might impact the operations in

the oil storage yard, the owner sought a solution to contain the embankment soils through surface coating.

FLEXIBLE GEOWEB SOLUTION

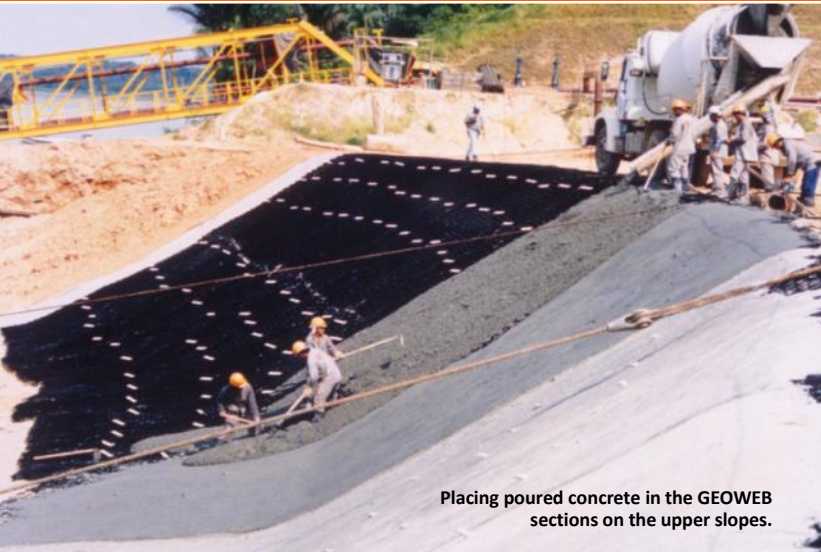
At the upper part of the slope, the Presto GEOWEB® geocells were installed and infilled with concrete on site. The bottom of the slope that extended underwater presented a different challenge.

The unique ability of the GEOWEB sections to remain flexible, even when filled with concrete, allowed them to be filled with concrete at the construction site, then transported on barges to the protection area, lifted, and put in place underwater.

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Placing poured concrete in the GEOWEB sections on the upper slopes.



Installing concrete in the GEOWEB sections on the upper slopes.

Eroded lower slopes before repair.



4 Photo Group Above:

Top Left: Lifting the cured concrete filled GEOWEB sections with steel cables.

Top Right: Transporting the GEOWEB sections to the site via barge.

Bottom Photos: Placing GEOWEB flexible mats on the underwater portion of the slopes.

PROJECT SUMMARY

Approximately 150,000 sf of the GEOWEB material GW30V4 and GW40V4 was placed and anchored on slopes varying between 50 and 75 feet in length.

The GEOWEB system with its inherent flexibility was an ideal solution for the challenges at this site. **The adaptability of the GEOWEB system allowed it to be constructed to provide erosion protection for both the upper and lower embankments.**

ADVANTAGES OF THE GEOWEB SOLUTION

The GEOWEB system proved to be a good solution for this site as it offered the following advantages:

- fast deployment to the site.
- fast installation of the GEOWEB sections and infill of the cellular structure with concrete on the upper slopes without need for additional formwork.
- ability to adapt the GEOWEB system to the irregular slope surface while maintaining its integrity.
- ability to create flexible mats with the concrete-filled GEOWEB sections for underwater placement.
- eliminated the need to import expensive rip rap.

Completed GEOWEB shoreline protection photo below.

