

**MSE WALL FOR SLOPE PROTECTION AT KARIANGAU OFFSHORE  
BALIKPAPAN, EAST KALIMANTAN, INDONESIA**

Reinforced Soil Walls and Slope Reinforcement

**Problem**

Kariangau Offshore Supply Base (KOSB) Fuel Terminal is a fuel terminal located in Balikpapan, East Borneo. It serves as fuel storage for various industries.

The Client needed a retaining structure for slope protection of the access road that connects the port and the fuel terminal. Few slope failures and erosion occurred from 2015 and slope remediation already been done in 2016. While the area has a low seismicity level, there is a presence of coal and clay shale at the project location this could be the cause of the problem if appropriate measures are undertaken. Certain substances of coal, typically the iron sulfide (FeS<sub>2</sub>) can be oxidized after being exposed to air and water, therefore they have the potential to damage the retaining structure if the adequate coating of the system is not applied. The clay shale, while hard with high shear strength when dry, can lose its shear strength when exposed to air and water.

The slope to be protected has various height, ranging from 20 - 30 meters. The initial solution was mass gravity retaining structure with gabion and woven geotextile.

**Solution**

PT. Maccaferri Indonesia proposed the hybrid MSE Wall structure called Terramesh System as an alternative to mass gravity retaining structure with gabion. Mainly, the Terramesh System consists of anchored gabion made from double twisted steel wire hexagonal mesh called Terramesh and woven polyester geogrid called MacGrid WG. The Terramesh units, considering the presence of the coal layer at the project location, were coated with Zinc 95% - Aluminium 5% and PVC. The MacGrid WG is also coated with PVC to maximize its durability.

To prevent water infiltration to the system, drainage geocomposite called MacDrain was installed behind. The erosion control mattress called MacMat EM was installed to protect the slope above the Terramesh System from water runoff, wind, etc. that can cause erosion.

The structure was designed using limit equilibrium method software. Both static and seismic analysis has been performed. Finally, the hybrid MSE Wall solution called Terramesh System proposed gave savings of the material cost of nearly 38% comparing to mass gravity structure with gabion and woven geotextile.

**Client:** PT. Petrosea, Tbk.

**Designer / Consultant:** PT. Zekon Indonesia

**Contractor:** PT. Petrosea, Tbk.

**Products used (Qty.)**

- Terramesh	3,825 sqm
- MacGrid WG	3,825 sqm
- MacTex Non-woven Geotextile	3,825 sqm
- MacDrain M	3,825 sqm
- MacMat	3,825 sqm

**Date of construction:** 01/2019 - 09/2019



Original Condition



Terramesh System Installation

PROJECT PETROSEA  
11/03/2019 07:35



PROJECT PETROSEA  
12/02/2019 08:24:12

Terramesh System Installation



PROJECT PETROSEA  
16/02/2019 11:20:49

Terramesh System Installation



MacMat EM Installation



After Construction

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