

REINFORCED SOIL SUPPORTS MOUNTAIN ROAD
AL JAIS, RAS AL-KHAIMAH, UAE

SOIL REINFORCEMENT / SLOPE PROTECTION

Product: Terramesh[®], Paralink[®]

Problem:

The highest peak in the UAE is Al Jais, located in the Northern Emirate of Ras AL-Khaimah, 25 Km away from the main town. Al Jais is a small community, but being 10° cooler than the main cities in the UAE, the project developers believed it could be a viable tourist destination.

Accordingly, a tourist resort is planned at Al Jais, and in later stages, there is the ambition to developing further hotels, ski slopes, a golf course and associated cable cars.

The proposed development consists of 36km of new road rising to 1700m. The construction in this mountainous area required extensive cut and fill earthworks; many sections run alternately through large steep embankment fill sections and slope cuts with retaining structures.

Between Ch20+350 and Ch20+575 a near-vertical structure was required reaching a maximum height of 32m to retain the new road. Furthermore, this site receives occasional rainfall & snowfall, during which flash floods are common which have washed-out entire roads and embankments. Therefore, the tall retaining structure solution had to be free draining to limit the build up of water pressures behind it.

Solution:

Maccaferri was awarded the contract for the design, supply and construction supervision support of the retaining walls. From the range of solutions offered, the "ParaMesh" system was selected as it offered significant advantages to this mountain road project.

"ParaMesh" is a composite soil reinforcement system featuring two types of soil reinforcement:

- Terramesh[®] System - A steel wire double-twist mesh gabion fascia unit with an integral geogrid soil reinforcement to prevent sloughing failure of wall face
- ParaLink 300 - A unique high strength polyester geogrid (Primary reinforcement) placed in layers with vertical spacing varying from 1m (at wall bottom) to 2m (at wall top).

Client:

PWD, RAS AL KHAIMAH

Main contractor:

GENERAL MECHANIC COMPANY

Consultant:

HALCROW

Designer:

MACCAFERRI MIDDLE EAST

Products used:

TERRAMESH SYSTEM:	3x2x1	- 1,400pc
	3x2x0.5	- 870pc
PARALINK 300:	32,400m ²	
TERRAM 1000 GTX:	6,000m ²	

Date of construction

NOV 2012 - AUG 2013



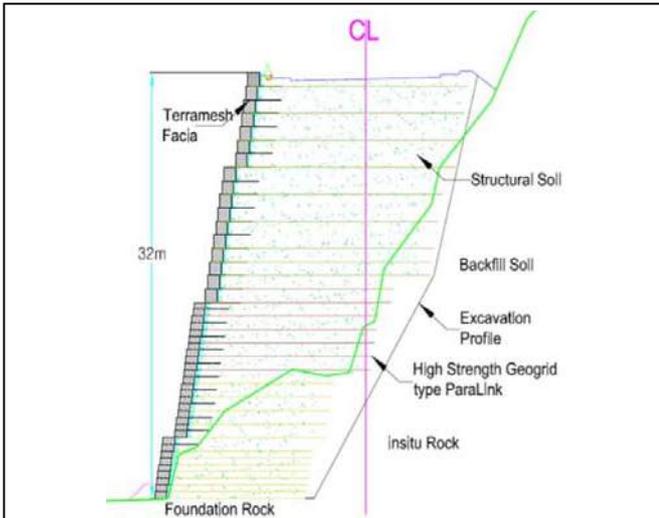
Al Jais Mountain Road Project location (Google Earth)



Typical cut and fill operations on project site



Excavation at 'ParaMesh' wall location



Cross section of structure at highest point



Installation of geotextile at back of Terramesh unit

Maccaferri Middle East supported the scheme designer, Halcrow with the design of the soil reinforcement structure, using the MacSTARs W design software.

The total face area of the wall is 3,670m², ranging from 5-32m high. A geotextile was detailed to separate the native soil and structural backfill materials.

The ParaLink primary soil reinforcement is placed between layers of Terramesh units. Structural backfill is compacted in layers upon the geogrid which reinforces the soil. Paralink features the toughest protective sheathing in the geogrid marketplace, and thus a wider range of structural backfills can be successfully used in the design and construction. This enabled the re-use of locally-won graded backfill material with boulders being conveniently used within the gabion fascia. These initiatives resulted in considerable cost and environmental savings in the project.

Being deep valleys, construction access at the toe of the wall was challenging and hence progress of the ParaMesh wall was initially slow. Productivity increased as the wall height progressed resulting in longer stretches of backfill for compaction. When actual conditions found on site varied from the design conditions design revisions were implemented, but due to the flexibility of the Terramesh system, the units could be easily modified on-site to suit conditions.

The flexibility, simplicity of construction, free-draining nature and ability to re-use site won materials made ParaMesh an ideal solution on this project.



Compaction of backfill onto Paralink geogrid reinforcement



Wall nearing completion



Panoramic view showing the series of soil reinforcement structures and the precarious nature of the construction location

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