ARAMEX DUBAI LOGISTIC CITY FACILITY EXPANSION
DUBAI WORLD CENTRAL, DUBAI, UAE

REINFORCED SOIL RETAINING WALLS / SLOPE PROTECTION
Product: Terramesh System, ParaLink, Geotextile.

Preamble:
A strategic initiative of the Government of Dubai, Dubai World Central (DWC) is a master-planned city around the Al Maktoum International Airport, the largest airport in the world when complete. Covering an area of approximately 145 square kilometers, DWC represents a self-sustained ecosystem that seamlessly integrates this global trade, business, logistics and aviation hub with a smart and sustainable urban city development. DWC will ultimately support a population of one million people. The city is now home to World Expo 2020.

Aramex Middle East decided to expand their new facilities at Dubai Logistics City, one of the region’s most important hubs for transportation and logistics to be able to maintain their leadership position in the Region.

Problem:
In the proposed plot for expansion facilities, there exists a level difference of 8m along a length of 500m that necessitated the planning of nearly vertical retaining walls, restricted by parking areas required at heel side and a drive way at top retained side.

The driveway above the retaining wall is expected to have high traffic load @ 50KPa due to the heavy logistics of Aramex Cargo facility. Due to the proximity of the project location to the recent earthquakes in the region with epicenter at Iran, the retaining walls has to be significantly seismic resilient. The building structures and the roads were designed for a design life of 100 years; hence the retaining wall should have a design life of minimum 100 years.

The originally proposed solution by the consultant was heavy gravity retaining walls using 35,000 pieces of gabion units requiring approximately 8,800cum of stones.

The project is a fast track type that requires the whole construction to be completed in less than one year.

For the main contractor M/s. Amana Steel Building & Contracting LLC, the main concern from the beginning was the time required

Client:
ARAMEX EMIRATES LLC
Main contractor:
AMANA STEEL BUILDINGS CONTRACTING LLC
Consultant:
GLOBAL ENGINEERING CONSULTANTS
Designer:
MACCAFERRI MIDDLE EAST LLC
Products used & BOQ
Terramesh System Size 3 x 2 x 1 : 1540 Nos
ParaLink 200kN/m Geogrid : 4,500 sqm
ParaLink 100kN/m Geogrid : 3,600 sqm
Terram 1000 Geotextile : 5400 sqm
Construction info:
Start Date: Feb 2015
Completion Date: Oct 2015
for construction and hence the delay that could happen from the gabion retaining wall which involves 35,000 number of individual gabion units and 8,800 cum of stones (which had to be imported from the other Emirates like Fujairah or Ras Al Khaimah).

Solution:

As a solution to the major problems highlighted in previous sections, the Contractor proposed to the 'client & consultant', the Maccaferri ParaMesh System type reinforced soil retaining wall. As the proposed system will achieve the same final stone finish looks like a gabion wall in addition to other benefits, the client approved the proposal of changing the tender solution of retaining walls from gravity gabion type to ParaMesh Reinforced Soil Wall type. Accordingly, Maccaferri was subcontracted for design, supply and construction supervision assistance of the 4m-8m high and 500m long retaining wall for this project.

Typically, ParaMesh is a composite soil reinforcement system with different types of soil reinforcement used.

Maccaferri Products used:
- Terramesh system, a double twisted steel wire mesh unit which forms the facia with the aesthetics of gabion but also with the reassurance of a secondary soil reinforcement to prevent sloughing failure of wall face.
- ParaLink 200 & 100, a high strength polyester geogrid (Primary reinforcement) with a 2 meter vertical spacing.
- Geotextile which act as a separation media for soil & aggregate materials.

The constructed total facia area of retention is 2900m²

The soil investigation results indicated that the foundation soil site stratigraphy is generally consistent with dense layers of calcareous sand overlying moderately weathered conglomeratic sandstone.
Maccaferri design output (In house Macstars W Software) for 8m high ParaMesh Wall for Global Stability & Wall Checks

Technical details of anchorage of Terramesh facia and final finish of installation at site

Construction of Pavement layers at top of ParaMesh retaining wall and typical details of crash barrier constructed
<table>
<thead>
<tr>
<th>Parameter</th>
<th>ParaMesh Wall</th>
<th>Gabion Wall</th>
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</thead>
<tbody>
<tr>
<td>System Type</td>
<td>Reinforced Soil Wall</td>
<td>Gravity Wall</td>
</tr>
<tr>
<td>Stone Quantity</td>
<td>2,900 cum</td>
<td>8,800 cum</td>
</tr>
<tr>
<td>Design Life</td>
<td>Designed for 120 years</td>
<td>Not known, but lesser than project require-ment of 100 years</td>
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<tr>
<td>Construction Time</td>
<td>Involves 1,450 pcs of Terramesh units and hence faster</td>
<td>Involves 35,000 pcs of Gabion units and hence slower</td>
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<tr>
<td>Seismic Resistance</td>
<td>Higher Seismic Resistance</td>
<td>Lesser Seismic Resistance</td>
</tr>
<tr>
<td>Settlement</td>
<td>Less as only 1m thick facia is filled with stones @ 35% porosity that undergoes settlement. Rest of the zone is filled with compacted fill</td>
<td>High as a larger width (upto 5m max.) at back of the wall face is filled with stones @ 35% porosity that results in more settlement.</td>
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<tr>
<td>Cost</td>
<td>Overall reduction in cost</td>
<td>Relatively Higher</td>
</tr>
</tbody>
</table>

Techno-commercial comparison between Maccaferri ParaMesh Solution Vs Gabion Wall Solution in Tender.