**Walls and Slopes**

**Geosynthetic Reinforced Soil**

**Dead Sea, Jordan, Middle East**

*Fortrac® MP* Geogrids reinforced a 17.0 m high soil slope

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**Project description and conditions**

As part of the Hilton resort project at the Dead Sea, Jordan, a 17.0 m tall, 70 m long reinforced soil slope at 70 deg from horizontal with steel mesh facing and *Fortrac® MP* geogrids was constructed. The wall is designed as a permanent structure taking into account the planned building loads at the upper reached level. The owner, Emaar International Jordan, requested that the proposed retaining and protection system be robust, constructed relatively fast and adopting with the general aesthetics of the site. This is also to match with the future construction for slope protection.

Fill material, composed of a mixture of boulders with alluvial soils are available within or just at boundary of the site. This fill is described as rock-soil.

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**HUESKER’s solution and features**

HUESKER Middle East team offered reinforced soil slope with galvanized steel mesh and infill rock fragment facing, referred to as “Half Gabion”. The steel mesh consisted of Ø 8 mm diameter steel bars at 20 cm spacing. To enable the use smaller diameter rock fragments within the half gabion face, a twisted wire net was also used (tied to the main steel mesh rebars). This way, the facing was filled by 5.0 – 45 mm rock fragments.

**Half gabion facing**

**Fill**: Rock-soil (boulders and alluvial mixture) was used as the reinforced and retained fill. This type of rock-soil
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can be constructed in 60 cm compacted lift-thickness. However, for the lower (30 cm spaced geogrids), 30 cm lifts were used.

**Design:** This system can be used with any Fortrac® geogrid types, however, based on availability the choice was made to use Fortrac® MP geogrids. These correspond to short-term (ultimate) strength from 35.0 kN/m to 110.0 kN/m. The design was performed by HUESKER-Middle East based on the Allowable Stress Design (ASD) design method, the bottom portion of the wall was designed based on 30 cm vertical spacing, the remaining height at 60 cm spacing. The design was covered by the Professional Indemnity Insurance.

**Construction:** The wall was constructed by our Jordan agent GES. Direct full-time supervision was furnished by HUESKER’s Middle East experienced staff, with daily and weekly reports submitted to the main project consultant, Arabtech Jardaneh (AJ).

**Quality assurance:** The construction quality assurance was accomplished through an independent laboratory by performing In-situ Plate Bearing Test according to the German DIN 18134 “Determination of Deformation and Strength Characteristics of Soil by Plate Bearing Test”. This test is the most appropriate for construction quality assurance when fill is composed of rock-soil.
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Features

• Robust system
• Rapid construction
• Adopted on-site and nearby rock-soil fill
• Highly tolerable system in terms of deflections
• Attractive finish with high engineered value
Project: Hilton Resort Protection
Wall/Slope
Height: 17.0 m, Length: 70.0 m

Location: Dead Sea, Jordan - Middle East

Client: Emaar International Jordan

Contractor: GES, HUESKER’s agent - Jordan as a subcontractor to Abu Halimeh Contracting Co.

Actual Work/construction Days: 28 days

Year: 2011

Products:
- Fortrac® 35/20-20/30MP
- Fortrac® 55/25-20/30MP
- Fortrac® 80/25-20//30MP
- Fortrac® 110/25-20/30MP