

SLOPE PROTECTION WORKS AT ZIRAKPUR-PARWANOO SECTION NH-22 ZIRAKPUR, NORTH, INDIA

Slope Protection

Problem

The Zirakpur-Parwanoo section of the NH22 highway is situated in the Shivalik range and passes through Punjab, Haryana and Himachal Pradesh, in Northern India. It was found that the highway is affected by the rockfall from the slopes above. The local strata is composed of shale, sandstone, medium and small sized rock fragments as well as mixed strata of fine grained soil and medium sized rounded boulders exist along certain stretches. The maximum height of the slope was about 150m.

Therefore any rockfall mitigation measures had to be tailored to the varied geology of the area. Three distinct zones of hazard were identified on the rocky slope above the highway:

- 1) Large boulders and exposed rocky outcrops.
- 2) Medium rock fragments.
- 3) Fine grained soils and smaller debris.

Solution

The highway concessionaire (Himalayan Expressway Ltd), Jaypee approached Maccaferri for providing a solution to overcome the slope hazards.

The entire slope area was divided into three distinct zones. The zone where larger boulders and rocky outcrops were encountered, High Energy Absorption panels (HEA Panels)- which has characteristics of high tensile strength and stiffness, were installed. HEA panels has minimal deflection under load which is ideal to prevent large boulders detached from the slope.

The areas where medium rock fragments were observed, Steelgrid BO was proposed and installed.

Finally, in areas where finer particles were observed, the Steelgrid BO was used in conjunction with erosion control mat- MacMat R. It is used for providing immediate, high-performance erosion control and root reinforcement for re-establishing vegetation on vulnerable slopes.

Top anchoring was done using an anchor trench wherever applicable. The meshes were secured on the rock slope using 2m long top anchors of 25 mm dia, surface anchors 0.5 m long of 25 mm dia, and bottom anchors 1m long of 16mm dia.

Client: NATIONAL HIGHWAYS AUTHORITY OF INDIA (NHAI)

Designer / Consultant: ICT PVT. LTD

Contractor: Maccaferri Environmental Solutions Pvt Ltd.

Products used (Qty.)

- HEA Panels	6,628 sqm
- Steelgrid	22,680 sqm
- MacMat	11,060 sqm
	25mm dia- 3069
- Anchor Bar	RM, 16mm dia- 532 RM

Date of construction: 08/2011 - 06/2012



Photo 1: Photograph showing variable strata present at site



Photo 2: Before installation of slope protection measures - August 2011



Photo 3: Photograph showing Steelgrid BO on rocky slope - April 2012



Photo 4: Photograph showing Steelgrid BO on slope



Photo 5: Photograph showing MacMat R used in conjunction with Steelgrid BO



Photo 6: View after installation of slope protection measures - April 2012