

NH22 HIGHWAY SAFETY IMPROVEMENTS
ZIRAKPUR, INDIA

ROCKFALL PROTECTION

Product: HEA Panels, Steelgrid® BO, MacMat® R

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 identified that the highway could be affected by 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 total height of the slope is about 150m.

Therefore any rockfall protection measures had to be tailored to the varied geology of the area.

Three distinct zones of hazard were identified on the rocky slopes above the highway;

- Large boulders and exposed rocky outcrops
- Medium rock fragments
- Finer grained soils and smaller debris

Solution adopted:

Maccaferri was approached by the highway concessionaire, Jaypee, to propose some solutions to overcome the slope hazards.

For the zones where larger boulders and rocky outcrops were encountered, High Energy Absorption panels (HEA Panels) were installed. The mesh needed a combination of high tensile strength and stiffness; i.e. the mesh has minimal deflection under load; ideal to prevent loose boulders moving on the slope,

In areas where medium rock fragments were expected, Steelgrid BO was proposed and installed.

Finally in areas where finer particles were to be expected, the Steelgrid BO was used in conjunction with MacMat R.

The various meshes were secured to the rock slope with top, bottom and local intermediate anchors where required.



Variable strata added complexity to the solutions



Steelgrid BO during installation



Steelgrid BO during installation

Client:

NATIONAL HIGHWAYS AUTHORITY OF INDIA

Main contractor:

MACCAFERRI ENVIRONMENTAL SLNS PVT LTD

Designer:

JAYPEE GROUP—HIMALAYAN EXPRESSWAY LTD

Products used:

HEA PANELS, STEELGRID BO, MACMAT R

Date of construction

2012

HEA Panels are the stiffest and highest strength meshes in Maccaferri's rockfall mitigation range. They are engineered from a single high tensile steel wire cable, laid into a grid configuration with a patented knot connection at each crossing point. This provides the HEA Panel with 25% higher stiffness than traditional steel cable net panels with clipped node connections.

Furthermore this junction connection enables the panel to be far better at resisting puncturing from bursting forces and tearing under extreme loads. This makes the HEA Panel ideal for demanding applications and is used with soil nails or anchors where efficiency of load transfer is important to minimise deflection.

Where deflections were less critical, Steelgrid® BO was specified; this is a combination of double twist woven mesh which is interwoven with high tensile steel cables. The 8mm steel cables are inserted longitudinally and transversely at intervals, enhancing the tensile strength of the traditional double twist woven mesh.

Supplied in rolled format Steelgrid® is available in a range of strengths and stiffnesses, enabling the optimisation of the solution for the geological conditions encountered.

MacMat® R is a geocomposite of a 3-dimensional polymeric geomat with an integral steel wire woven mesh reinforcement. It is used for providing immediate high-performance erosion control and root reinforcement for re-establishing vegetation on vulnerable slopes. It is often used in conjunction with soil nails to provide deep seated slope reinforcement in conjunction with surface stabilisation.

By drawing from a wide portfolio of natural hazard mitigation systems, Maccaferri is able to tailor solutions to the specific local conditions encountered; providing more cost efficient and effective solutions for clients.



Steelgrid BO on rocky slope



MacMat R used in conjunction with Steelgrid BO in places



MacMat R surface protection

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