

**RAILWAY CUTTING SAFETY IMPROVEMENTS  
DUDHNOI, INDIA**

**ROCKFALL PROTECTION**

**Product:** HEA Panels, Steelgrid® MO

**Problem:**

The Northeast Frontier Railway, abbreviated as N F Railway, is one of the 17 railway zones in India. It is responsible for rail operations in the entire Northeast of the country and parts of West Bengal and Bihar. The area of the N.F. Railway operations is characterized by exceptional beauty and at the same time by some of the most arduous terrain. This terrain makes any expansion of the network complex and expensive, and the only state in the area with an extensive rail network is Assam.

With a view to improve the passenger amenities, NFR decided to construct a new railway line from Dudhnoi to Mendipathar to connect the Garo Hills in Meghalaya with Assam and the rest of the country. This new line passes through very complex terrain and the new railway track is laid in cutting at a number of locations. To minimize excavation, the side slopes of the cuttings are almost vertical and there is a residual risk of rockfalls onto the track.

A rockfall protection solution was required to minimize the risk of rockfalls disrupting the train operations. Compounding the solution was the limited availability of space between the wall of the cutting and the train envelope.

**Solution adopted:**

Traditional rockfall mitigation solutions using drapery meshes function by controlling the falling rocks behind a containment curtain of drapery mesh. Periodically, the collected rock debris is emptied under maintenance. However, in this instance there was insufficient space between the cutting and the railway to collect rock debris. Therefore a much stiffer mesh system was required. The mesh needed not only high tensile strength, but most importantly stiffness; i.e. it would exhibit minimal deflection under load.

Accordingly, Maccaferri proposed High Energy Absorption panels (HEA Panels) and Steelgrid® MO meshes depending on the geology encountered. These were secured to the rock slope with top, bottom and intermediate anchors on the face.

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.

Client:

NORTHERN FRONTIER RAILWAYS

Main contractor:

MACCAFERRI ENVIRONMENTAL SLNS PVT LTD

Designer:

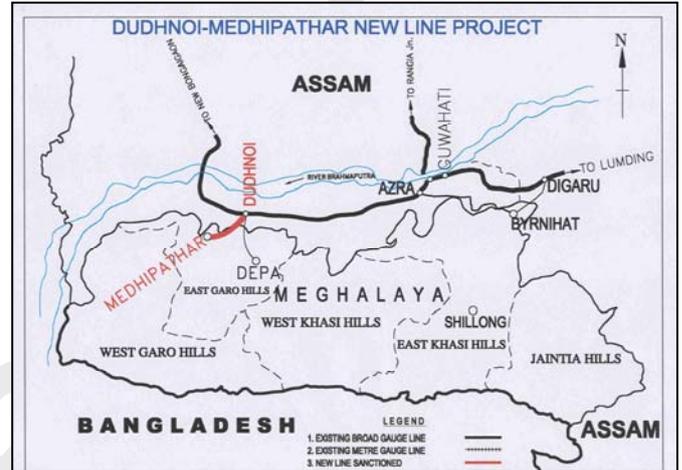
GENSTRU CONSULTANTS PVT LTD

Products used:

HEA PANELS, STEELGRID MO

Date of construction

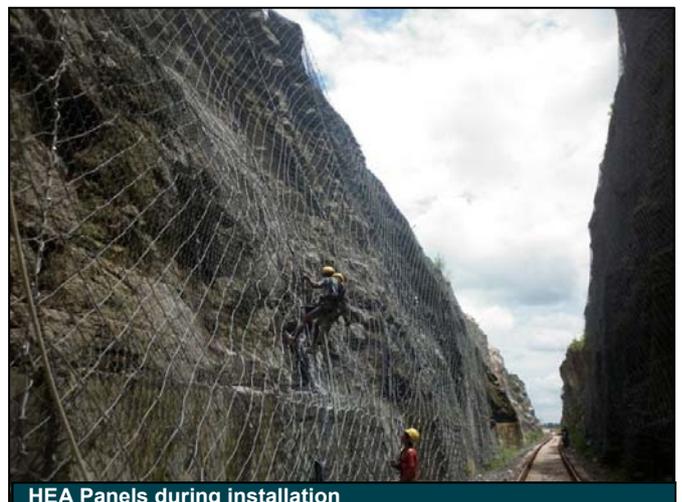
2015



Project location in Northeast India



Cut-slopes before rockfall protection measures



HEA Panels during installation

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

Where deflections were less critical, Steelgrid® MO was specified; this is a combination of double twist steel wire woven mesh which is interwoven with high tensile steel cables. The 8mm steel cables are inserted longitudinally 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.

Top and bottom rope anchors were installed first. Then mid-cutting anchors inserted to target specific geology.

Thereafter, the meshes were unrolled and secured to the slope.



Rockfall protection measures in place



Rockfall protection measures in place



Installing the Steelgrid MO mesh onto the rock slope



The completed project

## Officine Maccaferri S.p.A. Global Headquarters

Via JF Kennedy 10, 40069 Zola Predosa (BO) - Italy

T: (+39) 051 6436000 F: (+39) 051 643 6201

E: [info@hq.maccaferri.com](mailto:info@hq.maccaferri.com)

[www.maccaferri.com](http://www.maccaferri.com)

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