

**ROCKFALL MITIGATION ALONG NEAR AMRUTANJAN BRIDGE,
MUMBAI -PUNE EW
BORGHAT SECTION OF MUMBAI -PUNE EW, MAHARASHTRA, INDIA**

Surface Strengthening and Support

Problem

Mumbai-Pune Express way (officially known as Yashwantrao Chavan Expressway (YCEW)) is India’s first six-lane concrete expressway in Maharashtra connecting the financial capital of India with state cultural capital, Pune. Built along the Sahyadri mountain ranges through passes and tunnels, it is recognized as one of the dangerous expressways prone to a series of rockfall and landslides causing a heavy damage to infrastructure, traffic disruptions and casualties specially during monsoon season. In site near the Amrutanjn bridge, problems of slope stability have been observed on basaltic rocky slopes on either sides- facing express way below and NH4 above.

Solution

After conducting thorough investigation and taking into consideration the observations of geological experts and geotechnical engineers, Maccaferri has offered rockfall mitigation measures with secured drapery over the mesh system installed earlier (which has become ineffective). Systematic anchoring with raster of bolts of 3 to 4m at spacing 3x3m length have been proposed to stabilize unstable blocks of surficial instability and revetment with Steelgrid MO and Diagonal wire ropes has been proposed for alleviation of rockfall from face between the continuously threaded anchors(CTA). In certain stretches for larger instability thickness between 1.5 and m and in the upper portion of the cut, where the rock mass is strewn with vertical and sub-horizontal joints, anchoring by way of rock bolts of 4 to 6m length at spacing of 2.5x2.5m has been proposed along with Steelgrid MO and HEA Panel. Shotcreting is done over red bole (Red tachylytic basalt) patches observed on slope surface. Cable belting is done for loose large isolated unstable blocks on the Pune end of the hill which are dangerously seated on plane dipping towards the expressway, which could not be removed by scaling. Sub-surface drainage pipes were also installed at stipulated locations.

Secured drapery analysis has been carried out for finalizing the nail configuration and mesh selection using Maccaferri’s ‘MacRO Studio’ software.

Client: Maharashtra State Road Development Corporation Limited(MSDRC)

Designer / Consultant: Maccaferri Environmental Solutions Pvt. Ltd.

Contractor: Maccaferri Environmental Solutions Pvt. Ltd.

Products used (Qty.)

- HEA Panels	1500 Sq.m
- Steelgrid	MO-8026 Sq.m
	CTA-
- Anchor Bar	25mm/32mm-3748 RM

Date of construction: 10/2015 - 10/2016

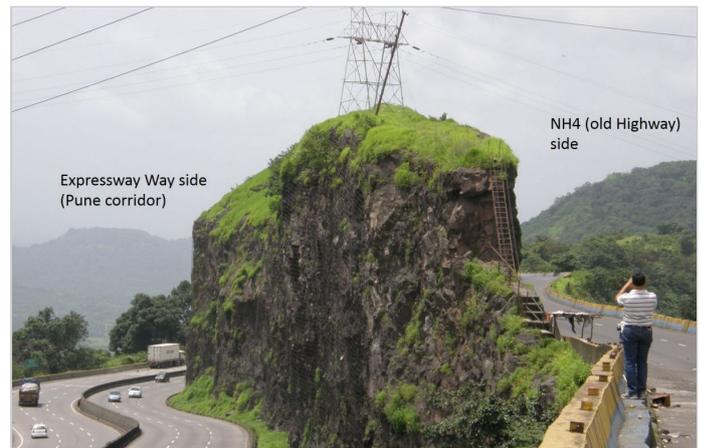


Figure 1- Initial condition of site near Amrutanjn bridge



Figure 2-Steelgrid installation ongoing



Figure 3-Shotcrete work done on Expressway side



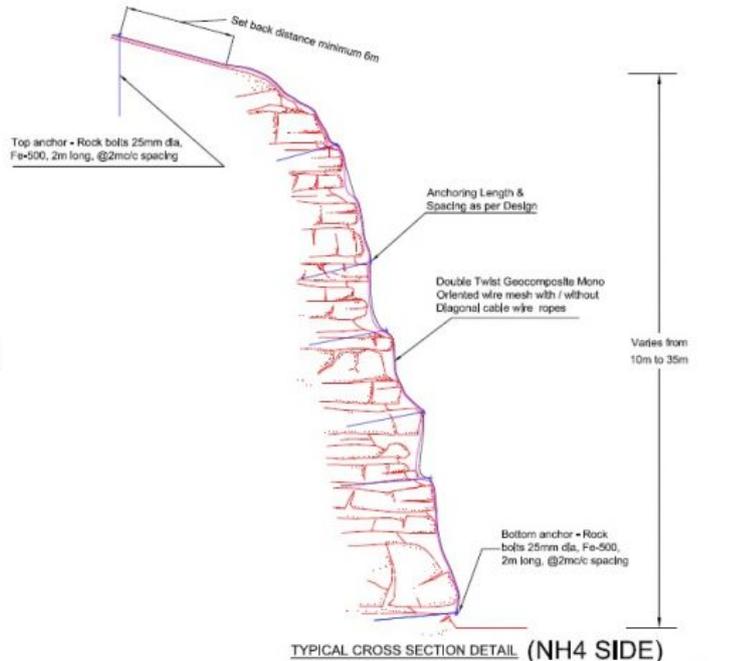
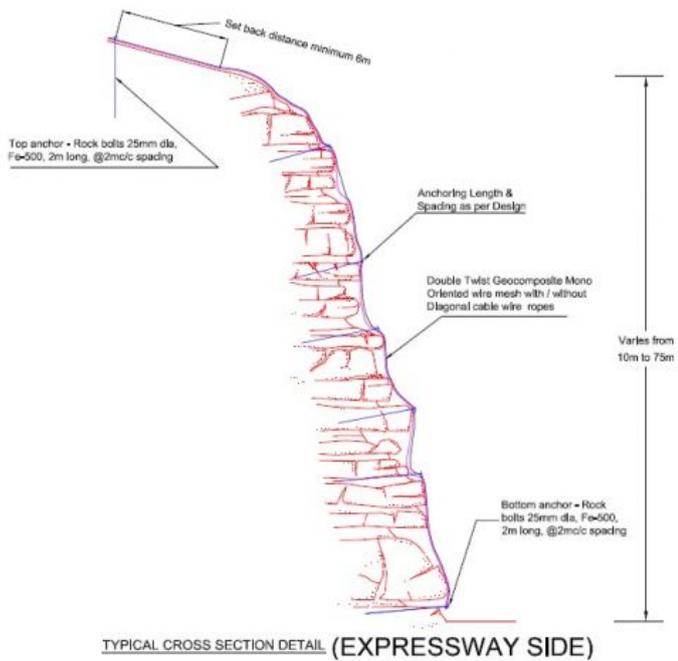
Figure 4-Steelgrid, HEA Panel and Diagonal Wire rope installation



Figure 5-Shotcrete work, Steelgrid, HEA Panel and Diagonal Wire ropes installed



Figure 6-Completed Works- Cable Belting and Secured Drapery



Typical Cross-sections

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