

ROCKFALL MITIGATION -NEAR ADOSHI TUNNEL, MUMBAI -PUNE EW

NEAR ADOSHI TUNNEL, 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 Adoshi tunnel, problems of surficial instability, planar failure, wedge failure, rock slide, rockfall from upslope etc have been identified.

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/soil nailing with mesh facia system over the previously installed mesh system earlier (which has become ineffective).

For stretches, where surficial instabilities have been observed, systematic anchoring with raster of nails(continuously threaded anchors(CTA)-25/32mm dia.) of 1.5 to 6m lengths spaced at 2x2m/ 2.5x2.5m/3x3m have been installed along with Steelgrid MO and Diagonal wire ropes or HEA panels. Multiple lines of rockfall barriers of capacities 1500kj and 250kj are installed near the ridge line, based on the simulation of trajectories.

Sub-surface drainage pipes (50mm dia perforated PVC pipes wrapped with non-woven geotextile) are also installed at stipulated locations. Pull-out tests were carried out on the nails installed to ascertain the nail capacity. Maintenance activities have been taken as per contract.

Secured drapery analysis has been carried out for finalizing the nail configuration and mesh selection using Maccaferri's 'MacRO Studio' software. Soil Nailing design, Planar analysis, Wedge analysis and Rockfall trajectory simulation are carried out using RocScience's RS2, RocPlane and SWedge, Rocfall 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	12590 Sq.m
- Steelgrid	MO-30702 Sq.m
- Anchor Bar	CTA-25/32mm)- 17428.5RM
- Dynamic barrier RB 1500	610 RM, 250kj RFBARRIER-200 RM

Date of construction: 09/2015 - 10/2016



Figure 1-Aftermath of the rockfall happened near Adoshi tunnel (July 2015)



Figure 2-Installation activities in progress

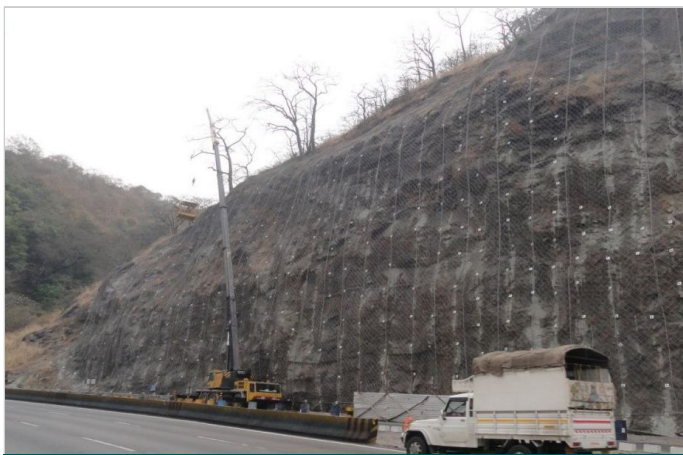


Figure 3-Installation activities in progress



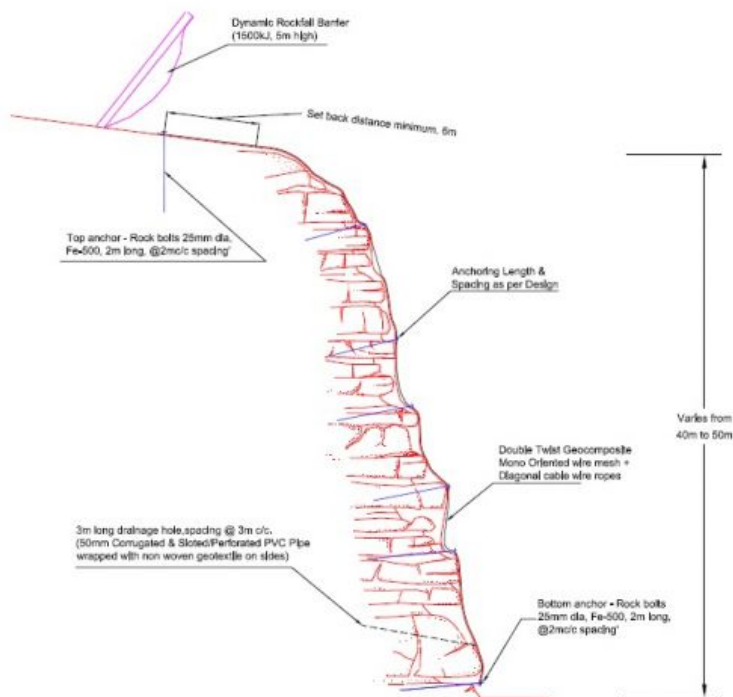
Figure 4-Installation activities in progress



Figure 5-Installation activities in progress



Figure 6-Completed Works



Typical Cross-section -stretch over the tunnel