

## ROCKFALL MITIGATION MEASURES AGAINST FALLING BOULDERS AT GHOLTEER KARNAPRYAG, UTTARAKHAND, INDIA

### Dynamic Barriers

#### Problem

Gholteer landslide is situated at a distance of 19.1 km from Karnapryag, lying at an altitude of 850m, near Gholteer village. The region falls in highest seismic zone of India and epicentres of some major earthquakes had been located in the region, a few of which had caused damage to property and resulted in loss of lives. Seismotectonic studies reveal that most of the events that occurred in the region are clustered in the vicinity of the surface trace of the Main Central Thrust (MCT).

Highly weathered quartzite is observed towards flanks of landslide area that too is highly to moderately weathered and disintegrated.

After the disastrous flash-floods which took place in Uttarakhand in June 2013, the national highway, NH 58 has faced significant devastation. The Ministry of Road Transport and Highways (MoRTH) has decided to rehabilitate and upgrade the entire NH 58 and suitably treat the landslides which affect the functioning of NH 58. This project has been later taken up by NHIDCL.

#### Solution

As per the site observations and previous history of rockfall incidents in this area, existing nallah location between Ch 379+450 km to Ch 379+550 km has been identified as the critical location based on the trajectory analyses and proximity to the structures for ease of maintenance. Rockfall barrier of nominal capacity 1500kj (RB 1500 Plus) and 5 m height has been proposed for 100 m stretch length at the height of 25m above the bottom road to mitigate the risk of rock detachments from upslope locations from affecting the structures at the toe of the slope.

**Client:** NHIDCL

**Designer / Consultant:** -

**Contractor:** BHARAT CONSTRUCTION

**Products used (Qty.)**

- Dynamic barrier RB 1500 100m

**Date of construction:** 10/2019 - 01/2020



Figure-1. Installation of Rockfall barrier



Figure-2. Installation of Rockfall barrier





Figure-3.Installation of Rockfall barrier



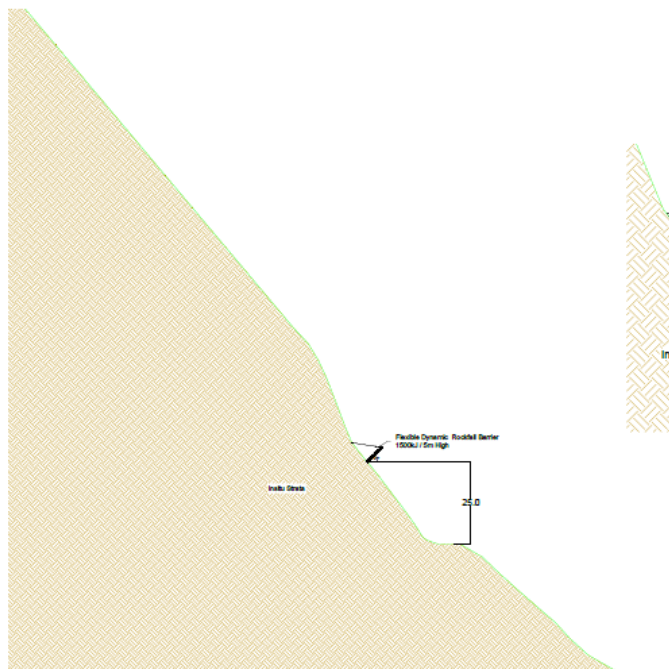
Figure-4.Installation of Rockfall barrier



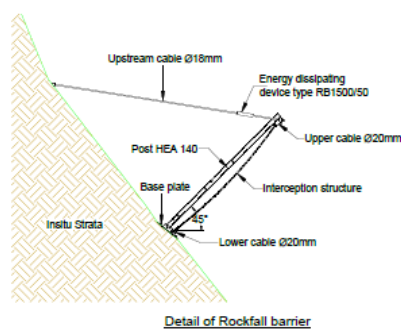
Figure-5. Front view of Rockfall barrier



Figure-6. Top view of Rockfall barrier



TYPICAL CROSS SECTION FOR ROCKFALL BARRIER AT CH 379+500  
(APPLICABLE CH 379+450 to 550)



Detail of Rockfall barrier

## Cross-section

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