

AVALANCHE MITIGATION FOR MSP 12 (L) NEAR ROHTANG TUNNEL

APPROACH ROAD TO ROHTANG TUNNEL SOUTH PORTAL , HIMACHAL PRADESH, INDIA

Snow Fences and Avalanche Protection

Problem

Atal Tunnel (formerly Rohtang Tunnel) is a strategic all-weather highway tunnel and one of the longest road tunnels in India. Being built on extremely challenging Himalayan terrain, the overall alignment and its vicinity is prone to many natural hazards such as cloud bursts, earthquakes, landslides, rockfalls, avalanches etc. Many locations along the approach road to the Manali south portal (MSP) have been susceptible to snow avalanche events, which have been causing considerable harm to people, infrastructure and machinery. Some critical locations, such as MSP 12 (at km 11.25) are identified near the MSP where avalanche paths are identified with starting (formation) zones located at very high altitudes of approx. 3300m above, where avalanche control structures are required to be provided. The reported snow thickness at MSP 12 is approx.4m.

Solution

Based on the prevailing difficult site conditions and short construction window available, flexible snow barriers comprising of snow umbrella (Snow ErdoX) units are selected for left gully of MSP 12. Snow ErdoX units are advanced avalanche protection system, which are self stable and has metallic structure with pyramid shape, lesser weight, easy to transport and quick to install. As the snow accumulates on the slope, these innovative control measures retain the accumulated snow pack, thus preventing the initiation of an avalanche.

Based on functional design, 7 lines of Snow ErdoX barriers (149 no.s (external reinforced units and internal unreinforced units) are constructed to constitute a total stretch length of 583.05m. The design of Snow ErdoX is based on Swiss technical guideline(2007). The lines are spanning above and below the highway based on the min. spacing calculated and overall identified formation area with individual Snow ErdoX units installed at distance of a 50 cm from each other(to allow the passage between the structures, which is prevented by traditional barriers). The end units on each of the barrier lines shall be of reinforced type. The foundation system of Snow ErdoX units are of anchors -SDA-32mm and pull out tests are performed to verify the bond strength considerations.

Client: Border Roads Organisation (BRO) - ROHTANG
Designer / Consultant: MACCAFERRI ENVIRONEMNTAL SOLUTIONS PVT. LTD.

Contractor: MACCAFERRI ENVIRONEMNTAL SOLUTIONS PVT. LTD.

Products used (Qty.)

- Erdox Snow Dk-400- 149 no.s
- Anchor Bar SDA32mm dia- 1866 RM

Date of construction: 10/2020 - 10/2021



Figure 1- Drilling for nails (foundation) in progress



Figure 2- Positioning of Snow ErdoX units using wooden template



Figure 3- Onsite fabrication of individual Snow ErdoX unit



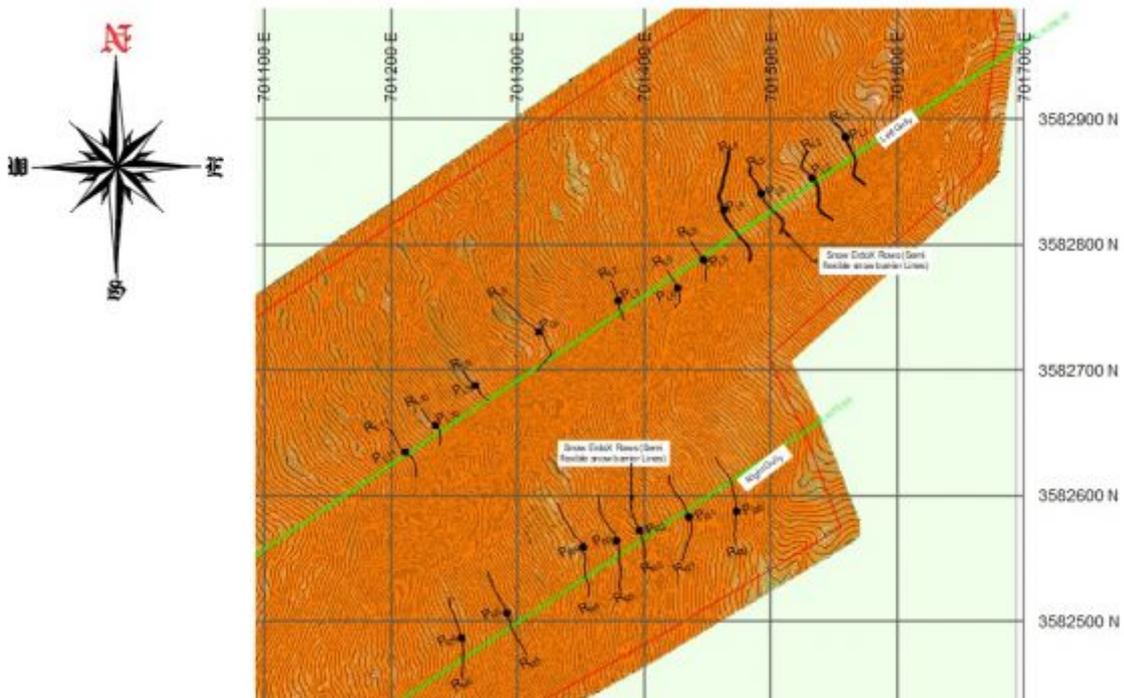
Figure 4- Execution in progress



Figure 5- Multiple lines of Snow ErdoX units installed left gully at MSP 12



Figure 6- Multiple lines of Snow ErdoX units installed at MSP 12 (L&R)



Plan showing Snow ErdoX lines at MSP 12(Left Gully and Right Gully)