AVALANCHE MITIGATION FOR MSP 11 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 11 (at km 10.5) are identified near the MSP where avalanche paths are identified with starting (formation) zones located at very high altitudes of approx. 3100m above, where avalanche control structures are required to be provided. The reported snow thickness at MSP 11 is approx.4m.

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-400-120 No.s
- Anchor Bar — SDA32mm dia-1360 RM

Date of construction: 07/2021 - 11/2021

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 MSP 11. 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, 10 lines of Snow ErdoX barriers (120 no.s (external reinforced units and internal unreinforced units) are constructed to constitute a total stretch length of 469m. 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.

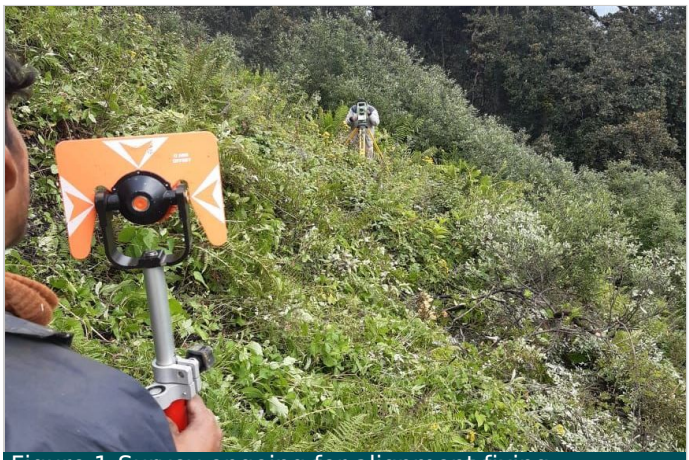

Figure 1-Survey ongoing for alignment fixing

Figure 2- Onsite fabrication of individual Snow ErdoX unit

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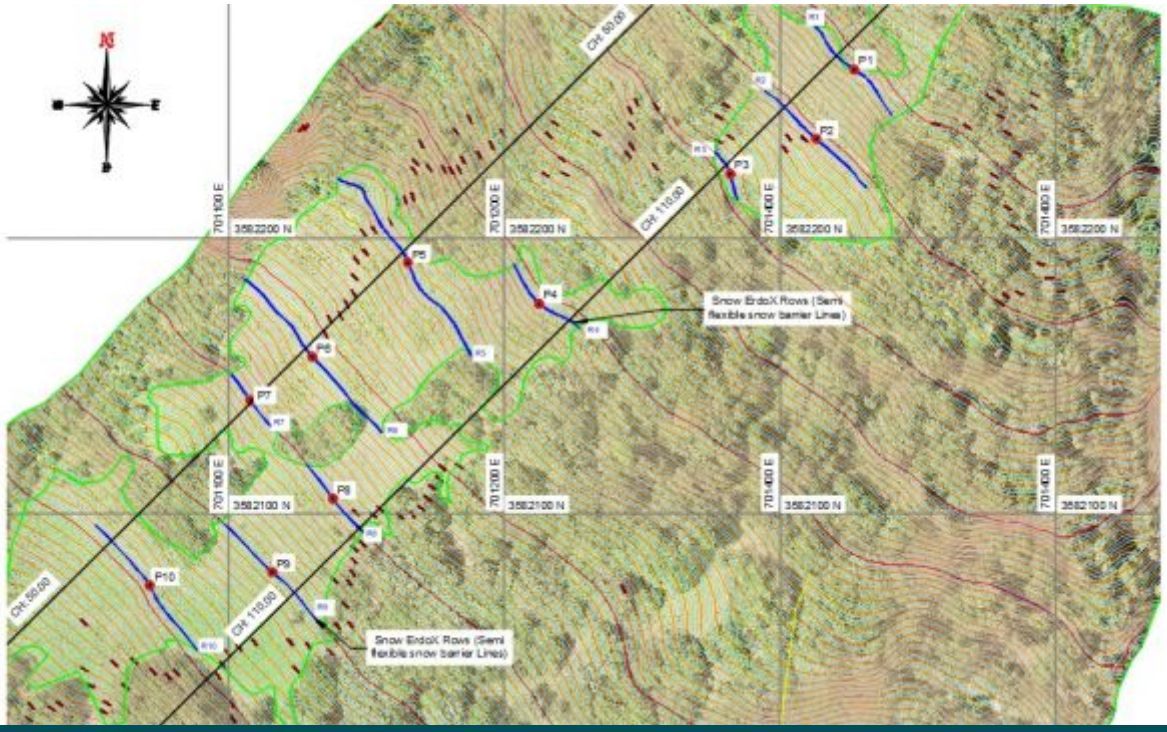
Figure 3-Drilling for nails (foundation) in progress

Figure 4-Multiple lines of Snow ErdoX lines installed (view from downslope durin

Figure 5-Multiple lines of Snow ErdoX lines installed (view from upslope)

Figure 6-Multiple lines of Snow ErdoX lines installed (view from upslope during



Plan showing Snow ErdoX lines at MSP 11

MACCAFERRI ENVIRONMENTAL SOLUTIONS PVT. LTD
D40, MIDC Ranjangaon, Tal-Shirur, Dist. Pune - 412 220
Tel: +91 2138 393000 , Email: info.in@maccaferri.com