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प्रपत्र- 33

परियोजना का नाम:- जनपद बागेश्वर में मण्डलसेरा मोटर मार्ग के किमी 0 2 से कलियाबगड़-गोगिनापानी तक मोटर मार्ग निर्माण कार्य।

भू-वैज्ञानिक की आव्याप्ति

नोट- प्रयोक्ता ऐजेन्सी द्वारा भू-वैज्ञानिक की आव्याप्ति प्राप्त कर प्रस्ताव के साथ संलग्न की जायेगी।

सहायक अधिकारी  
 प्रान्तीय चालू लोननिविं  
 बागेश्वर

## Geological Assessment of 3.0 km long alignment from Mandelsera motor road to Kaliabagar-Goginapani motor road District-Bageshwar.

Priya Joshi

19/04/2021

**1- Introduction-** Provincial Division, Public Works Department Bageshwar entrusted in construction of 3.0 km long alignment from Mandelsera motor road to Kaliabagar-Goginapani motor road District- Bageshwar. On the request of Assistant Engineer, Provincial Division, Bageshwar (In reference to letter no. 46/1C dated 15/03/2021), I carried out geological assessment of the above said motor road on dated 18/03/2021. Assistant Engineer Mr. Bhuwan Chandra Joshi and Junior Engineer Mr. Santosh Pandey accompanied during the site visit.

**2- Location-** The proposed motor road starts from Ring Road Mandelsera Prabhag Km 2 motor road. Total length of road is 3.0km in which 3 HP bend are proposed. These bend falls at 0/8-0/10, 0/13-0/15 and 2/26-2/27 cross section respectively. Gradient of the whole road at each cross section are as follows- 0/0-0/8 1:20R, 0/8-0/10 1:40R, 0/10-0/13 1:17R, 0/13-0/15 1:40R, 0/15-0/20 1:17R, 0/20-0/28 1:20R, 0/28-0/32 1:17R, 0/32-0/38 1:20R, 0/38-1/2 1:120R, 1/2-1/12 1:17R, 1/12-1/24 1:20R, 1/24-1/32 1:17R, 1/32-2/25 1:20R, 2/25-2/27 1:40R, 2/27-2/40 1:20R. One prominent ephemeral streams crosses the alignment at 0/37-0/38 cross section in which 6m span bridge is proposed. The co-ordinates of start and end points taken from hand held GPS are as follows-

Start Point

Latitude- 29°51'12.453"N

Longitude- 79°47'11.591"E

End Point

Latitude- 29°50'59.450"N

Longitude- 79°48'6.297"E

**3- Geological Assessment-** The alignment corridor proposed for the above said motor road lies in inner part of Kumaun Lesser Himalayan. Geologically the site in question falls in very close vicinity of a tectonic plane separating Berinag Quartzite from the autochthonous sedimentaries of Tejam Group is known as Berinag Thrust. Berinag Formation consists of Quartzite with intrusive, while Deoban Formation of Tejam Group is exposed in the area comprising of Limestone and Dolomite. Talc pockets intermixed with magnesite & dolomite boulders are exposed in the area. Several Soapstone mining projects are going in this belt.

Topography of the area overall is gentle to moderately steep. In starting portion rock type is Dolomite intermixed with Magnesite after that the rocks grades into quartzite. Thus in the area rocks of both Deoban Formation and Berinag Formation are exposed along the proposed alignment. In the first 500 m portion the topography is gentle and the rocks are

highly deformed and weathered, as the rock grades to Quartzite of moderately hard strength, the topography also changes to moderately steep. In portion where deformation and weathering is high the strength falls in weak category. The strength of the rock is estimated by manual test. Manmade terraces were also observed near to the villages which are mostly cultivated, while rest of the portion is covered with forest. In-between Magnesite, Talc bands were also observed. Joints on both the rocks are closely spaced and the opening between the joint planes is close to open up to 0.5mm. The openings between the joint planes are filled with clay. Largely the rocky strata along this alignment are capped by thin overburden material which varies in thickness from place to place. The soil material has clay content and the matrix is fine to very fine. The soils are good cohesive, dense and hard in dry conditions but these converts into soft clays under the wet/saturated conditions. Weathering condition is moderate to high in the Magnesite and moderately lower in Quartzite. Slope angle varies from  $20^{\circ}$ - $50^{\circ}$ . Three prominent ephemeral streams crosses the alignment, in these streams bridges are proposed. In these streams water level is only high during the rainy season. The joints data observed from Soapstone outcrop in the starting portion is as follows-

Table I

S.No.	Feature	Dip angle	Azimuth
1	Joint J1	$50^{\circ}$	N $230^{\circ}$
2	Joint J2	$55^{\circ}$	N $50^{\circ}$
3	Joint J3	$60^{\circ}$	N $340^{\circ}$
4	Slope	$30^{\circ}$	N $280^{\circ}$

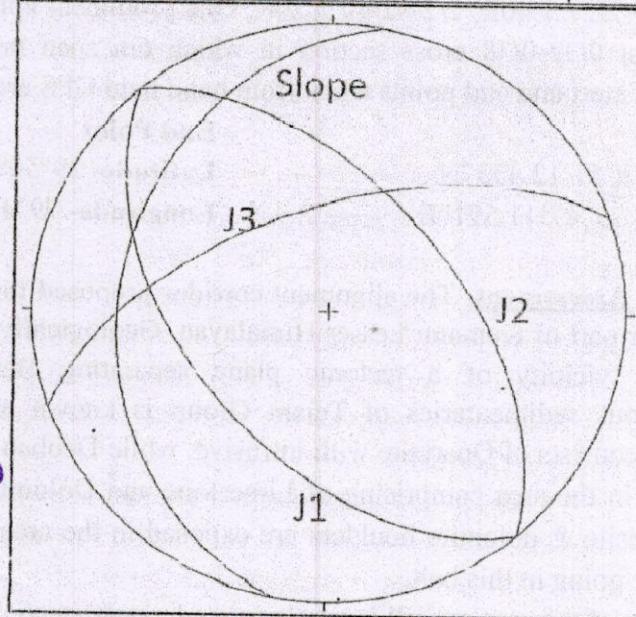


Figure 1 Stereographic projection of Joints and slope data recorded from Soapstone

From the above stereographic projection, it is clear that wedges are forming due to intersection of joints but does not dips in slope direction. Planar and wedge failure can occur along the alignment, in case if any joint or tension crack acts as a releasing surface and if any wedge or any joint comes parallel to the slope.

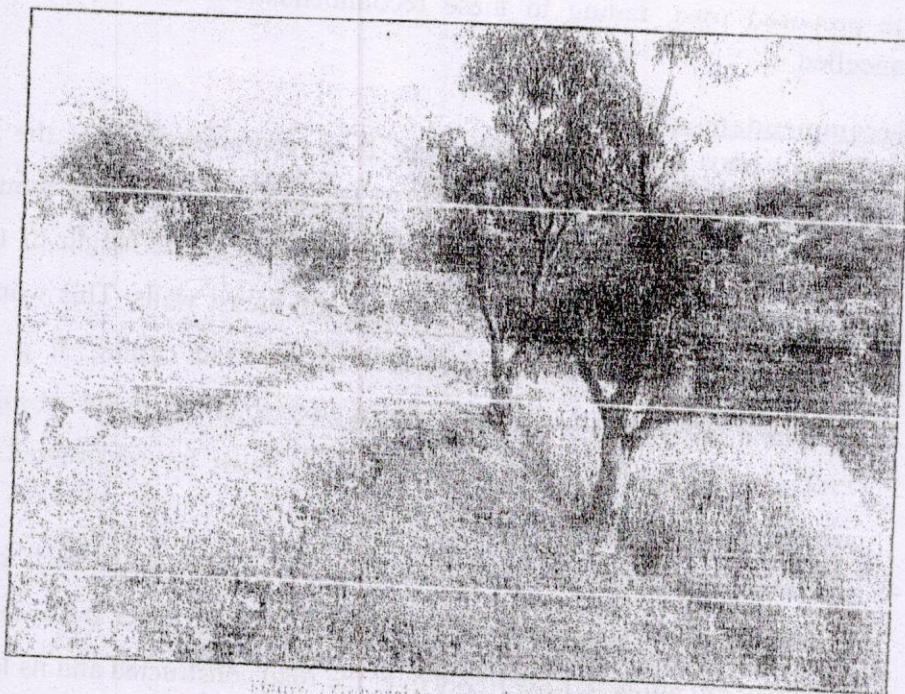


Figure 2: General stereogram of the slope.



Figure 3: General view of the slope showing joint intersections.

(2)

in such material the recovery rate is not more than 50% and the remaining material may be used as fill material and soil test will be carried out to determine the suitability of the material.

On the basis of the geological/geotechnical studies carried at the site and the fact mentioned above the following recommendations are being made for the construction of the proposed road, failing to these recommendations this report will be treated as cancelled.

#### **4- Recommendations-**

- 1- Do not blast heavily by explosives. It is recommended that the blasting shall be carried out by controlled method i.e. by leaving large volume of dummy holes.
- 2- The entire hill and valley side slope along the whole length of the road must be protected by suitably designed retaining and breast walls. This work should be done simultaneously with the advancement of the road cutting. It is advised to leave sufficient weep holes in the walls; this is so as to facilitate the subsurface drainage.
- 3- Properly designed culvert/bridges/causeway must be constructed over the streams whichever is suitable.
- 4- Construct U shaped lined drain all along the hill side of the road and make adequate cross drainage arrangements. The accumulated rain water from upper reaches of the hill must not allow to flow freely over the road constructed and its lower hill slopes.
- 5- Disposal of muck and excavated waste on the lower slopes of this road is to be strictly avoided. It is advised to dispose the muck on the identified site for muck disposal.
- 6- The portion of the road which passes through the cultivated field where water seepage from the ground is high; RCC should be done.
- 7- All the HP bends must be constructed with standard gradient and protection must be given on the hill side to retain the slope.
- 8- Geological report of the bridges which are proposed in the alignment will be given separately after the site selection.
- 9- All the construction activities must be carried out as per the prescribed norms and the standard codes of the practice laid by BIS and MORTH.

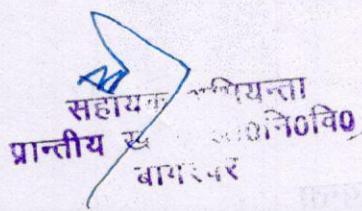
Letter No: 16<sup>th</sup> /05 संभूः कै०/21

Date: 19/04/2021



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वायरेक्स