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Geological Assessment of 3.2 Km long Nirayi-Supakot motor road District- Almora.

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1- **Introduction-** Construction Division, Public Works Department Almora entrusted in construction of 3.5 Km long Nirayi-Supakot motor road Almora District. On the request of Assistant Engineer second, Construction Division, Almora (In reference to letter no. 79/IC dated 22/06/2020), I carried out geological assessment of the above said motor road on dated 01/10/2020. Junior Engineer Mr. Sanjay Singh Kanwal accompanied during the site visit.

2- **Location-** The site in question starts from Km 1.8 of Someshwer-Nirayi motor road. Sanctioned length of the road is 3.0 km but after survey total length of the road is coming 3.2 Km which consists of 1 HP Bend at 0/20-0/22 cross section respectively. Gradient of the complete road from start to end cross section are as follows-0/0-0/1 1:20F, 0/2-0/3 LEVEL, 0/3-0/20 1:24R, 0/20-0/22 1:40R, 0/22-0/30 1:60R, 0/30-0/32 LEVEL, 0/32-0/37 1:20F, 0/37-0/39 LEVEL, 0/39-1/10 1:24F, 1/10-1/34 LEVEL, 1/34-1/36 1:20R, 1/36-2/6 LEVEL, 2/6-2/10 1:30F, 2/10-2/28 1:30F, 2/28-3/4 LEVEL, 3/4-3/8 1:24F. The co-ordinates of start and end points taken from hand held GPS are as follows-

Start Point

Latitude- 29°45'41.25"N

Longitude- 79°38'34.83"E

End Point

Latitude- 29°46'08.20"N

Longitude- 79°37'35.88"E

3- **Geological Assessment-** The alignment corridor proposed for the above said motor road lies in part of Kumaun Lesser Himalayan. Geologically the site in question is sandwiched between North Almora Thrust in the South and by Berinag thrust in the North. It comprises rocks of Berinag Formation. Berinag Formation is huge succession of massive, coarse-grained pebbly to even boulder white pale purple quartzarenite with metamorphosed amygdaloidal vesicular Basalts and tuffites. This quartzarenite is widely known as Berinag Quartzite.

Topography of the area overall is gentle. Terraces were observed all along the road many of them are cultivated. Rock type observed on the site is Quartzite of Berinag Formation. The rock is moderately hard and compact in strength. The strength of the rock is estimated by manual test. Four prominent sets of joints were observed. Joints are closely spaced and the opening between the joint planes is close to open up to 1-2mm. In-between the opening clayey soil is filled. Largely the rocky strata along this alignment are capped by thick 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 area. Slope angle varies from 10° - 25° . Most of the road passes through terraces. One prominent stream falls at the start point also known as Nirayi Gad in which 21m span bridge is proposed. The stream is perennial. Hydrological conditions are mainly dry in the region expect in monsoon season. The joints data observed at the site are as follows-

Table I:

S. No.	Feature	Dip angle	Azimuth
1	Foliation/J1	05°	N 70°
2	Joint/J1	15°	N 290°
3	Joint/J2	40°	N 210°
4	Joint/J3	30°	N 190°
5	Slope	15°	N 220°

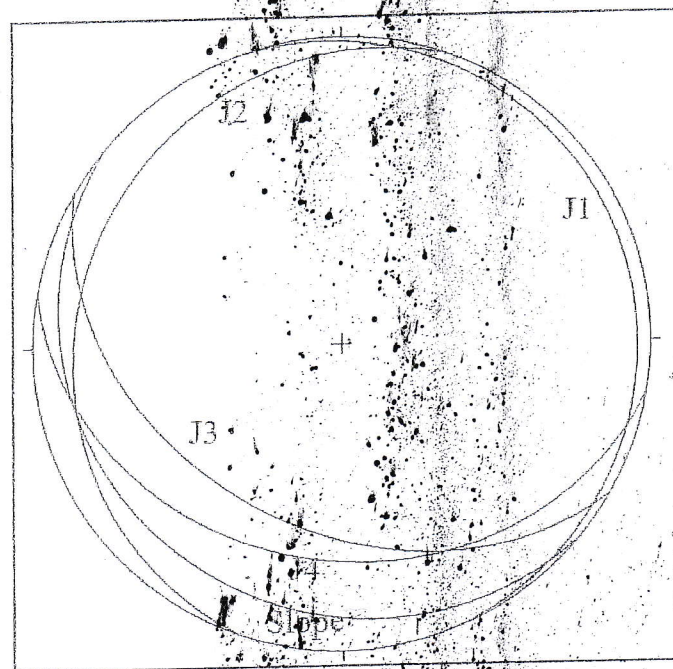


Figure 1: Stereographic projection of joints and slope.

From the above stereographic projection (Fig 1) it is clear that joint J3 and J4 are parallel to the slope direction which is susceptible to planar failure. Failure can occur if any joint or tension crack act as releasing surface.



Figure 2. Quartzite outcrop, near the summit of the mountain.

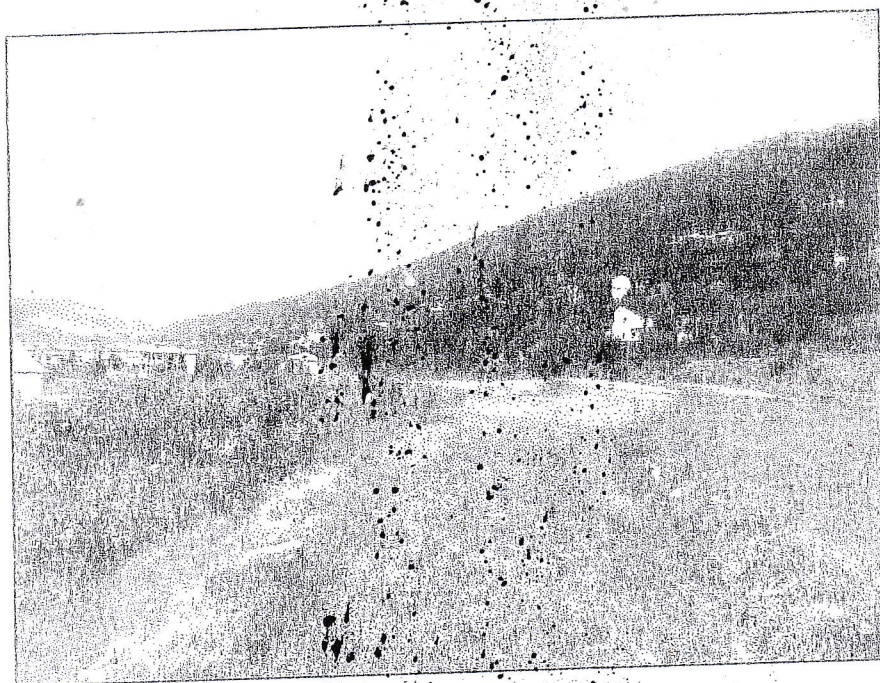


Figure 3. View of the mountain from the field.



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/ 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/bridge/causeway must be constructed over the streams whichever is suitable.
- 4- Construct extra-large lined drain all along the hill side of the road and made 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- Geological assessment report for the 21m span proposed bridge will be given separately after site selection.

- 7- 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.

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प्रिये श्री लक्ष्मि

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