

Geological Assessment of 6.00 Km long Bhasoli link road to Dalmati and Batuliya villages District- Almora.

Priya Joshi

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1- Introduction- Provincial Division, Public Works Department Almora entrusted in construction of 6.00 Km long Bhasoli link road to Dalmati and Batuliya villages Almora District. On the request of Shri Harish Pandey, Executive Engineer, Provincial Division, Almora I carried out geological assessment of the above said motor road on dated 10/10/2018. Junior Engineer Shri Jagdish Prasad accompanied during the site visit.

2- Location- The Bhasoli link road to Dalmati and Batuliya villages starts from Bhasoli village. Sanctioned length of the road is 6.00 km. 8 HP bends are proposed all along the road which falls at 1/22-1/24, 1/29-1/31, 3/5-3/7, 3/25-3/27, 3/30-3/32, 5/4-5/6, 5/8-5/10 and 5/12-5/14 cross section respectively. Gradient of road varies as -0/0-1/22 1:18F, 1/22-1/24 1:40F, 1/24-1/29 1:18F, 1/29-1/31 1:40F, 1/31-1/40 1:20F, 1/40-2/11 1:18F, 2/11-2/14 LEVEL, 2/14-2/35 1:18F, 2/35-2/40 LEVEL, 2/40-3/5 1:20R, 3/5-3/7 1:40R, 3/7-3/17 1:18R, 3/17-3/20 LEVEL, 3/20-3/25 1:20F, 3/25-3/27 1:40F, 3/27-3/30 1:20F, 3/30-3/32 1:40F, 3/32-3/33 1:20F, 3/33-3/34 LEVEL, 3/34-3/39 1:20R, 3/39-4/1 LEVEL, 4/1-4/7 1:20R, 4/7-4/10 LEVEL, 4/10-4/14 1:20R, 4/14-4/37 1:18R, 4/37-5/4 1:20R, 5/4-5/6 1:40R, 5/6-5/8 1:20R, 5/8-5/10 1:40R, 5/10-5/12 1:20R, 5/12-5/14 1:40R, 5/14-5/40 1:18R. Bhasoli, Tanvadi, Batuliya and Dalmati villages are falling along the proposed alignment. Two perrinial nala were also falls across the alignment at which 4 m, and 6 m span bridges were proposed at respectively 3.350 and 3.500 km. The co-ordinates of starting and end points taken from hand held GPS are as follows-

Starting Point

Latitude- 29°37'42.44"N

Longitude- 79°30'50.31"E

End Point

Latitude- 29°38'25.66"N

Longitude- 79°29'37.10"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 lies in Almora Nappe of Kumaun Lesser Himalaya. Almora Nappe is bounded by South Almora Thrust (SAT) in South and by North Almora Thrust (NAT) in the North. It comprises rocks of Almora Group. Almora Group comprises of two different lithological units which are Biotite Mica Schist, and Micaceous Quartzite of Saryu Formation and Granite-Granodiorite plutonic bodies.

Topography of the area overall is gentle to moderately steep. Area is mostly barren. Rock type observed on the site is Micaceous Quartzite and Schist which belongs to Saryu Formation. The quartzite is moderately hard and compact in strength while the

schist is weak in strength. The strength of the rock is estimated by manual test. Some manmade terraces were also observed near to the villages which are mostly cultivated. Three sets of joints were observed in Quartzite. 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 thin overburden material which varies in thickness from place to place. At some places schist outcrop were also observed having phyllitic content. The foliation in the schist dips in 40° direction with gentle amount. The soil material has silty 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 schist and moderately lower in quartzite. Slope angle varies from 20° - 50° . Two prominent nala is observed. Both the nala are perennial and flows in $N220^\circ$ & $N170^\circ$ direction. On both side of the nala rock is exposed. Water level is only high during the rainy season Water seepage is observed along the alignment. The joints data observed at the site are as follows-

Table I

| S.No. | Feature | Dip angle | Azimuth |
|-------|-----------|------------|---------------|
| 1 | Foliation | 30° | N 10° |
| 2 | Joint | 50° | N 200° |
| 3 | Joint | 45° | N 160° |
| 4 | Slope | 35° | N 180° |

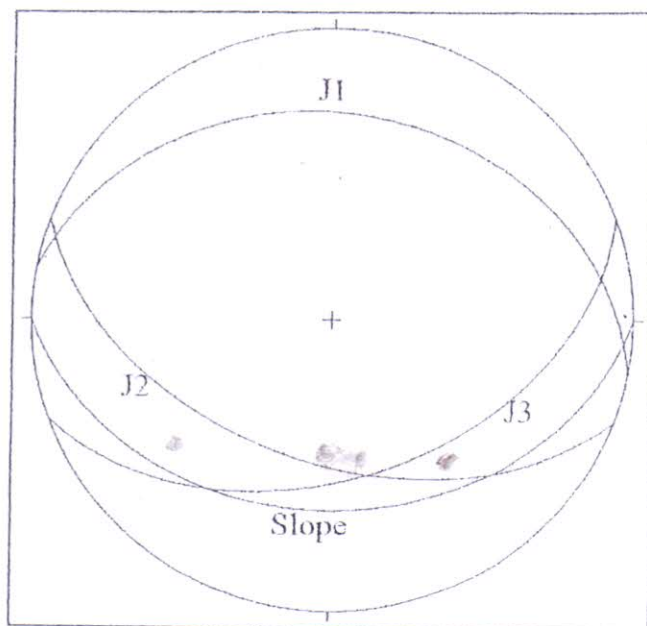


Figure 1 Stereographic projection of joints and slope data recorded from quartzite outcrop

From the above stereographic projections it is clear that a small wedge is forming on the quartzite outcrop due to the intersection of joints J2 and J3 along the slope direction. But as the dip of the wedge is greater than the dip of the slope face so it does not fulfill the conditions for wedge failure and does not impact on the stability of the area.

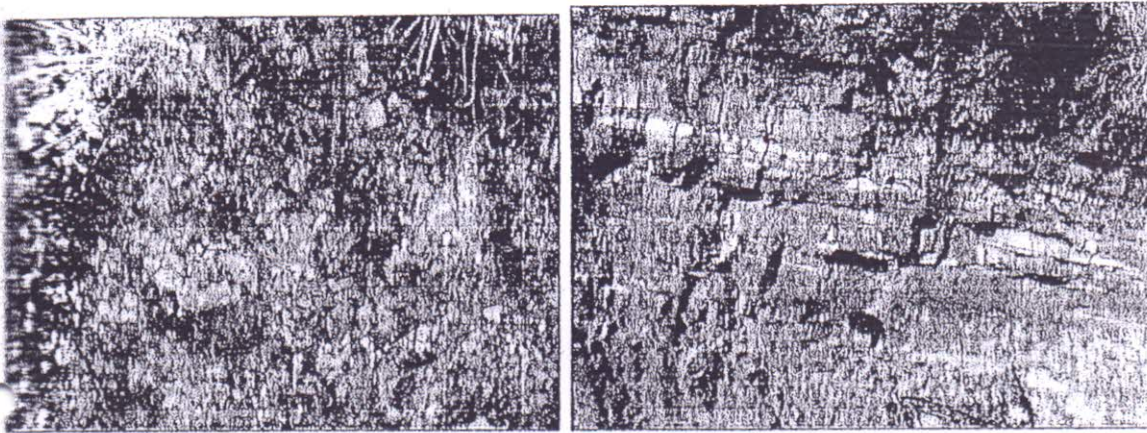


Figure 2 Schist and Micaceous Quartzite outcrop exposed at the site



Figure 3 Bala at which 6m span bridge is proposed

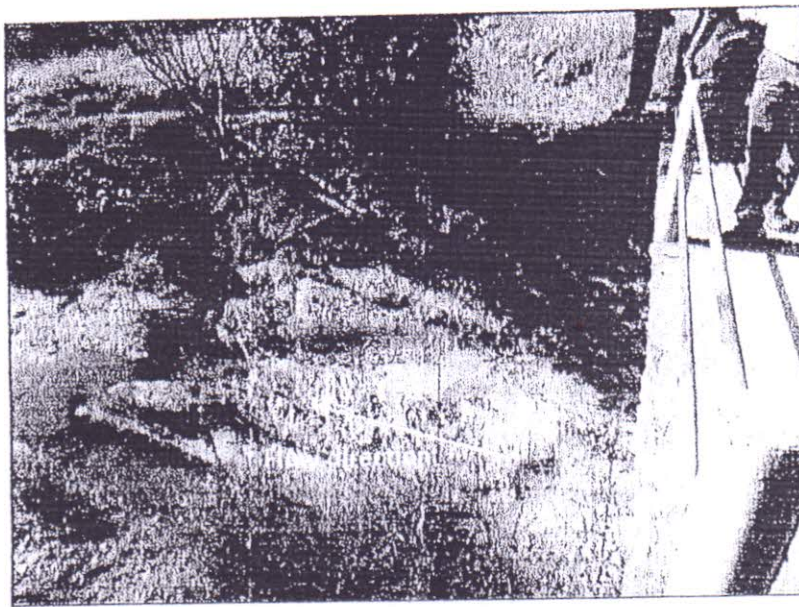


Figure 4 Hala at which 4m span bridge is proposed



Figure 5 General topography of the Area

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.

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- 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/bridges must be constructed over the nala whichever is suitable.
- 4- Construct U shaped 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- For bridge construction foundation of both the banks must be placed wisely on fresh, hard, compact and intact rock mass after removing Overburden/weathered top portion and RBM.
- 7- Banks on the either side must be protected with the suitably design retaining and flood protection walls. Foundation of these retaining and flood protection walls must be placed below the scouring level.
- 8- The height of deck level of the bridge must be high above the HFL of the nala.
- 9- The portion of the road which passes through the cultivated field where water seepage from the ground is high; RCC should be done.
- 10- All the HP bends must be constructed with standard gradient and protection must be given on the hill side to retain the slope as the Hp bends are falling in close distance especially in last km.
- 11- 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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Date: 10/10/2018

छाया प्रति मर्यापित

प्राधिकृत प्रमाणित
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अरुमोड़ा

Priya Joshi
10/10/2018

Priya Joshi
(Assistant Geologist)
Chief Engineer Office
PWD, Almora.

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