

**Geological Assessment of the alignment corridor proposed for the  
Construction of 5.0 Km Majhera-Kumarti-Saure-Naurad motor  
road in Bhikiyasain Block, Ranikhet District-Almora.**

*Priya Joshi*

22/01/16

**1- Introduction:-** The Provincial Division, Public Works Department, Ranikhet has proposed the construction of 5.0 Km long motor road namely Majhera-Kumarti-Saure-Nauradh motor road in Bhikiyasain Block, Ranikhet, District Almora. On the request made by Shri. K. L. Verma, Executive Engineer Provincial Division Ranikhet I carried out the geological assessment of the proposed alignment corridor of the above said motor road on 09.01.2016. Shri. Manoj Pande, Astt. Engineer also accompanied the site visit.

**Location:-** The proposed alignment for the construction of the above said motor road passes through Kumarti, Saure, Nauradh villages and the total length of Majhera-Kumarti-Saure-Nauradh road is 5.0 Km. The site is located in Bhikiyasain Block, District Almora.

**2- Geological assessment:-**

Geologically, the alignment corridor proposed for the above said motor road lies in part of Kumaun Lesser Himalayan Belt bounded between Ramgarh Thrust and South Almora Thrust (SAT). Ramgarh thrust separates the underlying autochthonous sedimentaries of inner and outer lesser Himalaya from the overlying low grade metamorphic unit of Ramgarh group. The area lies in close vicinity of Bhikiyasain tear fault, which is an active fault trending in NNW-SSE direction. These fault/thrust system are controlling the river domain and drainage system around this area. The rocks i.e Phyllite, Schistose Quartzite, and Carbonaceous Phyllite of Nathuwakhan Formation of Ramgarh Group occupy this area.

The topography of the manifests signatures related to the active thrust/fault system. Old triangular facets of hill slopes were observed in the area. On the lower reaches of the hill, debris cones were also observed which mark the existence of an active fault. The slopes facets of this alignment corridor are not dissected by any major nala course. The Nauradh River, a right/left bank tributary of Gaagas River flows in a straight course with the gentle gradient towards north direction and then furthers northward it turns for a considerable distance and thereafter it takes a sharp turn to western direction where it joins the Gaagas River. The terrain containing is characterized by the steep and moderately inclined hill slopes oriented towards N 90° - N 70° directions.

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 micaceous

छायाप्रति प्रमाणित  
*Mak*  
सहायक अभियन्ता  
प्रान्तीय खण्ड, लो0नि0वि0  
रानीखेत

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.

Remaining portion of the alignment is comprised of quartzite which contains mica, thus a minor schistosity is observed. The rocks are massive, hard and compact in nature. These rock masses have been dissected by many linear discontinuities. Three prominent sets of joints are prominently identified (Fig.1). Quartzites are hard compact in strength and show not much sign of deformation. The rocks are slightly weathered and oxidized up to  $W_1$  grade. Hydrological conditions in this area are mainly dry in the fair weather. The prominent joint sets recorded from the rock outcrops exposed at the site are as follows-

**Table-1**

S.No.	Feature	Dip angle	Azimuth
1	Bedding/Joint J1	$25^\circ$	North $^\circ$
2	Joint J2	$70^\circ$	N $140^\circ$
3	Joint J3	$69^\circ$	N $220^\circ$
4	Slope	$65^\circ$	N $70^\circ$

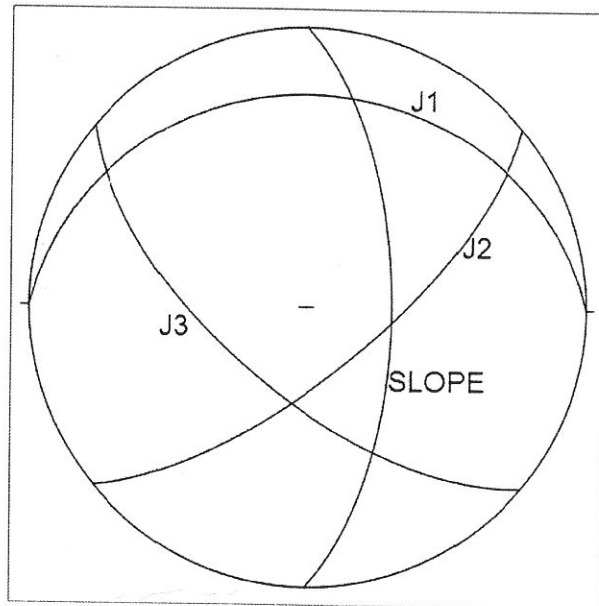


Fig. 1 Stereographic projection of joints and slope data of Bhikiyasain road which lies above the proposed motor road

From the above stereographic projection it is clear that the joints  $J_1$  and  $J_2$  form a slight wedge but it do not create much impact on the stability of the area, as the rock is quite competent and hard in physical strength. It is apprehended that small rock slides may be

छायाप्रति प्रमाणित  
Mhat  
सहायक अभियन्ता  
राज्यीय खण्ड, लो०नि०वि०  
राजीव



encountered during the construction at the starting point but the rest part of the alignment looks stable and quite competent from the stability point of view.

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 this report will be treated as cancelled.

**3- Recommendations:-**

- 1- Construct the road by half cut and half fill method and compact the fill material properly, preferably by the dynamic compaction.
- 2- In the rocky part 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.
- 3- 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.
- 4- Properly designed culvert/bridges must be constructed over the nala whichever is suitable.
- 5- 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.
- 6- 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.

*Mlak*  
102

*Priya Joshi*  
24/1/16  
**Priya Joshi**  
(Assistant Geologist)  
Chief Engineer Office  
PWD, Almora.