

Geological Assessment of the site Proposed for 12 m span steel Girder Bridge over Nikan Gadhera, in Ranikhet sub Division, District- Almora, Uttarakhand.

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16-01-2013

1. **Introduction:-** The construction Division, PWD Ranikhet has proposed the construction of 12 m span RCC bridge over Naikan Gadhera in Ranikhet sub Division, District- Almora. On the request of Er. Manoj Bisht, the Executive Engineer, C.D. PWD, Ranikhet the undersigned carried out the geological/ geotechnical assessment of the site proposed for the above said bridge on 07.11.2012 in presence of Er. Umesh Chandra Pant Astd. Engineer and Er. M.C. Joshi, Additional Astd. Engineer of the Division were present during the site visit.
2. **Geological/ Geotechnical Assessment:-** The site proposed for the bridge is located in the middle lands of Kumaon Lesser Himalayan Belt. The Quartzites and chlorite schists are exposed in and around the proposed site. These rocks are thinly foliated coarse grained to pebbly or even bouldery and usually are sericitic quartzarenite of white, pale purple and green in colours. At the proposed site these rocks are hard, compact and widely spaced jointed in nature and are exposed on the both side of stream banks and its upslopes. Four prominent joint sets have been recorded from the site which are tight and linear in nature. The details of these joints are as follows:-

Table-1

S.No	Feature	Dip angle	Azimuth
1	2	3	4
J ₁	(So bedding joint)	32°	N040
J ₂	joint	61°	N140
J ₃	joint	45°	N200
J ₄	Joint	68°	N320

The rock mass exposed at the site is slightly weathered in nature and needs stripping of (±) 1.0 m order for the placement of foundation.

According to the estimation carried out on the rock mass exposed on the either side proposed ground the "Uniaxial Compressive Strength" of the rocks

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has been ranging between 100 M Pa to 150 M Pa. These values suggest that the rock mass of the either banks is competent and hard for the construction purposes.

At the proposed site Naikan Gadhera flows in N 010 direction with a very low gradient and the bed rocks are exposed on the stream bed. The either side upslopes of the site are moderate and bear very low relief. The joints traversing the rock mass do not form any adverse geometry for the rock failure.

The stream banks do not manifest any sign of erosion/ scouring.

3. Seismicity:- The site proposed for the construction falls in zone V of seismic zoning Map of India (IS 1893, part 1, 2002) which corresponds to intensity IX on MM scale.

On the basis of the geological / geotechnical studies carried at the site and the facts mentioned above the following recommendations are being made for the construction of the proposed bridge.

4. Recommendation:-

- (i) Place the foundations of the abutments on the fresh, hard and intact insitu rock.
- (ii) Do not blast on the rock, stripping may be done manually.
- (iii) Upstream stream bank protection work is necessary.
- (iv) Do not remove the boulders from the bed of the stream.
- (v) The bridge as a whole or every part of it must have assesmic design as the proposed construction falls in the area prone to the seismic hazards.
- (vi) All the construction activity must be carried out as per the standards and norms following the BIS codes prescribed for the similar civil construction in Himalayan Zone.

5. Conclusion:- On the basis of the geological / geotechnical studies carried at the site and with the above recommendations, the site was found geologically suitable for the construction of 12 m span RCC bridge over Naikan Gadhera in Ranikhet sub Division, District- Almora, Uttarakhand. Photo copy attested

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