

परियोजना का नाम	:-	जनपद रुद्रप्रयाग में प्रधानमंत्री ग्रामीण सड़क योजना के अन्तर्गत प्रस्तावित, सन से बज्यूण मोटर मार्ग (लम्बाई 15.300 किमी) के नव निर्माण हेतु हस्तान्तरण प्रस्ताव।
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Office of Empanelled Geologist  
P.W.D. Uttarakhand

Geological Investigation Report  
E.G. – Road / Bridge / Alignment  
Rudraprayag – 1 / 2013

Prefeasibility Geological Report of the Proposed Alignment of San to  
Bajyun Motor Road, Distt. Rudraprayag

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**Prefeasibility Geological Report of the Proposed Alignment of  
San to Bajyun Motor Road, Distt. Rudraprayag**

J.P. Madhwai  
27/12/2013

1. **Introduction :-** The Irrigation Division, PMGSY, PWD, Rudraprayag, has proposed the construction of 29.400 Km. long motor road named San to Bajyun motor road under PMGSY Project on the request of the Executive Engineer, Irrigation Division, PWD, PMGSY, Rudraprayag. I carried out the geological assessment of the proposed alignment of the road in presence of Er. Atar Singh the concerned J.E. on Dated 23/12/2013.
2. **Location:-** The proposed alignment originates from Km. 10 of Rudraprayag to Chopta Motor Road the place named Syund as a Branch Road. Ten H.P. Bend has been proposed for the said road.

3. **Geological Assessment:-** Geologically the alignment corridor of the proposed road is located in the Garhwal Region of Lesser Himalayan Zone of the Main Himalayan Belt (MHB) mostly the heterogeneous assemblages of rocks of Rautgarh formation and Mandhali formation.

Mostly massive deep purple, violet and pink fine grained quartzite interbedded with mudcracks bearing purple slates. Intruded by sills and stocks of dolorite of Rautgarh formation and carbonaceous, pyritic phyllite, limestone and conglomerate of Mandhali formation are exposed in and around the area of the proposed alignment.

Tectonically the entire area is bounded by the North Almora Thrust (NAT) in South and Main Central Thrust in the North. These rocks have been subject to five phases of deformation and hence they are sheared, shattered and tectonized at places otherwise they are massive to thinly foliated in nature. The rock mass occupying the entire gamut is traversed by five prominent joint sets (rock defects) which are described in the table given below

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The details of the joints recorded at the site are given in the following table:-

Table

S. No.	Feature	Dip angle	Azimuth
1	2	3	4
J <sub>1</sub>	(S <sub>0</sub> Bedding Joint)	20°-50°	N10-N50
J <sub>2</sub>	(S <sub>1</sub> Foliation Joint)	46°-75°	N110-N130
J <sub>3</sub>	(Random Joint Set)	52°-61°	N180-N225
J <sub>4</sub>	(Sealed with Quartzite's)	38°-55°	N320-N335
J <sub>5</sub>	Joint	70°-82°	N135-N165

It has been observed that the rock mass exposed along the proposed alignment is slightly to moderately weathered and oxidized, however at places fresh and hard bed rock are visible. The rocks of the proposed alignment are mostly enveloped by the overburden material of varying thickness from 0.5 m to 10 m.

The rock mass exposed along the alignment is mostly medium hard and its "Uniaxial Compressive Strength" has been estimated ranging between 25 MPa to 50 MPa. The values of the rock quality designation (RQD) calculated at the site ranging between 70 to 90 percent suggests that the slope forming rock mass are less distressed in nature and decrease the risk of instability.

By and large the alignment slopes are stable and do not bear any signature of mass wasting/land sliding.

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 road.

#### 4. Recommendation:-

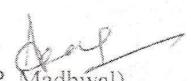
- (i) The alignment some time traverses along/across minor fault zone which is geologically fragile and special attention needs to be given for stability of road where alignment crossing the Nalas or Gads or Local streams.
- (ii) The hill slope is another factor responsible for geological hazards; the road basically traverses the slope class 35° to 48° special attention needs to be given for stability where it is 50° to 65° in some parts.
- (iii) Form the road by half cut – half fill techniques and ensure the proper compaction of the fill material.

*Photo Copy Attached*

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- (iv) Do not dispose the debris in hill side, dispose it in a safe zone.
- (v) Do not blast, blasting is detrimental for this zone of Himalaya.
- (vi) The road must have extra wide lined long drain with adequate cross drainage arrangement.
- (vii) The road must be formed shoulder to shoulder paved, this is so to check the water ingress into the sub surface material.
- (viii) Construct suitably designed retaining walls / Brest wall all along the road, it is essential for the overall stability of the hill slope, because the area is tectonically very sensitive.
- (ix) Construct Culverts 5.00 mtr., Span Culverts at Km. 1.125, 2.050, 3.425, 3.775, 4.000, 10.200, 16.800, 18.800, 22.375,
- (x) Construct Bridges 15.00 mtr., 10.00 mtr., 7.00 mtr., 15.00 mtr. at Km. 0.550, 5.150, 8.200, 20.900,
- (xi) Construct Causeways at Km. 2.000, 26.000, 27.000 and 29.000
- (xii) All the construction activity must be carried out as per the standards and norms following the IS 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, prima facie the 29 Km. long alignment of San to Bajyun motor road, Distt. Rudraprayag, Uttrakhand, looks feasible for construction of road.

  
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*Photo Gds Attached*

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