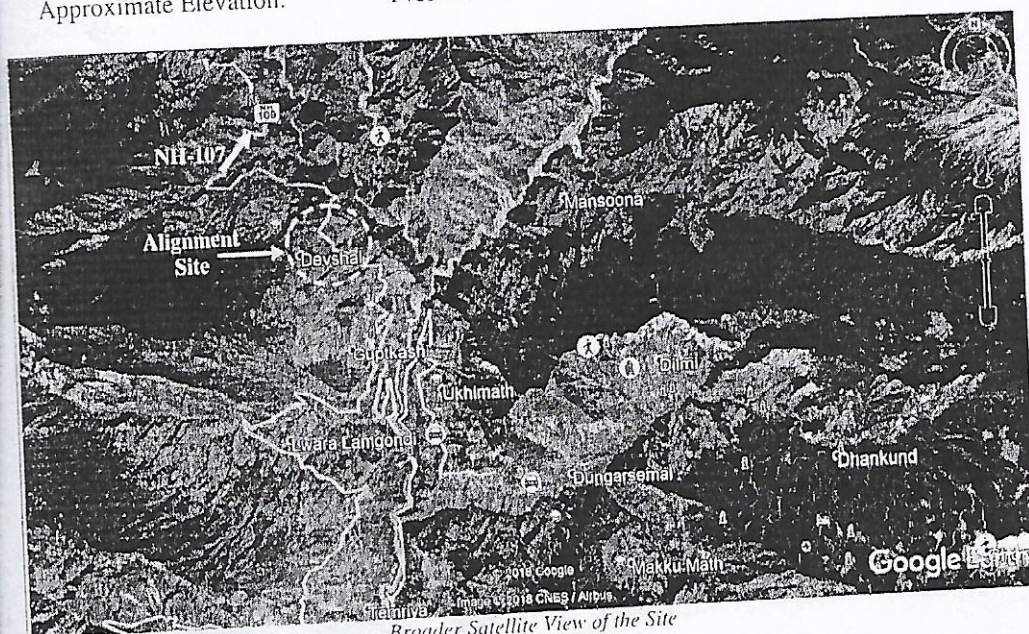


**Geological Assessment of 1.50 Km long Narayankoti-Kotheda-Devshal Motor Road**  
**Alignment between CH 0.0 and 1.50 Km, Ukhimath Division,**  
**District Rudraprayag**  
**Tushar Sharma**  
**23/04/2018**

**Introduction:** The Construction Division, Ukhimath has been entrusted for the construction of 1.50 Km long Narayankoti-Kotheda-Devshal motor road between CH 0.0 and 1.50 km, District Rudraprayag. In order to assess the alignment site for construction, Er. Manoj Das (Executive Engineer) Construction Division, Ukhimath asked for a geologist to make a site visit. Consequent to his request a site visit was made on 08/03/2018; Er. Maan Singh (Junior Engineer) CD, Ukhimath was present during the site visit.

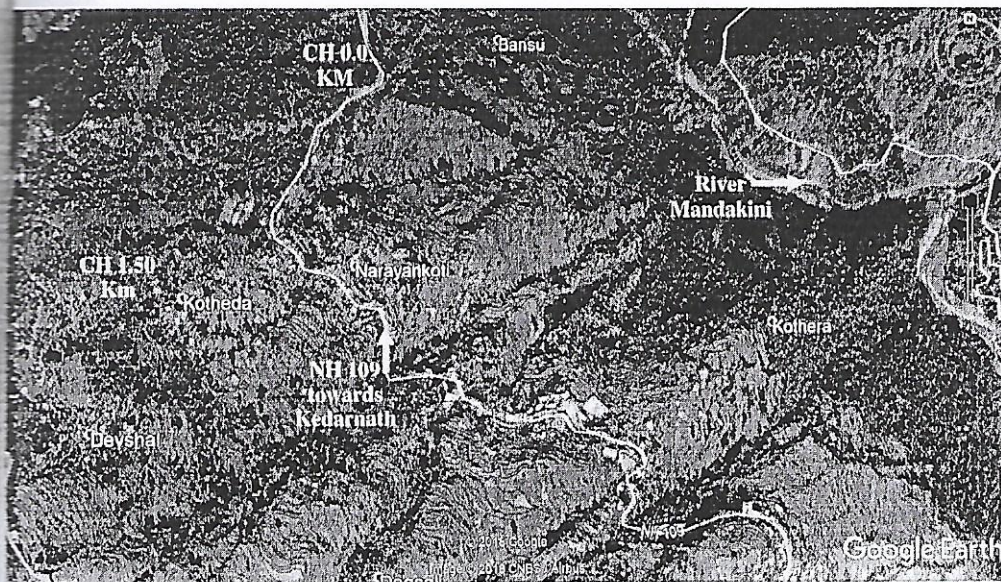
**Topographical Information/Location:** The above mentioned motor road alignment diverts from CH 45.50 Km of NH-107 Motor Road and connects Narayankoti, Devshal, Kotheda, Kalasu, Bansu, Tyudi and Jandhar villages, also the motor road will connect NH-107 with Chardham Yatra helipad at Jandhar, Ukhimath block, district Rudraprayag. The co-ordinates along with elevation, masl of the site near CH 0.0 Km are as follows-

Latitude:	30° 32' 49.55"
Longitude:	79° 04' 26.25"
Approximate Elevation:	1415 M



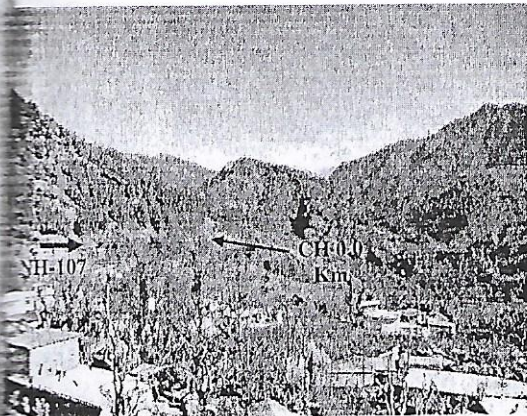
*Broader Satellite View of the Site*



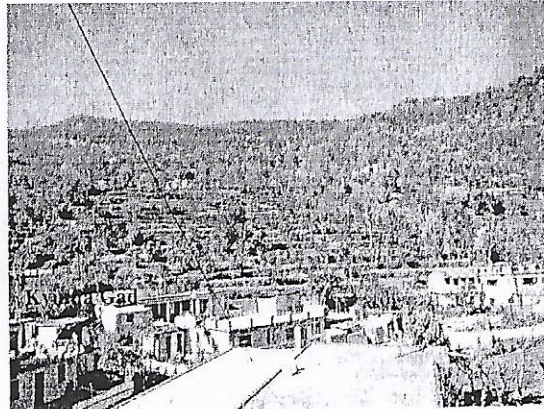


*Closer Satellite View of the Road Alignment Site*

**Geological Assessment:** Geologically, the area falls under the Higher Himalayan zone, Munsyari Formation by (Valdiya, 1973; Valdiya and others, 1999). It is in the close vicinity of a regional fault known as Munsyari Thrust which passes near Kund- Guptkashi and separates Meta-sedimentary rocks of Garhwal with high grade metamorphic rocks of Higher Himalaya. However, the road alignment runs through the slope over which 1.125 Km is cultivation land (Naap Khet) and 0.375 Km Civil forest land covered with overburden and slope wash material with vegetation with a few patches of bed rock consisting of Biotite-Schist, Quartzite and Quartz-Biotite Gneiss. The approximate strength of exposed rock mass is around ~100-150 MPa and has undergone  $W_0$  to  $W_3$  weathering grade.



*CH 0.0 Km of the road alignment*



*View of gentle slope of the alignment*



The hill slope of the road alignment is gentle to moderately steep (20-30°) which roughly declines towards East to North-East direction. The alignment passes through a small nalla/stream at CH 0.775 Km. There is one hair pin bend on the alignment which is at CH 0.850 Km. The gradient of the road alignment ranges between 1:18 to 1:20 with both rise and fall with a gradient of 1:40 at hair pin bends.

**Seismicity of the area:** According to Indian Standard code the site falls in seismic zone V of seismic zoning Map of India (IS 1893, part 1, 2002) which corresponds to intensity IX or above MM scale.

On the basis of the geological inspection of the site studies carried and the facts given above, the following recommendations are being made for the construction of the proposed road failing to these recommendations this report will be automatically treated as cancelled.

#### 5- Recommendations:

1. Blasting by explosives for the road construction is to be avoided as far as it is possible. Use of explosives will render the slope highly unstable as the slope consists of jointed/ fractured rock mass and overburden/slope wash material.
2. Excavation work must be carried out by skilled manual workers as the rock slopes are prone to slide down in case of rapid disturbance.
3. The slopes on either sides of the road must be protected by the construction of suitably designed retaining wall/ breast wall with proper weep holes, this work shall be carried out simultaneously with the advancement of the road cutting.
4. Construct a large U-shaped longitudinal concrete lined drain all along the hill side of the road with adequate provision of cross drains is necessary.
5. Construct small bridge/pulliya over the nalla/stream at CH 0.775 Km so as to avoid any damage to the road during monsoon season.
6. Construct the road by half cut and half fill techniques and compact the fill material properly by dynamic compaction.
7. Disposal of muck and excavated waste on the lower slopes of this road is to be strictly avoided; failing to which will increase the weight of the lower slope resulting in the increase in driving forces. It is advised to dispose the muck on identified sites for muck disposal.
8. All the construction activities ought to be carried out as per the standard codes of practice laid by the BIS and MORTH.

On the basis of the geological/geotechnical studies carried at the site and recommendations, the site proposed for 1.50 Km long Narayankoti-Kotheda- motor road between CH 0.0 and 1.50 km was found geologically suitable for

Date: 23/04/2018

*Tushar Sharma*

(Tushar Sharma)  
Assistant Geologist  
Office of Chief Engineer  
PWD (Pauri Zone)

P.C. Attested

*S. S. S.*  
सहायक अभियन्ता  
निर्माण खण्ड लो० नि० वि०  
ऊखीमठ (ऊदप्रयाग)