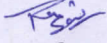


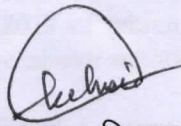
परियोजना का नाम :- मुख्यमंत्री ग्राम सड़क संयोजन योजना के अन्तर्गत जनपद चमोली के विकास खण्ड पोखरी में रौता-मालकोटी-सेरा तक मोटर मार्ग के नव निर्माण हेतु ^{1.89 हे.} भूमि हस्तान्तरण प्रस्ताव।

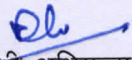
भू-वैज्ञानिक की आख्या

भू-वैज्ञानिक की आख्या संलग्न है।


अमीन
नि०ख०,लो०नि०वि०
पोखरी,


कनिष्ठा अभियन्ता
निर्माण खण्ड लो०नि०वि०
पोखरी


सहायक अभियन्ता
निर्माण खण्ड लो०नि०वि०
पोखरी


अधिशासी अभियन्ता
निर्माण खण्ड लो०नि०वि०
पोखरी .

To,
The Executive Engineer
(Construction Division)
PWD, Pokhri

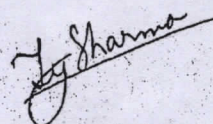
Subject: Submission of Geological Site assessment report of 5.0 Km long Rauta-Markoti-Sera Motor Road.

Dear Sir,

In response to your request of making a site visit for the assessment of the site selected for the construction of 5.0 Km long Rauta-Markoti-Sera Motor Road, in Pokhri Division, district Chamoli (Garhwal), a site visit was made on 12/10/2017 of which a report has been prepared. Therefore it is requested to please find report of the above mentioned site attached with this letter.

Date: 16/10/2017

Yours Faithfully



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

Geological Assessment of 5.0 Km long Rauta-Markoti-Sera Motor Road
Alignment Corridor between Chainage 0.0 to 5.0 Km, Pokhri Division,
District Chamoli (Garhwal)

Tushar Sharma
16/10/2017

1- **Introduction:** The Construction Division, Pokhri, has been entrusted for the construction of 5.0 Km long Rauta-Markoti-Sera Motor Road between CH 0.0 to 5.0 Km. In order to assess the geological conditions of the road alignment site for its feasibility, Er. Rajesh Chandra (Executive Engineer) Construction Division, PWD, Pokhri asked for a geologist to make a site visit. Consequent to his request a visit to the proposed road alignment site was made on 12/10/2017; Er. Neeraj Bhandari and Er. Kuldeep Rawat (Junior Engineers) CD PWD, Pokhri were present during the site visit.

2- **Topographical Information/Location:** The alignment site proposed for the construction of 5.0 Km long -Markoti-Sera Motor Road extends from end point of Udamanda-Rauta Motor Road at village Rauta, Pokhri Division, district Chamoli (Garhwal). The co-ordinates along with elevation, masl of the site H 0.0 Km as follows-

Latitude : 30°20'51.09"
Longitude : 79°08'39.90"
Approximate Elevation : 1550 M

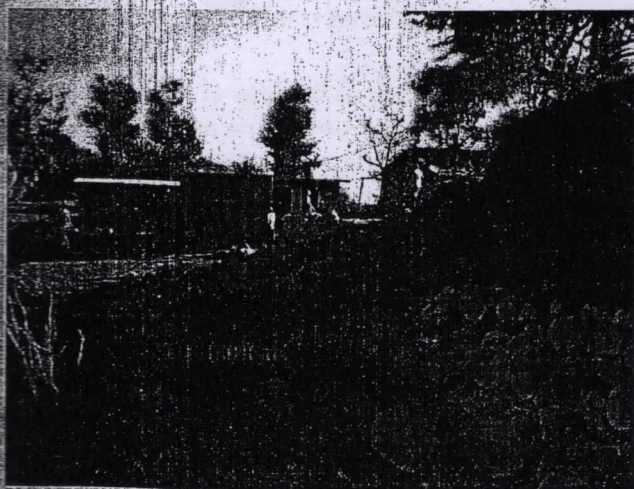


Broader Satellite View of the Site



Closer Satellite View of the Road Alignment Site

- 3- **Geological Assessment:** Geologically, the road alignment site area falls under the Meta-Sedimentaries of Lesser Himalaya. The rocks exposed in the area consist of Quartzite, Phyllitic Quartzite, Talc-Serisite Schist, Chlorite Schist & which belong to Berinag Formation of Jaunsar Group and Bhatwari and Barkot units of Ramgarh Group. The hill slope of the site area is moderate to steep which declines at $\sim 40^\circ$ - 60° more or less towards South-West direction. The road alignment passes through cultivation land (Naap Khet), Pine trees and shrubs (Reserve Forest) along with patches of hard/jointed quartzitic to schistose Quartzite bed rock. The approximate strength of exposed rock mass is around ~ 100 MPa and has undergone W_0 to W_2 weathering grade.



View of site at CH 0.0 Km



View hill slope of site and Salna Village from far

There total six hairpin bends on the road alignment which are at CH 0.550, 1.325, 2.375, 2.475, 2.575 and 3.300 Km respectively. As the distance between 3rd & 4th and 4th & 5th hair pin bends (which is 100 and 100 m respectively) is quite less therefore utmost care is to be taken while excavating and developing hairpin bend sites. The road alignment has a falling gradient of 1:20 with no rising gradient and 1:40 in the hair pin bends.

There is a vertical face of slope having loose mass debris/overburden between CH 4.500 and 4.625 Km this patch is susceptible to failure when disturbed hence damaging the road especially during rainy season therefore it is advised to perform the road cutting/excavation work with utmost care also slope stabilization measures are to be taken at this patch keeping in view the stability of the road and safety of the residential and school buildings of village Sera which are just below the above mentioned patch.

4. **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 I, 2002) which corresponds to intensity IX and above on 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:

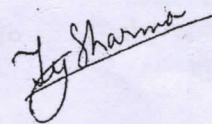
1. Blasting by explosives for the road construction is to be avoided as far as it is possible. Use of explosives will render the slope highly unstable as the slope consists of jointed/fractured rock mass and overburden/slope wash material.
2. Excavation work must be carried out by skilled manual workers 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 especially between CH 2.350 & 2.650 Km where there are three Hair Pin Bends quite close to each other.
3. It is advised to perform the road cutting/excavation work between CH 4.500 and 4.625 Km with utmost care and proper slope stabilization measures are to be taken at this patch keeping in view the stability of the road and safety of the residential and school buildings of village Sera which are just below the above mentioned vertical face of slope having loose mass debris/overburden as at this patch when disturbed the slope is susceptible to failure.
4. It is advised to plant soil binding vegetation like Didonia, Lemon grass or Ram Baans on naked patches of the slope which appear to be unstable.
5. Construction of large U-shaped longitudinal concrete lined drain all along the hill side of the road with adequate provision of cross drains is necessary.

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 the identified site 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.

6- **Conclusion:** On the basis of the geological/geotechnical studies carried at the site and with the above recommendations, the site proposed for 5.0 Km long Rauta-Markoti-Sera Motor Road was found geologically suitable for construction between CH 0.0 to 5.0 Km.

Letter No: 2129/भू.वे.०-7-पौड़ी/2017

Date: 16/10/2017



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