

Geological Report in regard to for constructing motorable road from Jeori Rest house to Nawaru, District Shimla (Km 0/000 to 2/341)

INTRODUCTION

The Executive Engineer, B&R Sub Division, HPPWD, Rampur, Shimla, Himachal Pradesh vide letter No RMP/WA-I/FORESTCASE/2013-1967-68/dated 22/05/14 intimated the State Geologist that there is proposal for constructing motorable link road from Jeori rest house to village Nawaru (RD 0/00 to 2/341 KM) in this regard he has requested the State Geologist, Himachal Pradesh to get the site under reference geotechnically inspected from the stability point of view and suggest remedial measures in this regard.

In compliance to above request made by Executive Engineer, Rampur, the undersigned was deputed by State Geologist Himachal Pradesh to undertake the Geotechnical investigation of the said site and to submit the requisite report.

The site was inspected by undersigned on dated 15-7-2014 along with, Sh. Kishore, Asstt. Engineer. The present report deals with the studies carried out with regard to the nature of hill slope, lithology of bed rock encountered, type of strata forming the hill slope, structural disposition, strength of rock types, joint pattern, topography, past history of land sliding if any, drainage pattern, effect of surface run off and occurrence of any neotectonic activity along the hill slope. Based on above studies the report has been prepared incorporating the recommendations

LOCATION OF THE AREA:-

The area under reference lies in Shimla District of Himachal Pradesh and falls in the Survey of India (SOI) toposheet no.53E/14 (1:50,000 Scale). The proposed road bifurcates from Jeori- Sarahan road uphill side of Jeori Rest house. It will cover habitation of two villages i.e. Nawara and Nawaru.



Tentative Proposed road alignment

GEOLOGY:

The area falls under the lesser Himalayan region and present a rugged mountainous terrain with moderate to high relief. The area is a part of catchments of Satluj river system and drained by river Satluj and its number of tributaries. The altitude of the area is above 1000 mtrs with deep narrow valleys gorges having steep cliffs and escarpment faces.

In the recent past, the area has been visited by several Geologists in connection with the Geological mapping, mineral investigations and construction of the Hydro-electrical projects in the valley. The Geology is highly complicated (Rampur tectonic window) due to thrust sheets, faulting and folding during the Geological past. Due to these movements the underlying rocks moved over younger formation. As a result of these movements the rocks have undergone tremendous variation in their Engineering properties. The rocks are highly jointed, shattered and fissured in nature as observed during the course of inspection. The tectonic sequence is tabulated below:

Table-I

Group/ Series	Lithology
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Sarahan Series	Schist and Gneisses with Barauni and Jangi granite and pegmatites
Rampur series	Quartzite with basic Nogli and Brauni Khad rocks, Phyllites with near Jhakhri interbedded quartzite

The thick sequence of quartzite and phyllites exposed around Rampur is grouped as Rampur formation. The quartzites are hard, massive flaggy vitreous white and brown, The phyllites are generally carbonaceous in nature and associated with intercalations of quartz-mica-schists and basic rocks. The meta-sedimentaries of Rampur formation are thrust over by various rocks of Central Crystalline along folded upwarps in the satluj valley exposed the concealed younger rocks forming tectonic window around Rampur and is popularly known as "Rampur window~".

Rocks of Sarahan Formation are very well exposed along steep hill slope on both side of river Satluj while traveling from Rampur toward Jeori. This formation has a thrust contact with the quartzites of Rampur formations. The bed-rock consists of gneissose schist and Quartz-sericite — chlorite-schist.

OBSERVATION:

The proposed road alignment has generally moderate slope and lies in the intervening valleys of Rampur-Sarahan geo-morphological division of Shimla District. At some places where the slope is steep, bed rocks are very well exposed along road cutting and nalla cutting.

The proposed road will cover two villages i.e Nawaru and Nawara. The rocks in the area are of Sarahan Group of rocks. The places with flat and gentle hill slope are covered with the overburden material. These deposits are found mixed with sandy, silty and clayey soil. The weathering and disintegration of the upper portion of the rocks has resulted in the formation of the soil cover. As a result of percolation of rain water into shattered bed rocks caused weathering of rocks. It contains large quantity of clayey matrix along their foliation planes. Most of flat surfaces and gentle slopes are covered with

debris/overburden material (silt & clay).The slope/ridge where bed rocks are not exposed is covered with soil/overburden of variable thickness. The sloping hill slope also exhibits presence of thick matter of soil, unconsolidated debris.



Proposed road alignment
village Nawara-Nawaru

CONCLUSIONS AND RECOMMENDATIONS:

Based on surface studies made in the field, it is inferred that the hill slope along which the proposed road alignment is proposed appears to be stable on Geological point of view. However, following recommendations are considered absolutely essential for long term safety of the road and stability of the hill slopes.

1. As already discussed, the road alignment partly passes through soil and partly through bed rock. At present the hill slope is considered stable and there is no apprehension of any land sliding, if it remains in its natural configuration. However, at some points when cutting of hill slope is carried out for construction of road, it will render the existing hill slope steep and vertical in certain stretches. When the material is incompetent and back height becomes more it has the tendency to attain the angle of repose through minor land slips/slumping which is a common phenomena in hilly terrain. It is therefore, suggested that properly

designed retaining structures are required to be constructed along such vulnerable locations.

2. The road alignment is mostly passing through thick overburden/debris in some stretch as discussed earlier. The hill slope covered with such material is stable when it is in dry state but when there is a saturation of soil due to rain water, its stability is profoundly disturbed. It is therefore, suggested that proper disposal of water towards uphill side and road side may be ensured particularly in the area affected with slow creep movement to minimize the percolation of water into the soil and also to check soil erosion of the freshly cut hill slopes.

3. During excavation of road, waste/muck shall be generated which will be dumped at the defined sites for the purpose. It is suggested that proper retaining walls should be constructed to check the flow of waste material/muck.

4. The proposed road alignment passes through some small dried drainage/gullies. These locations are very prone to the landslides and due to high discharge of percolated and snowmelt water which can cause damage to road. Hence, it is recommended that proper side drains and cross drains may be provided and the water from the side drains be diverted to the nearby natural drainage for safety of the road.

Submitted by


(Sunil Verma)

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