

Geological report for Link Road Construction from Chillon to Choki Mrigwal road(KMS 0/00 to 8/00) within the jurisdiction of Renuka Ji Forest Division, District Sirmour HP.

1.1 Introduction

In consequent to insufficiency of plain land, road construction in hilly terrain requires site selection, stable alignment along hillslopes with respect to their dip and strike and stable lithology etc. The steep slopes are common type of structural arrangement that is found on hilly terrains which requires proper mapping for stable alignment of road construction.

The Executive Engineer, Shillai Division HPPWD, Shillai, Distt Sirmour HP is going to construct link road from Chillon to Choki Mrigwal road (KMS 0/00 to 8/00) within the jurisdiction of Renuka Ji Forest Division, District Sirmour, HP (Online Proposal No FP/HP/ROAD/48987/2020) as said road appears in MLA Priority of Hon'ble Industry Ministry of Himachal Pradesh and also this road needs Geological report for FCA clearance from Forest Division, Renuka Ji. Accordingly, The Executive Engineer, Shillai Division HPPWD, Shillai, Distt Sirmour HP vide his letter no. PW/SD/CB/FOREST CASE-2023-24-14990 dated 21.02.2024 requested the Geologist Zone-III, Himachal Pradesh for the Geological investigation of site identified for the construction of link road from Chillon to Choki Mirgwal road (KMS 0/00 to 8/00), Tehsil Kamrau Distt Sirmour HP.

Accordingly, The Geologist Zone-III, Himachal Pradesh vide letter No. Ind. Bhu(Geo-7) Eng.- Sirmour-5/2002-13346, dated 22/2/2024 assigned the undersigned to inspect the area proposed for the construction of road and to submit the demanded geological report. In compliance to the directions issued vide above referred memo, the area identified was inspected by undersigned along with officials from HPPWD, Division Shillai and accordingly Geological report of the site is prepared.

1.2 Location

The proposed road alignment commences at the NH-707 on the Sataun-Heyona stretch at Chillon and whole road alignment passes through hillslope. The available road alignment has irregular elliptical shape. The major portion of the proposed road alignment will cut across hill slope surface.

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(Google image showing tentative alignments of the road)

1.3 Regional Geology Of The Area

The mighty Himalayas covers the most part of the District Sirmour with mainly Shivalik and Lesser Himalaya ranges present predominantly in the District. These ranges exhibit a rugged mountainous terrain with moderate relief. The rocks found in the area comprise Sandstone, Shale, limestone and schist deposited during past 600 million years.

Various litho-units ranging from Proterozoic to recent era are found to occur in Sirmour district. Among all, typical Mesozoic era formations cover most of the parts and Quaternary formations occupy southern part of the district.

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Granite Gneisses of Jatogh formation belonging to lower Proterozoic is located in northern part of the district while Deoban Formation of upper Proterozoic is confined to the eastern part in limited extent. Jaunsar and Shimla Group of lower Proterozoic to upper Proterozoic period cover middle portion of the district which encircles Tal, Krol and Infra-Krol formation of Triassic period respectively. Among which the Krol Formation of Triassic period is known for its limestone deposits. Subathu and Dharmshala formation of Oligocene cover a major portion of the southern area.

The site situated in the bedrocks of Krol and Tal formation comprising of Dolomite, thick quartzites, greywack chert, banded shales.

The geological setup of the site inspected is as under:

Formation	Age	Rock Type
Tal Formation	Cretaceous and Jurassic	Thick quartzite, greywacke chert, band shales.
Krol Series	Permo- Carboniferous	Limestone and Shales

1.4 Observations

The undersigned took a traverse along probable road alignment alongwith HPPWD officials to ascertain the idea of local lithology and settlement of the area. It is observed that the total road alignment is passing through hill topography. The rocks are mostly exposed and fractured. There is very less overburden/soil cover along road alignment.

The terrain of the site is largely sloping in the form of hillslope with fractured and thinly jointed quartzite intermixed with weak decomposed dolomite-shale alterations having a slope angle of moderate to steep towards uphill. The site shows some sliding at few locations, but largely it appears that the site is feasible for the development of road construction by using proper slope stability structures.

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(Images showing slope surface at the site)

1.5 Conclusions and Recommendations

The road along hill slope impart their load to the hill slope through moving vehicles and other vibration. It results in increase in the shear stress, which may cause impermanence of hill slopes. It is recognized that designs for the construction of road and foundations associated with variety of related disciplines such as geology, soil and rock dynamics, etc, which plays their important role.

In order to carry out any activity in the hill, the hill slope needs to be stabilized. Following recommendations/ suggestions may be considered, which include removal of loose material, proper drainage, both surface and sub-surface and the use of restraining structures.

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Excavation:

The exposed rocks are mostly fractured and thinly jointed, it is therefore recommended that the road shall be constructed on half cut half fill method to avoid any major disturbance in the stability of the hill. It is also recommended that the rocks in the site are fractured and weak, so proper shotcrete of the rock is needed by providing wire meshing structures to give stability to the hill slope.

Foundation:

As observed during the inspection that slope is moderate at the site, it is recommended that hill should be cut in benches by maintaining angle of repose of 45 degrees for slope stability.


Construction of Drainage Channel:

It is necessary to have proper drainage from consideration of structural safety and stability. The strata belonging to the said site are prone to weathering effect. It is recommended that proper lined drainage arrangements may be made. When there is ingress of rain, it will significantly accelerate this problem. It is therefore, recommended that proper drainage channel should be constructed from the uphill side in order to drain surface water away from the road alignment. Proper and effective method of constructing retaining wall both along downside and upside by making weep hole for draining of water should be made so that there is no ingress/absorption of water in the hill side.

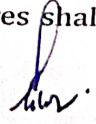
Construction of Retaining Structure:

Site topography reveals that during heavy rains, there may be chances of sudden displacement of soft material which may cause slide or subsidence along the slopes facing valley. The downhill area should be supported with the retaining structure which is also capable to bear the load of the moving vehicles and other vibrations. It is suggested that a proper concrete retaining structure should be constructed from the road level in step manner, in order to protect the slope as well as to bear the structural load of the moving objects. Alternate weep holes should be provided in the structure to drain underground water, which may lead to create hydraulic pressure.

On the basis of observations made during the site inspection, it is suitable for road construction. However, as recommended, proper retaining measures shall be adopted while construction of road for prolong future use.


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