

**Geological Report No. Geol./Road -01/ NH/ Misc./ 22**

**Geological Report for the project namely “Feasibility Study/Detailed Project Report for the Project of UP-gradation and 4-lanning of Paonta Saheb-Ballupur (Dehradun) Section of NH-72 (Km 97.000 to Km 149.000) in the State of Uttarakhand and Himachal Pradesh”.**

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**Geological Assessment of the Alignment corridor proposed for Ponta Saheb-Ballapur Section of NH-72 in the state of Himanchal Pradesh -Uttarakhand**

- 1- **Introduction:** The National Highways Authority of India (NHAI) has been entrusted with the development of Four Lanning of Ponta Saheb- Ballapur Section of NH-72 in the state of Himanchal Pradesh and Uttarakhand. NHAI has appointed M/s Yongma Engineering Co. Ltd. in association with CHO & KIM Engineering Pvt. Ltd. for preparing Detailed Project Report of this project. On the request made by Shri R.S. Sharma, Managing Director, Sugam Technocrats Pvt Ltd, on behalf of DPR Consulatnats, I carried out the Geological assessment of the proposed alignment corridor along with Mr. Sharma and the concerned engineers.
- 2- **Location:** The alignment corridor of the proposed alignment originates from Ponta saheb , Himanchal Pradesh and terminates at Ballapur hamlet of Dehradun City and in question it is included in the survey of India toposheet number 53 F/11 & 53 F/15 .
- 3- **Regional geology and Geological Assessment of the alignment corridor:**

Geologically the area containing the alignment corridor falls in active tectonic zone of Himalaya foothill bounded by the Siwalik hills in the south and outer scarp of the Main Himalayan Belt (MHB) in the north. The area exhibits typical Himalayan topography i.e., rugged mountain terrain with upper piedmont, middle piedmont and lower piedmont slopes. Most of the alignment corridor is located within the famous Doon valley which is an intermontane longitudinal tectonic syncline basin bounded by Main Boundary Thrust (MBT) in the north and Siwalik hills arising in the northern part of the Himalayan Frontal Fault(HFF) in the south . The NE-SW trending Ganga tear fault demarcates the eastern boundary of Doon Valley while N-S oriented Yamuna River limits its extension in the west. From a point between these two rivers, runs a ridge which forms water divide of the valley. To the west of this ridge water collects to form Assan river a tributary of the Yamuna River which in turn forms Sitla Rao. Piedmont slopes of watershed of Assan river exposes alluvium which had been filled up the bottom of the syncline and rests on the slopes of bordering hillocks. The alluvium is comprising mostly of doon gravels, formed of coarse clastic fans of late Pleistocene and Holocene period. The area belonging to the left bank of Yamuna River also partly deposited pile of river sediments which forms terrace of river borne material (RBM) which attains height of 20m to 40m above the river bed level.

Most of the proposed alignment passes on the left bank slopes of Assan River and the ground along this formed of boulders, cobbles, pebbles embedded in sand silt and clayey matrix with a major fraction of gravels.



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The thickness of these alluvium deposits along the alignment corridor is enormous below the natural ground level. This ground-forming material is naturally dense and well compacted in nature. Nowhere in situ bedrocks are exposed to the surface of the ground.

The hill section of the proposed NH for which this geological report is being generated falls between Km 4 to Km 14. The ground in this section comprises mostly of tightly packed boulders, cobbles, and pebbles embedded in clay-sand -silt matrix. The soil in this section is semi-dispersive in nature as it contains less plastic cohesive clays. On the basis of simple field assessment (Diagnostic features) made at a few locations along the alignment, the Undrained Shear Strength of the material was found to be between "100 to 200" k Pa. The strata in the vertical columns exposed along the Nala sections is almost monolithic and dense in nature and as per the prescribed guide for relating descriptive terms it's Relative density Index (RD) has been estimated between "65-85", SPT N -value (blows /300mm) "30-50", Dynamic Cone (blows/100m) "7-17". These suggested parameters are being generated only for evolving the preliminary design scheme of the cut slopes and for detailed design purposes proper geotechnical investigation shall be carried out on-site as well as in the laboratory especially for safe cut and designing the slope where cutting is involved.

By and large, the ground of the alignment is comprised of Stiff soils which are hard, dense, and well-graded in nature. Nowhere signatures of ground deformation i.e. ground subsidence, sinkholes, potholes, tension cracks were seen during the inspection of the site.

- 4- **Seismicity of the area:** - According to the Indian Standard Code of practice the site of proposed construction falls in Zone IV of the Seismic Zoning Map of India (IS 1893, Part I,2002).
- 5- **Conclusion:-** On the basis of studies carried at the site the proposed construction of National Highway, Ponta Saheb- Ballapur section, Km 04.00 to Km 14.00, passing through the forest land will have no adverse effect on the ground Geology of the forest area of NH- area falling astride the road, found the suitable for construction.

  
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