Geological Assessment of the Site Proposed for the Construction of 200 m Span Double Lane RCC (Class-A loading) Motor Bridge over Binj Rao River on Chilla-Pashulok Motor Road near Ganga Bhogpur, Dugadda Division, District Pauri (Garhwal)

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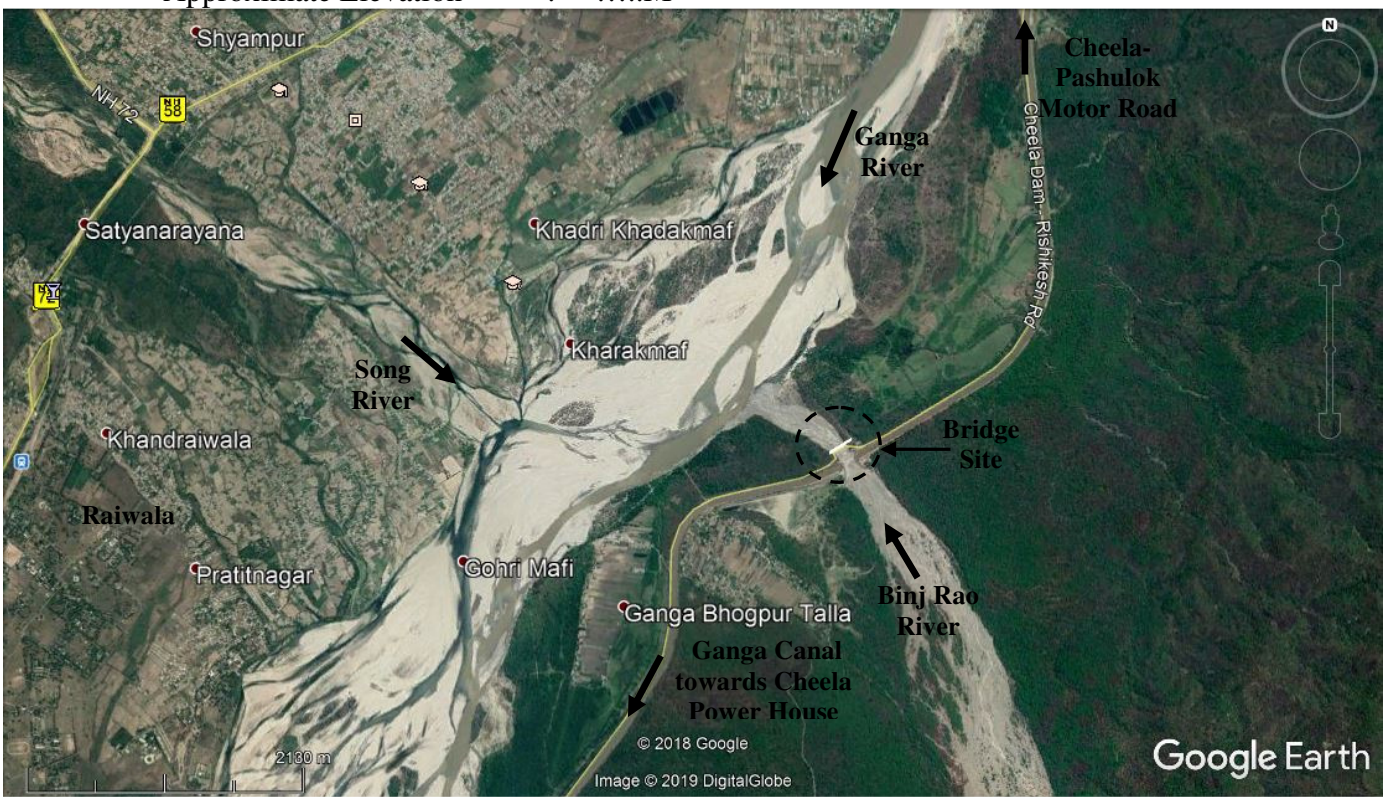
1- Introduction: The Construction Division, Dugadda, has been entrusted for the construction of a 200 m long Double Lane RCC (Class-A loading) motor bridge over Binj Rao River on Cheela-Pashulok motor road near Ganga Bhogpur. In order to assess the geological conditions of the site of bridge construction for its feasibility, Er. Nirbhay Singh (Executive Engineer) Construction Division, PWD, Dugadda asked for a geologist to make a site visit. Consequent to his request a visit to the proposed bridge site was made on 27/09/2018; Er. Nirbhay Singh (Executive Engineer), PWD, Dugadda and Er. Satyaprakash (Assistant Engineer), Camp office Laxmajhula,CD, PWD, Duggadda were present during the site visit.

2- Location: The above mentioned proposed motor bridge is located across Binj Rao River on Chilla-Pashulok motor road just downstream of Aqueduct of East Ganga Canal, near Ganga Bhogpur in Duggadda division, district Pauri (Garhwal). The co-ordinates along with elevation, masl of the right abutment of bride site are as follows-

Latitude	:	30° 02’ 00.10"
Longitude	:	78° 16’ 32.75"
Approximate Elevation	:	…..M



Broader satellite view of the bridge site.

Closer satellite View of the Site

3- **<u>Geological Assessment</u>:** Geologically, the area around the bridge site falls under thick recent alluvium and river borne material brought by the rivers coming from the hills up in the north. A traverse was made around the Binj Rao river flood plain near Aqueduct of East Ganga canal a suitable site for bridge construction was selected just 25-30 m downstream of the aqueduct. The river flood plain is quite wide both upstream and downstream of the selected site and will require a very long span bridge (>200-250 m) in order to cross the river. Also, keeping in view that there is approach road (Cheel-Pashulok motor road) nearby the present site was selected.

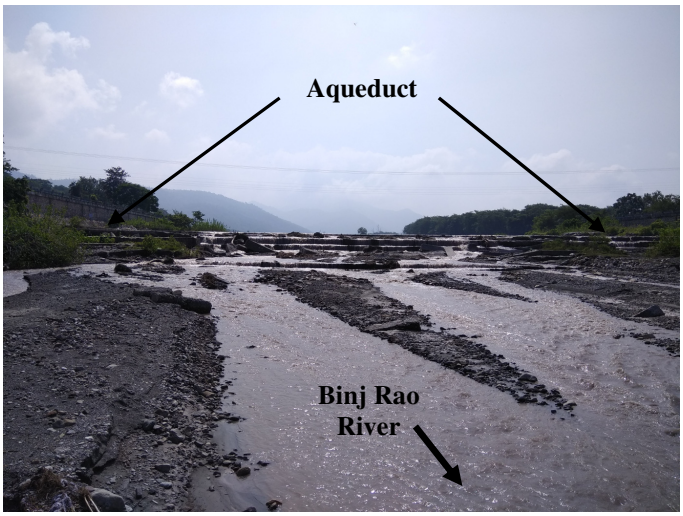
The ground material around both the abutments of the proposed bridge site appears to have varying competency and deformability values due to which the settlement values under the same loading pressure would be different at both abutments. Therefore, it is advised to design the foundation of the abutments on the basis of geotechnical parameters of the ground.

The terrain proposed for the construction of the abutments on either side of bridge appears have varying rock conditions therefore, it is advised to carry out Sub surface soil testing investigation (minimum 5m depth) to ascertain the presence of rock and ground deformability values.

4- **<u>Seismicity of the area</u>:** According to Indian Standard code the site falls in seismic zone IV of seismic zoning Map of India (IS 1893, part 1, 2002) which corresponds to intensity VIII on MM scale.

View of site near the right abutment

View of left abutment of the site from the left bank



Upstream of view of the Site

Downstream of view of the Site

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

5- Recommendations:

1. As the site is covered with thick cover of alluvium/river borne material therefore both the abutments ought to have strong and deep foundations enough to bear the heavy traffic load.

2. In order to develop the site for construction, rather than blasting the rocks must be excavated manually.

3. The deck level of the bridge should be kept sufficiently above the highest flood level (HFL) of the river.

4. The bridge is being constructed on the foot hills Himalayan Belt which is a geodynamic seismo-tectonic block, which is likely to experience earthquake events, the area itself lies in seismic zone IV of seismic zoning Map of India therefore, the bridge as a whole and its abutments must be designed earthquake resistant.

5. River banks on either side must be protected by suitably designing retaining/flood protection walls on both the banks especially in upstream direction as the river water can erode the banks during rainy season when there is possibility of flash flood. In that case the river water can even cut the banks at bridge abutments from behind hence severely damaging the road and the bridge abutments.

6. It is advised to carry out Sub surface soil testing investigation (minimum 5m depth) to ascertain the presence of rock and ground deformability values.

7. All of the construction activities should be carried out as per the norms and standards by the IRC-06/ MORTH, for the similar structure constructed in the Himalaya.

6- <u>Conclusion</u>: On the basis of the geological/geotechnical studies carried out at the site and with the above recommendations, the site proposed for construction of 200 m long Double Lane RCC (Class-A loading) motor bridge over Binj Rao River on Cheela-Pashulok motor road near Ganga Bhogpur was found geologically suitable for construction.

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