

परियोजना का नाम:— जनपद बागेश्वर के विधानसभा क्षेत्र बागेश्वर में (यू०डी०आर०पी०) के अन्तर्गत भितारकोट से पार जूनियर हाईस्कूल को जोड़ने हेतु 40मी० स्टील गार्डर पैदल सेतु के निर्माण हेतु वनभूमि प्रस्ताव।

(5)

Geological Assessment of 36m span Bridle Steel Truss Bridge in
Garur Ganga River near Bhitarkot to join Junior High school,
District-Bageshwar

Priva Joshi
14.09.2018

1- **Introduction**-The World Bank Division Public Works Department Bageshwar has been entrusted for the construction of 36m span Bridle Bridge in Garur Ganga River near Bhitarkot to join Junior High school, District-Bageshwar. On the request made by Mr. N. S. Majhela, Executive Engineer World Bank Division Bageshwar, I carried out the geological assessment of the proposed site of the above said bridge on dated 10.08.2018. Assistant Engineer Mr. Shahid Akhtar and Junior Engineer Mr. Mukesh Kumar accompanied during the site visit.

2- **Location**-Site proposed for the bridle bridge construction over Garur Ganga River lies near Bhitarkot of Garur to join Junior High school. The co-ordinates of left bank taken from hand held GPS is as follows-

Latitude- 29°54'25"N

Longitude- 79°33'09"E

3- **Geological Assessment**- The location proposed for the above bridge lies in part of Kumaun Himalayas. Geologically it lies near Almora Thrust. It is an autochthonous unit of Precambrian meta-sedimentary rocks exposed in the vast window of inner Kumaun Lesser Himalaya. This section is exposed by the highly to moderately deformed rocks which belong to Berinag Formation. Berinag Formation comprises of Quartzite with meta-basics.

The Garur Ganga River is flowing with the moderately steep gradient in N120° direction. The river has a narrow channel comprising River Borne Material (RBM). RBM comprises of sub angular to sub rounded size of boulders, cobble, and pebbles embedded in clay silt and sand matrix. The river is perennial and has high carrying capacity. The stream can carry large amount of material during heavy rains and in monsoon due to which the widening process of channel is continuous as visible on left bank.

The topography of both the banks is gentle which comprises of river floodplain deposit forming flat terraces. RBM consists of various sizes angular - sub rounded - rounded rock fragments on both the banks. The material on the river bed is mainly dumped during the rainy season; due to the high flow velocity large boulders with unsorted matrix were deposited along the channel. On both the banks manmade terraces were also observed which are mostly cultivated. The soil is good cohesive, dense and

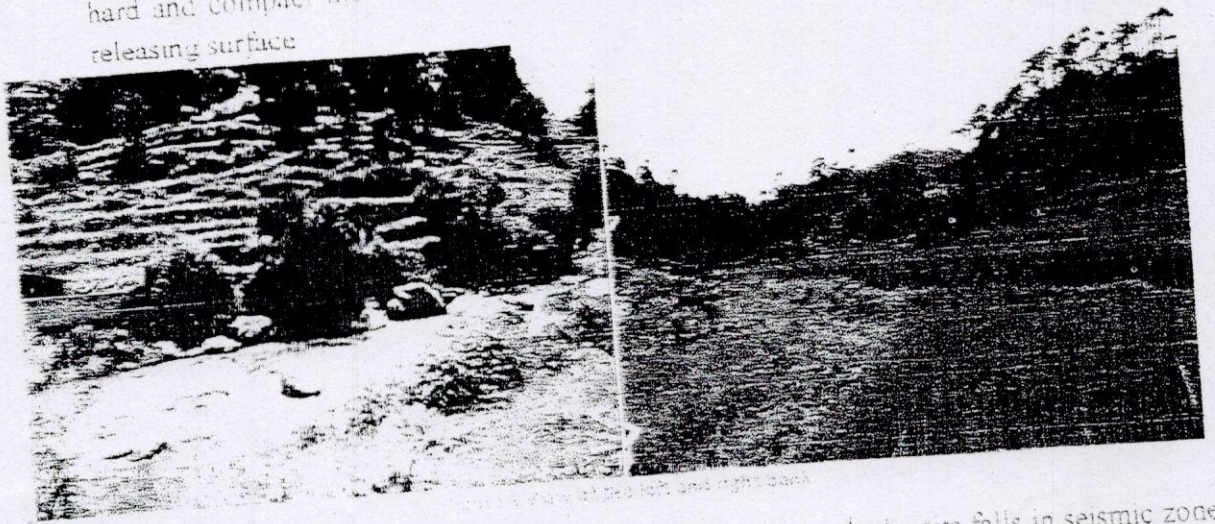
hard in dry conditions but these converts into soft clays under the wet/saturated conditions. No rock is exposed at the proposed location.

The outcrop exposed at the road level which is far away from the site is Quartzite. On the day of site visit to the proposed location whole area is covered with thick vegetation, but rock can be found on right bank under the RBM. Rock is moderately hard in strength. The strength of the rock is estimated by manual test. Low grade of deformation and weathering is observed. Joints are closely spaced and the opening between the joint planes is close to open up to 1mm. In-between the opening along the joint plane soil-silt is filled. Some rolled boulders were also observed on right bank hill slope. Three prominent joint sets which were recorded from Quartzite outcrop on left side hill slope are as follows:-

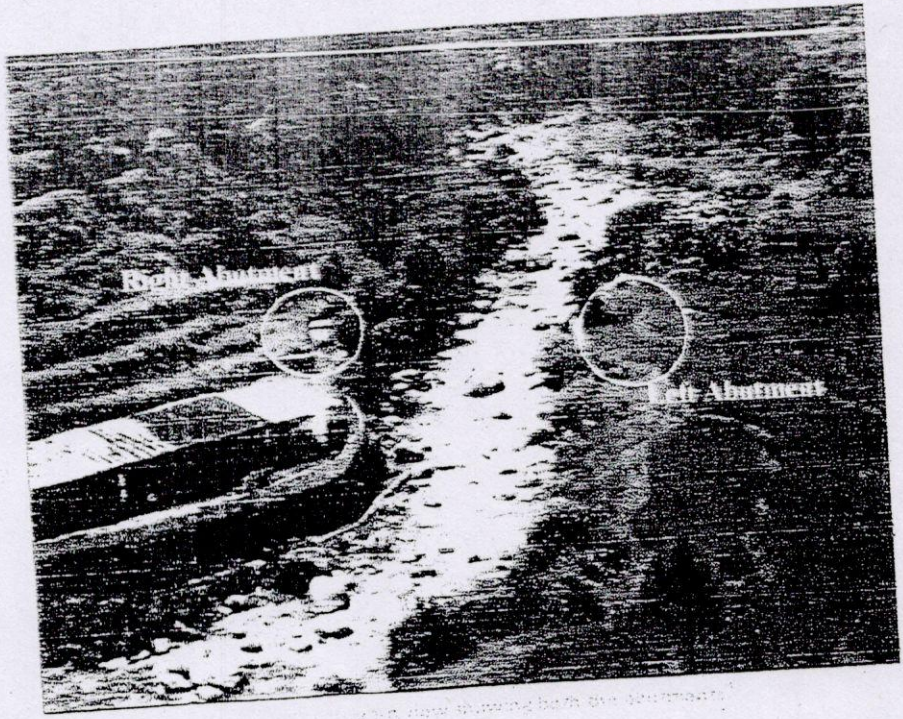
Table-1

S.No.	Feature	Dip angle	Azimuth
1	Joint J1	15°	N 340°
2	Joint J2	35°	N180°
3	Joint J3	45°	N 250°
4	Slope	25°	N240°

From the joint data it is clear that joint J3 dips in the slope dip direction but as the rock is hard and compact the failure does not occur until any joint or tension crack acts as a releasing surface



± Seismicity of the area:- According to Indian Standard code the site falls in seismic zone V of Seismic Zonation Map of India (IS 1893, 2002) which corresponds to intensity IX on MSK scale



Left bank showing both the abutments



Small cave or structure in bank

5- Recommendations:-

- 1- Lay the foundation of either side abutments on fresh, hard and compact in-situ rock mass. Foundation must be laid above the rock after removing weathered rock mass. If in-situ rock is not found on both the banks then, the foundation should be deep enough to bear the load of the heavy structure sufficiently below the scouring depth. Consolidation grouting can be done for making the RBM monolithic and homogeneous.
- 2- The height of deck level of the bridge must be high above the HFL of the river. As the water level in the river fluctuates rapidly during rainy season.
- 3- If any opening/cavities are developed or encountered during the site development and during bridge erection then they must be properly grouted and backfilled with the concrete of suitable strength.
- 4- River banks on the either side must be protected with the suitably design retaining walls and flood protection walls. Foundation of these walls must be placed below the scouring level. On the either side of the banks proper plum/spur should be constructed to dissipate the energy of water.
- 5- Proper protection must be given on either side of the banks to prevent erosion of river bank and abutment by the river, especially on the left bank, as 25-30m upstream of the proposed location on the left bank river is cutting the bank. Spur should be constructed there to prevent further erosion and to channelize the stream.
- 6- It is advised to carry out Sub surface soil investigation to ascertain the geotechnical parameters of the foundation grounds and on the bases of these parameters, site is developed.
- 7- As the proposed site falls in seismic zonation V, therefore the bridge must adopt proper earthquake resistant design as per the appropriate code of practice.
- 8- All construction practice must be carried out as per the norms and standard codes of the practice laid by BIS and MORTH IRC-6.

(55)

Conclusion:- On the basis of the geological/geotechnical studies carried at the site and with the above recommendations, the site was found geologically suitable for the construction of 36m span Bridle Bridge in Garur Ganga River Near to join Junior High school. Failing to these recommendations this report will be treated as cancelled.

Letter No: 4346 / 15 स०म०वै०/18

Date: 14/09/2018

Priya Joshi
14/9/2018

Priya Joshi
(Assistant Geologist)
Chief Engineer Office
PWD, Almora.

Erving

सहायक अभियन्ता
विश्व बैंक खण्ड लो० नि० वि०
बागेश्वर