

REVIEW OF EXISTING BRIDGE SYSTEM IN SMALL RIVERS IN ALLUVIAL REGIONS OF UTTAR PRADESH

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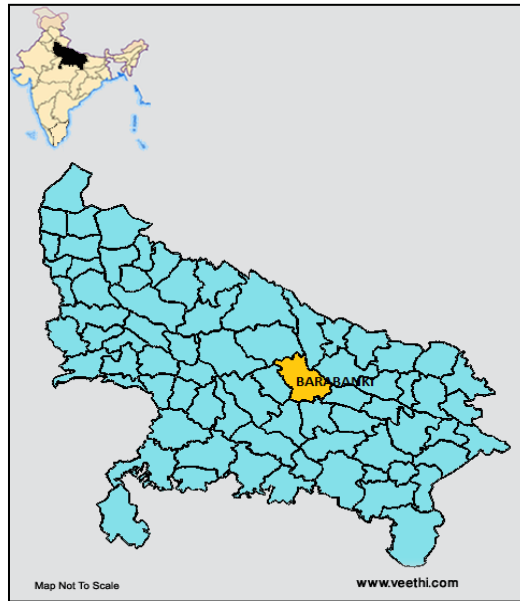
Abstract -From early days, people use techniques to cross the rivers, streams or any depression without closing or obstacle the way beneath. This type of structure called bridge. With the advancement of civil engineering several types of bridges came into existence. They may be like wooden, steel, masonry arches, RCC and prestressed concrete bridges. Indian Roads Congress categories three types of the bridges lengthwise i.e. culverts up to 6.0 m, minor bridges above 6.0 m to maximum 60.0 m length and major bridges above 60.0 m. In present scenario minor bridges are provided over small rivers are symbol of development and prosperity of any region as most of the roads have to cross small rivers at several places. Bridges are always been an important part of environment too because most of cases water flowing below is used for drinking, irrigation and underground recharging. Specially in the alluvial region of India spread from Punjab to West Bengal has peculiar nature. The soil is almost soft in nature mostly sand, clay and silt, very fertile for vegetation. Water retention and movement condition are also very high throughout the year. The population of human being is very dense most part of this land as being cultivable. There are several type of water bodies exist in this region such as pond, small drain, small and medium rivers which fell into the big rivers like Ganga, Yamuna, Ghaghra, Gomti and Sai etc. These rivers are originated from Himalayas or foot hills of Himalaya and outfall at Bay of Bengal. More than 100 years, a road system for earthen track and pucca has been introduced for traffic like cart, chariot and motorised vehicle. There were little number of bridges over major rivers exist i.e. bridge alone to cross over the river Ganga except in few places like Allahabad, Kanpur and Varanasi and over the Ghaghra Alga bridge, Maghighat, Bhatni. But some bridges has constructed over small and medium rivers by Muslim local rulers and business men which now become obsolete. It is found that most of the bridges are of masonry arches wooden and trusses has insufficient water and carriage way. After independence the road network system has been improved to meet out socioeconomic need of people the new bridges has been constructed with standard road width and sufficient water way. Study has been conducted for existing new constructed bridge system over small river and alluvial region of Uttar Pradesh to set guidance in future course of action in replacing and providing new bridges to optimise the need of people.

For this purpose as a particular case for study of small river Reth having maximum discharge 106 cumecs traversing about 96.2 km of district Sitapur, Lucknow and Barabanki of Uttar Pradesh has been taken into consideration. The bridge system over this river provided for the road network of the area is almost new and replacement of older bridge. The replacement of the bridges at different site is varying place to place.

Keywords- bridges, alluvial areas, discharge

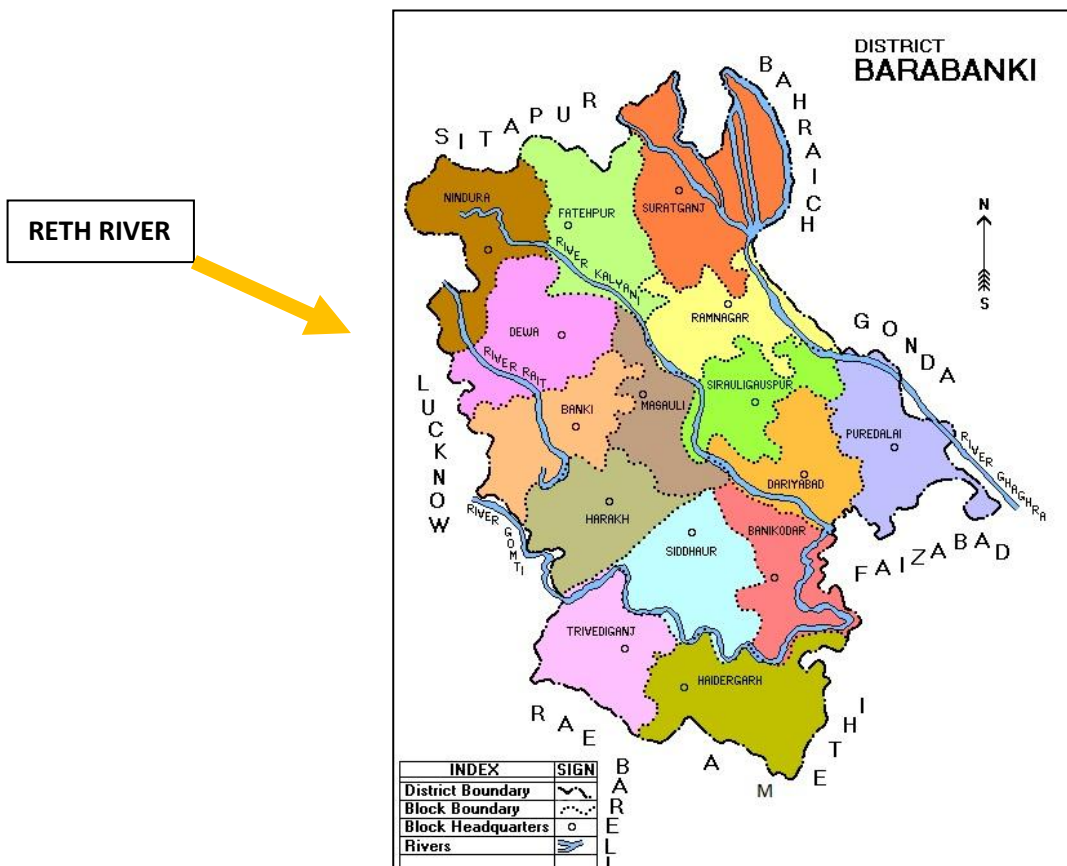
INTRODUCTION

The field study of the bridge system has been conducted by visiting the site and local enquiry. The river Reth is falling in alluvial region of Indo gangatic plain is one of the tributaries of river Gomti is originating From village- Kumharawan, Babaganj of block Bakshi-Ka-Talab District Lucknow and fall into river Gomti near Teergaon Block Harak dist. Barabanki after traversing 96.2 km most of green field vegetation from origin. The ground level difference between origin to out fall is about 14.5 m.



Map of India showing District Barabanki of Uttar Pradesh

The study area is district Barabanki in which the Reth river flows in 74.2Km. stretch. The villages existing on both side of Reth river banks are Amarsanda, Guguar, Baburi Gaon, Nai Mau, Mahrore, Jabrikala, Madhwapur, Shahpur, Hadaora, Bichlanga, Gadiya, Mitaura, Kasba Banki, Kobri, Kothideeh, Badel, Daudpur, Jafarpur, Satrikh, Sultanpur, Sarifabad, Akhtiyarpur, Saryanpandey, Teergaon, Sethmau, Karimabad etc. The total catchment area in barabanki district is 51615 hectare (200 square miles). The maximum discharge is 106 cumecs.



Map of District Barabanki showing Reth River

Study and Data collection

As discussed above the following details are collected by the survey of site and records of the different departments such as U.P. P.W.D, U.P. Irrigation, UP Revenue Department and Block Development Office.

In full reach of 74.1 km. there are 13 bridge structures existing of which 10 number are road bridges. These bridges are existing on national highway, state highway and on village roads. These are maintained by U.P. P.W.D.

A study has been made on all bridges which are tabulated below:

Table - 1: Bridge location and Type

Sr. No.	Chainage(in Km.)	Type of Bridges	Connecting Villages
1	2.85	Well foundation	Barkernagar, Parimathpur
2	6.1	Well foundation	Gyannagar, Diyantnagar
3	13.64	Well foundation	Sarifabad, Attyarpur
4	22.2	Well foundation	Bergadha, Saheria
5	35.45	Well foundation	Munaira
6	42.5	Well foundation	Wadinagar, Saheliya(Darapur),
7	48.0	Well foundation	Lucknow-Barabanki road (Old)
8	56.870	Well foundation	Dunpurwa Banki road, Chillhata, Punaaurapur
9	63.050	Well foundation	Kaithisaraiyya, Dewa road
10	71.950	Open foundation	Garhi, Chhindvahi

After observing the table-2, bridges are mostly having well foundation and inflated water way.

Table - 2 : Existing bridge and Waterway required and existing

Sr. No.	Chain-age (km.)	Type of Bridges	Connecting Villages	LWL (m)	HWL (m)	Discharge (Cumecs)	Required Water way(m)	Existing water way (m)
1	2.850	Well foundation	Barkernagar, Parimathpur	101.178	103.248	106.00	50.0	68
2	6.100	Well foundation	Gyannagar, Diyantnagar	101.665	103.725	105.00	49.5	64
3	13.640	Well foundation	Sarifabad, Attyarpur	102.706	104.736	104.00	49.3	64
4	22.200	Well foundation	Bergadha, Saheria	104.080	106.080	99.00	48.0	68
5	35.450	Well foundation	Munaira	106.125	108.015	87.00	45.0	64
6	42.500	Well foundation	Wadinagar, Saheliya(Darapur),	107.125	108.995	79.00	43.0	58
7	48.000	Well foundation	Lucknow-Barabanki road (Old)	107.950	109.790	71.00	41.0	54
8	54.200	Well foundation	Bithura Banki marg	108.850	110.700	66.50	39.5	26
9	56.870	Well foundation	Dunpurwa Banki road, Chillhata, Punaaurapur	108.950	111.310	56.00	36.2	52
10	63.050	Well foundation	Kaithisaraiyya, Dewa road	109.580	112.080	50.00	34.2	46
11	71.950	Open foundation	Garhi, Chhindvahi	111.559	113.249	37.58	30.0	34

After observing the table-2 the length of water way which has been provided in new bridges are much more than required except in one place.

Provision of well foundation with T-beam superstructure the cost construction is high in comparison to open and raft foundation as deeper depth of T-beam/Pre-stressed Beam increase the height of approach road and protection work. The construction of well foundation type bridges also require a very high skilled persons and equipment. So the construction becomes very difficult and costly.

CONCLUSION

To avoid above mentioned problems and make the structure easier and economical, bridges like box type and based on raft foundation can be an economical sustainable substitute on the small rivers and nallas.

REFERENCES

- i. N Krishna Raju "Design of Bridges"
- ii. Victor "Essentials of Bridge Engineering"
- iii. Srivastava Rajendra Kumar Srivastava Mana "Minor Bridges and Culverts, Principles and Provisions"
- iv. IRC: 05, Standard Specifications & Codes of Practices for Road Bridges, Section I(General features of Design) Indian Road Congress New Delhi India 2015
- v. IRC: 06, Standard Specifications & Codes of Practices for Road Bridges, Section II(Loads & stresses)Indian Road Congress New Delhi India 2017
- vi. IRC: SP:13,Guide lines for Design of small Bridges & culvertsIndian Road Congress New Delhi India 2008
- vii. IRC: SP: 78, Standard Specifications & Codes of Practices for Road Bridges, Section VII(Foundations & subStructure)Indian Road Congress New Delhi India 2014
- viii. "Standard general arrangement and structural drawings for 5.0 m clear span and it's multiple for minor bridges on Raft Foundation Volume-I Published by Uttar Pradesh Public Works Department 2011
- ix. "Standard general arrangement and structural drawings for 5.0 m clear span and it's multiple for minor bridges on Raft Foundation Volume-IIPublished by Uttar Pradesh Public Works Department 2011
- x. "Aspire", The concrete bridge magazine, winter 2014, which describes Sustainable bridges for future
- xi. Project of re-modelling of Reth River 11th Circle, I.D. Faizabad