

**PROPOSAL FOR
TERMS OF REFERENCE**

FOR

**“Construction of 2 x2 lane bridge across river
Ganga between Sultanganj and Aguwani ghat with
approach road connecting NH 80 and NH” 31**

PROJECT

CONCEPTUAL PLAN

Project Proponent

SENIOR PROJECT ENGINEER

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CONCEPTUAL PLAN
FOR
“CONSTRUCTION OF 2 X2 LANE BRIDGE ACROSS RIVER GANGA BETWEEN SULTANGANJ AND
AGUWANI GHAT WITH APPROACH ROAD CONNECTING NH 80 AND NH 31”
BY
BIHAR RAJYA PUL NIRMAN NIGAM LIMITED

- **Location of Project Site:** The proposed project site is located in Khagaria and Bhagalpur district which is surrounded by Saharsa in north, Munger & Begusarai in South, and Madhepura in east and Begusarai & Samastipur in west. The proposed alignment is 3160 m long consisting 2 x 2 lane bridge and 4km and 20km approach road in Sultanganj and Aguawani Ghat Side respectively. The Ganges forms the southern boundary of the district in its entire length. The location map and google map is given in **Figure-I and figure 2.**

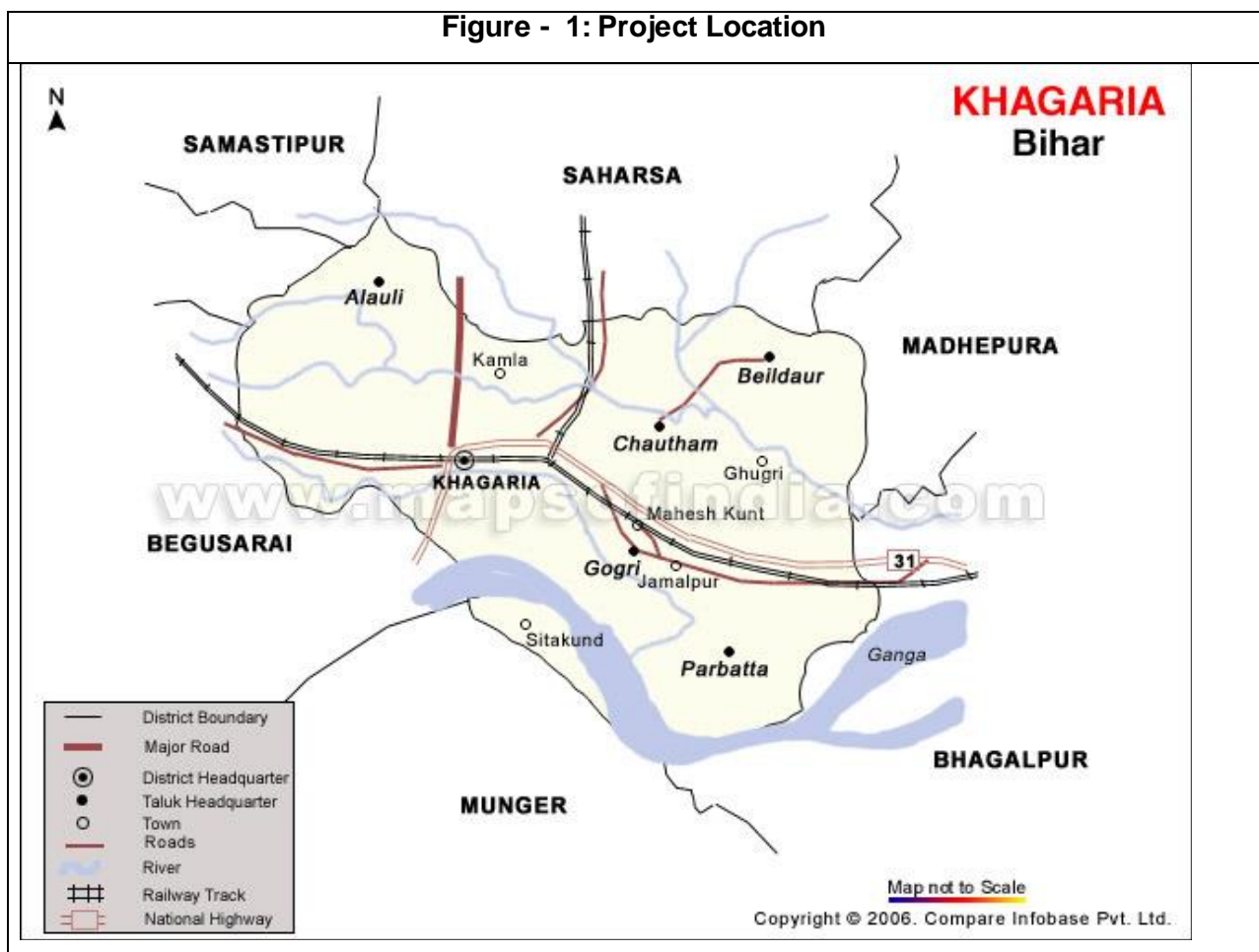
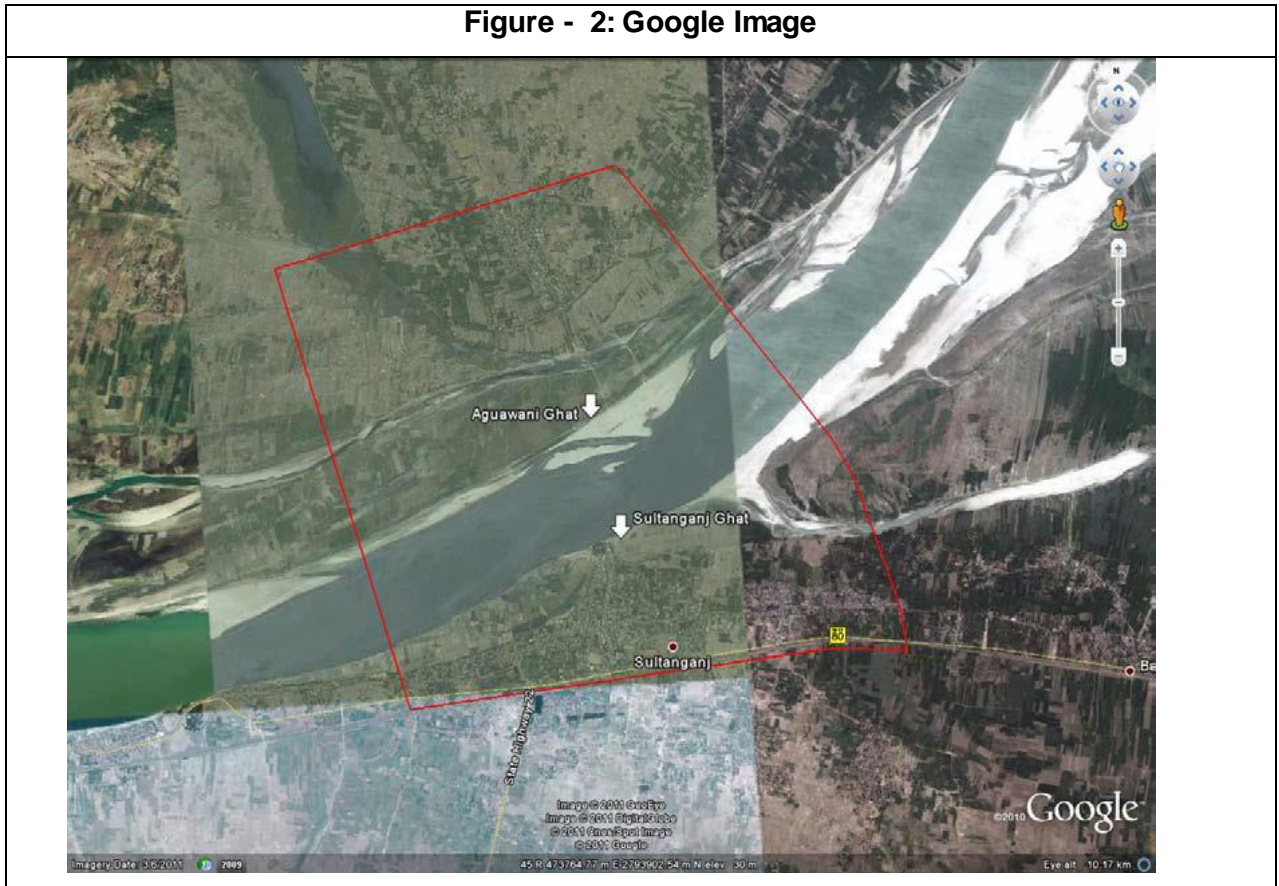


Figure - 2: Google Image



- **Land Area:** Total Land area to be acquired for the project is – 161.66 ha including 40.6 ha in Bhagalpur district and 121.06 ha in Khagaria District.

Total Built-up area –

Major Bridge

Section – 1	145 m × 25.5 m	= 3697.50 m ²
Section – 2	575 m × 25.5 m	= 14662.50 m ²
Section – 3	550 m × 25.5 m	= 14025.00 m ²
Section – 4	0.5 × 73.5 m × (25.5 + 33.5) m	= 2168.25 m ²
	101 m × 33.5 m	= 3383.50 m ²
	0.5 × 73.5 m × (25.5 + 33.5) m	= 2168.25 m ²
	327 m × 25.5 m	= 8338.50 m ²
	412.50 m × 25.50 m	= 10518.75 m ²

Section – 5	902.50 m × 23.0 m	= 20757.50 m ²
Dolphin Observatory		
(Extra)	(63.5 – 33.5) × 7.0 m	= 210 m ²
ROB	108 m × 20 m	= 2160 m ²
	0.5 × 90 m × (40 + 25) m	= 2925.00 m ²
	Total Built up Area	= 85,014.75 m² or sq.m
Approach Road	26.50 m × 24000 m	

▪ **Approach Road Objective:** Bridge will improve the connectivity between south and north Bihar and will have a very long lasting impact on the rural economy. The bridge is expected to benefit 164.8 lakh rural people in eight districts like Madhepura, Saharsa, Mujaffarpur, Samastipur, Begusarai, Khagaria, Bhagalpur and Banka. The location has also tourist potential, bridge which will provide a clear view point to see dolphins of River Ganga, which will help in gaining more knowledge and awareness to the National Aquatic creature.

▪ **Necessity of Bridge:** The basic objective of the new four lane bridge is to provide new NH31 to NH80 connectivity and to cater for Bhagalpur, Khagaria and Munger bound traffic. Also cater for major traffic congestions during the Sharawani fest (Mela) at Sultanganj in Bhagalpur district.

At present, there is one bridge at Simaria (Begusarai district) across the Ganges between Simaria and Hathidah (Mokama) and distance from Patna to Bhagalpur is approx. 235km. There are two routes by which one can reach Bhagalpur from Patna. One, via Khagaria by NH-31 and crossing Vikramshila Bridge at Barari Ghat and ~~other is~~ crossing Rail cum Road Bridge at Mokama and other is reaching Bhagalpur travelling on NH-80 from mokama.

NH-31 is an important National highway in India. It provides gateway to state in North East India. NH-31 links Barhi in Bihar to Jalukbari (Guwahati) in Assam. NH-80 links Mokamah in Bihar to Farakka in West Bengal passes through three states Bihar, Jharkhand and West Bengal. From Maheshkhunt, on NH-31, NH 107 branches off to Saharsa district. Due to increase in traffic volume a bridge is required to cross Ganges from NH-80 to NH-31 or vice versa near Sultanganj Ghat towards NH-80 and Aguawani Ghat on NH-31 side. The roadmap of NH 31 and NH 80 are as shown in **Figures 3 and 4** respectively.

Figure - 3: National Highway 31

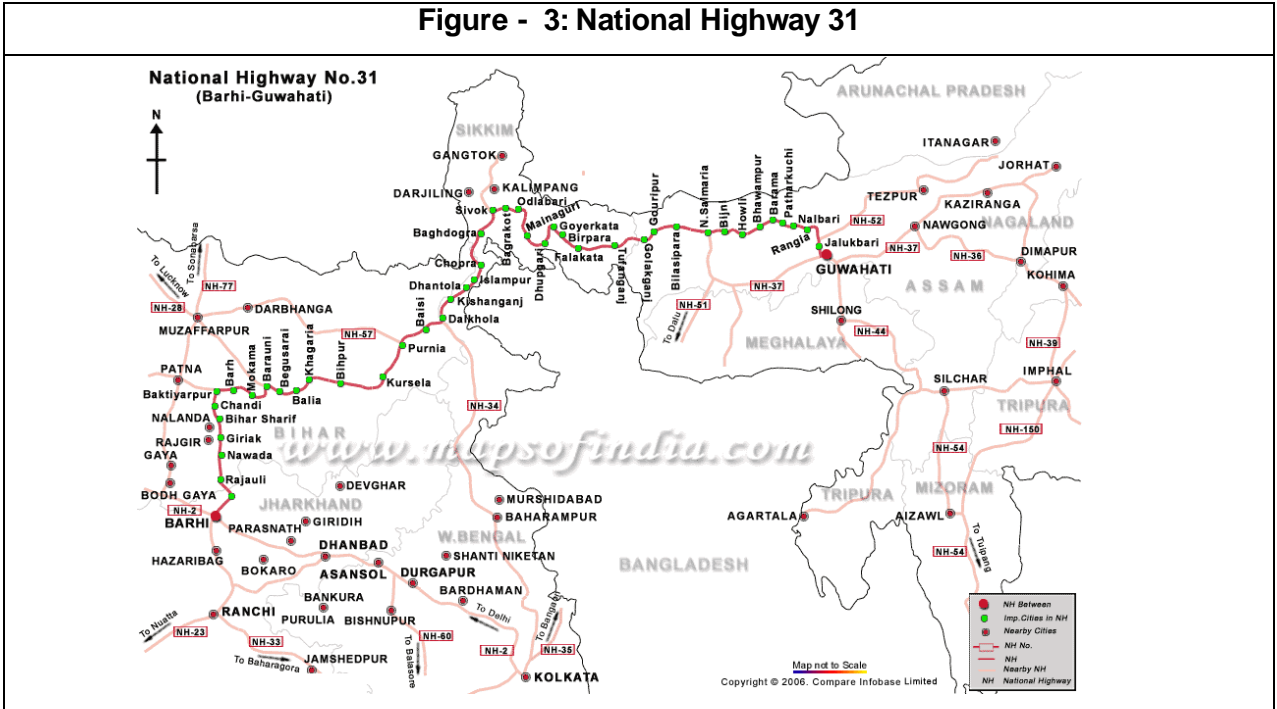
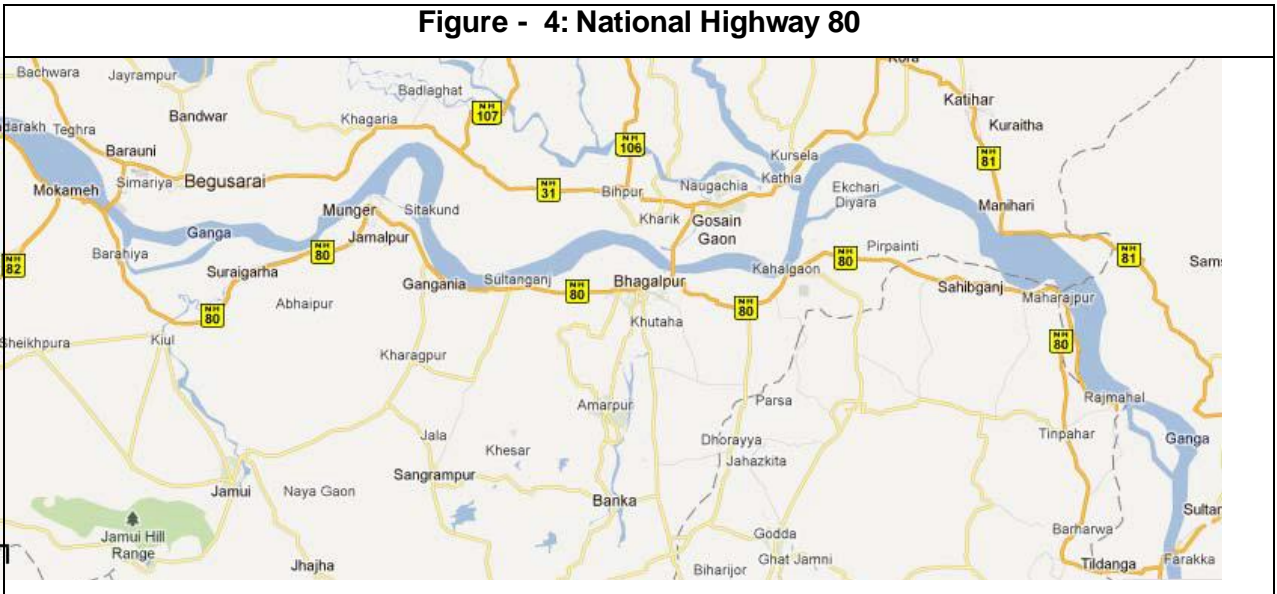


Figure - 4: National Highway 80



▪ Existing Bridges in the Vicinity of Project

There are four bridges in the vicinity as listed below:

- i. Vikramshila Bridge between Naugachhia & Bhagalpur
- ii. Munger Ganga Bridge
- iii. Rajendra Setu at Mokamah
- iv. Gandhi Setu at Patna

Vikramshila Setu

Vikramshila Setu is a bridge across the Ganges near Bhagalpur. This 4.7 km long bridge serves as a link between NH 80 and NH 31, running on the opposite banks of the Ganges. It runs from Barari Ghat on Bhagalpur side on the south bank of the Ganges to Naugachhia on the north bank.

Munger Ganga Bridge

Ganga Bridge at Munger is a rail-cum-road bridge across the Ganges. This 3.19 km long bridge is located 55 km downstream of the Rajendra Setu near Mokamah and 68 km upstream of the Vikramshila Setu at Bhagalpur. The bridge forms a link between NH 80 on the southern side of the Ganges and NH 31 on the northern side of the Ganges. It helps to connect Jamalpur station on the Sahibganj Loop line of Eastern Railway to the Barauni-Katihar section of East Central Railway.

Rajendra Setu

Rajendra Setu (Mokamah Bridge) across the Ganges was the first bridge to link North Bihar and South Bihar. The road-cum-rail bridge near Mokama in Patna district was inaugurated by Dr. Rajendra Prasad, Late President of India in 1959. It is about 2 km long and carries a two lane road and a double line railway track.

Mahatma Gandhi Setu

Mahatma Gandhi Setu across the Ganges connects Patna in the south to Hajipur in the north of Bihar. It was the longest river bridge in India at the time of its construction. It was inaugurated in May 1982 by the Late Prime Minister, Mrs. Indira Gandhi. Its length is 5,575 meters, which was one of the longest bridges in the world at that time. It consists of 45 spans of 121 m each and 2 spans of 63 m at each end. The deck provides for a 7.5 m wide two lane carriageway.

▪ Traffic Surveys, Analysis and Forecast

- The traffic study aims at estimating the base year Annual Average Daily Traffic (AADT) and Travel Characteristics on the link and forecasting the AADT for project horizon years considering the immediate influence area and surrounding road network of the project road.

Following primary traffic surveys have been conducted:

- ✓ Classified Traffic Volume Count (TVC)
- ✓ Origin-Destination Survey (OD)
- ✓ Axle Load Survey (AL)
- ✓ Speed and Delay Survey
- ✓ Willingness to Pay Survey (WTP)

Traffic survey locations for carrying out TVC and OD surveys were selected after a site reconnaissance study considering the following parameters:

- ✓ The station should represent homogeneous traffic section.
- ✓ The station should be outside urban and local influence.
- ✓ The station should be located in a reasonably level terrain with good visibility.
- ✓ The O-D stations should preferably be located near police stations for the convenience and safety of stopping vehicles for roadside interview survey.

Figure - 5: Traffic Survey Location Map

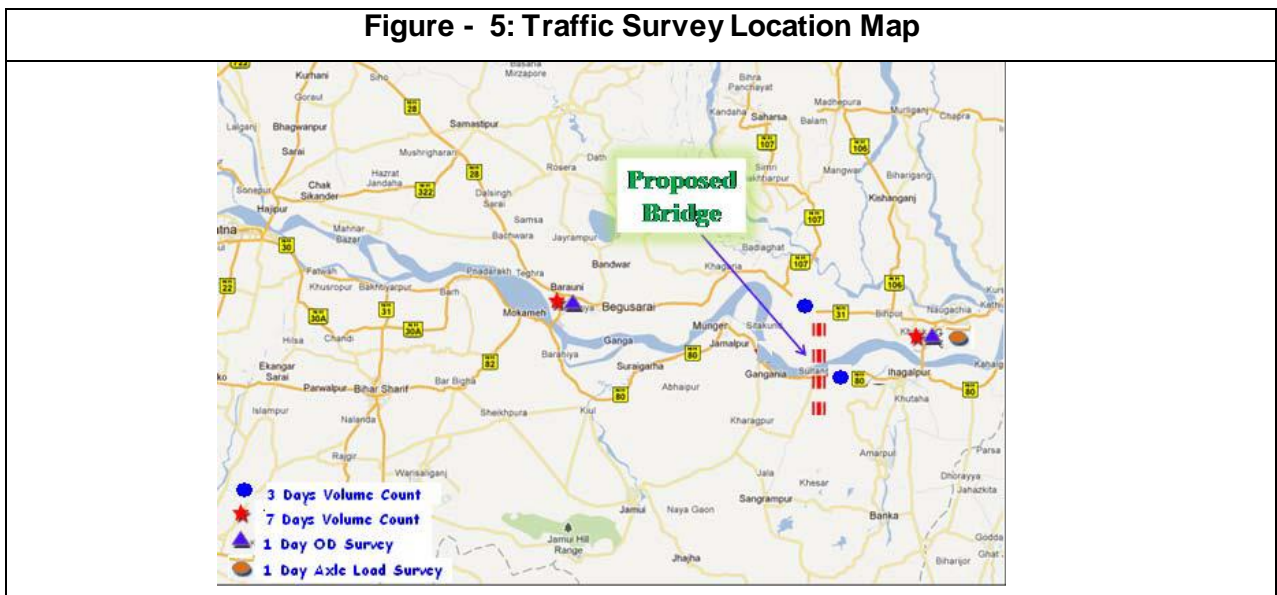


Table 1 : Schedule of Traffic Survey

S.No.	Type of Survey	Survey Location/ Section	Date
1	Classified Traffic Volume Count Survey	TVC 1	Near Rajendra Bridge at Mokama Village 11.12.2011 to 17.12.2011
		TVC 2	Near Vikramshila Setu at Bhagalpur 12.12.2011 to 18.12.2011
		TVC 3	Near Mahadevpur Village on NH-80 14.12.2011 to 16.12.2011
		TVC 4	Near Pasraha Village on NH-31 15.12.2011 to 17.12.2011
2	Origin-Destination Survey	OD 1	Near Rajendra Bridge at Mokama Village 14.12.2011 to 15.12.2011
		OD 2	Near Vikramshila Setu at Bhagalpur 16.12.2011 to 17.12.2011
3	Axle Load Survey	AL 1	Near Vikramshila Setu at Bhagalpur 16.12.2011 to 17.12.2011
4	Speed & Delay Survey	Along the Project Influence Area 14.12.2011 to 15.12.2011	
5	Willingness to Pay Survey	Along the Project Influence Area 14.12.2011 to 15.12.2011	

Traffic Assessment

The traffic demand forecast will be made through standard methods. Traffic surveys will primarily consist of manual classified counts namely to determine the existing volume and composition of traffic using key links and nodes within the study area. Such counts will provide verification of existing counts and significant gaps in count data will be plugged. For traffic

forecast an assessment will be done with historic traffic data indicated in recent levels of traffic growth. This will be then compared with recent growth in the national economy, most notably Gross Domestic Product, and the forecasts of future short to medium term growth produced by the Government of India and international agencies such as the Asian Development Bank and the World Bank. The forecast growth of the national economy will be used as a guideline for the derivation of traffic growth forecasts for the study road, taking account of any significant historic discrepancies between the two. Adopting traffic forecast significantly different to national economic predictions will require careful justification. Given the uncertainty inherent in such predictions the consultant recommends the use of high, medium and low growth scenarios. It is advisable to have four growth periods representing the immediate, short, medium and long term.

- **Project Alignment and Bridge Site:** The proposed alignment includes the proposed bridge over River Ganges between Sultanganj (Bhagalpur district) and Aguawani Ghat (Khagaria District) with approach road connecting to the nearest NH-31 and NH-80. Proposed Bridge site is located approximately 30km upstream of an existing Vikramshila Bridge. Salient Feature of proposed bridge is as follows:

Table 2 : Project Alignment

Length of bridge (Including Viaduct portion)	3160 m
No. of spans	30 No.
Maximum Span length	270 m
Northern Approach portion	20 km
Southern Approach Road	4 km
Footpath Width (Both Sides)	1.5 m
Type of construction	Cantilever, cast in situ, segmental & cable stayed type of super structure.

Cost of Construction: 859 Crores INR

Water Requirement:

Construction Phase: 13 KLD considering 290 worker.

Source: Water required for construction activities and drinking will be sourced from both surface and ground water resources, depending on the availability. Prior permission will be taken from concerned department before abstraction/withdrawal.

Power requirement:

105 KW Power will be required and supply will be met through North and South Bihar Power Distribution Company Ltd.

ENVIRONMENTAL POLLUTION AND MITIGATION MEASURES

ENVIRONMENT MANAGEMENT DURING CONSTRUCTION STAGE

Environmental Impact/Issues	Mitigation Measures
Compaction of Soil	Construction Vehicles, machinery and equipment has been moved or stationed in the designated area only. While operating on temporarily acquired land for traffic detours, storage, material handling or any other construction related or incidental activities.
Bridge Design	a) The bridge is designed in such a way that minimum pillar is required in the water way.
Bridge Foundation	a) Well foundation has been and is being used to support the structural load of this bridge and to have minimum impact on river ecosystem. b) Careful planning and selection of appropriate equipment is necessary to ensure that the well are sunk without any substantial tilting
Soil Erosion	a) Chances of soil erosion from the high embankment portion on the east bank has been taken care of by stone pitching. b) Bridge location at stable banks is provided for streamlining the river flow at the proposed bridge location c) The works consist of measures as per design to control soil erosion, sedimentation and water pollution, through

	<p>use of dikes, sedimentation chambers, basins, fiber mats, mulches, grasses and other devices. To control all the temporary sedimentation problem at the time of construction.</p>
Contamination of soil by fuel and lubricant	<p>a) Vehicles/machineries and equipment operation, maintenance and refueling is being carried out in such a fashion that spillage of fuel and lubricant does not contaminate the river water and surrounding ground. All spills and collected petroleum product is being disposed off in accordance with MoEF&CC guidelines.</p> <p>b) In all fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil had stored and return after cessation of such storage and refueling activities.</p> <p>c) Construction material was not stored in river area and will not be stored in future area.</p>
Flooding	<p>a) In addition to the design requirement, all desired measures has been taken to prevent temporary or permanent flooding of the site or any adjacent area.</p> <p>b) The scope for prevention of flooding includes prevention of loss of use, loss of access any land or property their own, as a result of flowing or stagnant water caused by direct or indirect.</p>
Sanitation and waste disposal in construction camp	<p>a) Construction labourers camps is located more than 500m away from the nearest habitation.</p> <p>b) The sewage system for construction labourers camp has been designed, built and operated so that no pollution to ground or adjacent water bodies/water courses will take place. Compliance with the relevant legislation is being strictly adhered to. Garbage bin is being provided in the camps and regularly emptied and the garbage disposed</p>

	<p>off in a hygienic manner.</p> <p>c) In connection with underground water resources including percolating water, all necessary precaution to prevent interference with such water resources is being taken.</p> <p>d) All relevant provisions of the factories Act, 1948 and the building and other construction workers (regulation of employment and conditions of service) Act, 1966 is being adhered to.</p> <p>e) Unless otherwise arranged by the local sanitary authority, arrangement for proper disposal of excreta by composting at the work place as approved by the local medical health or municipal authorities.</p>
Wastage of water	<p>a) The water is being used in such a way that wastage of water is minimum in the construction process.</p> <p>b) The contractor is arranging for supply and storage of water for construction.</p>
Emission from construction vehicles, equipment and machinery	<p>a) The discharge standards promulgated under the Environment Protection Act, 1986 is being strictly adhered to. All vehicles, equipment and machinery used for constructions conform to the relevant standards like BIS, EN & DINS norms.</p> <p>b) All vehicles equipment and machinery used for construction is regularly maintained to ensure that pollution emission levels comply with the relevant requirements.</p>
Noise from vehicles plants and equipment	<p>a) The plant and equipment used in construction (including the aggregate crushing plant) shall strictly conform to the GOI noise standards.</p> <p>b) All vehicles and equipment used in construction is</p>

	being fitted with exhaust silencer. During routine servicing operations, the effectiveness of exhaust silencer is being checked.
First Aid	a) At every workplace, a readily available first aid unit including an adequate supply of sterilized dressing material, appliances and ambulance has been provided as per the factory rules of Patna.
Noise Mitigation	Heavy Noise producing equipment and operations shall not be allowed in the night time.
Environmental Monitoring	Environmental Monitoring in respect of ambient air, water quality, soil quality and noise level to be done as per monitoring plan.

ENVIRONMENT MANAGEMENT DURING OPERATION

Air Environment	Throughout operation stage. Start immediately after completion of construction.	Free flow of traffic shall be ensured
Noise Environment	Starting to immediately after completion of construction, through operation stage.	<ul style="list-style-type: none"> • Acoustic enclosed DG sets will be used. Noise barriers will be provided whenever noise levels above Noise Standard. • No honking on bridge and approach roads will be ensured
Water Environment	Start of the project of completion	<ul style="list-style-type: none"> • Rain water to be channelized to storm water drain. • Water will be taken from

		tanker supplier for landscaping area.
Soil Environment	During Operation phase at each 5 th year	
Waste Management	Throughout Construction and operation stage.	Solid waste, if any, will be collected and disposed off at Municipal Site. Recyclable waste, if any, will be collected and given to recycler. Soil will be sent to Municipal landfill site.
Tree Plantation	Start of the project of completion	The plantation is proposed on central verge of the approaches and bridges. Also beside the approach road with a width of 4m at a stretch. Apart from this compensatory afforestation shall be done with the forest department for which amount will be paid to forest department in lieu of tree cut.

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16/04/2019

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