Pre Bid Queries of Design and Construction of Single Lane Bridge at Swarupnagar, (WB) across Ichamati River (NW-44) including Approach Road and RE wall on EPC Mode				
TENDER No: - IWAI/KOL/NW-44(ICHAMATIRIVER)/SWARUPNAGARBRIDGE				
Date of pre-bid- 15.12.2023				
Sr.No	**Section No. Clause, Sub Clause No and Page No. of Tender**	**Tender clause description**	**Queries**	**Reply of IWAI, Noida**
1		Detail Project Report is essential in EPC mode tender, but no Detail Project Report is uploaded in tender document.	Kindly upload Detail Project Report to evaluate the project understanding/requirement.	The DPR is being uploaded.
2		GAD (General arrangement drawing) is essential in EPC mode tender, but no GAD is uploaded in tender document.	GAD (General arrangement drawing) is essential in EPC mode tender, but no GAD is uploaded in tender document.	The GAD has been included.
3		Bill of quantities are not required in EPC mode tender, only DPR and GAD are required to evaluate the tender cost. Apart of this, numbers of items are missing in bill of quantities, which will create confusion in cost and create risk of monopolization or reduce competition in the bidding process.	Kindly remove Bill of quantities or upload correct quantities with surety. * Excel sheet of BOQ_824612 * Section V, Finance bid – 2.1, page 60 & 61 * Section VI, TOR, clause 3.2, page 64 & 65	May kindly refer the revised BoQ uploaded.
4	Clause no- 16.1.1 of ITB Page no. 25	Experience of similar work "Similar Works related to Construction of Marine Structure viz., Jetties / Berths in Sea/Backwater/River"	Similar work definition is not related to bridge work, As it is a Bridge work, hence similar nature work must be in line with bridge experience only.	May kindly refer amendments at Sl.No 1
5	Section- VIII- SCC- Page no-138 Clause 4.4.1	Performance Guarantee – 5 % of the contract value, shall be released only after the completion of Maintenance Period or Defects Liability Period, whichever is later	Any one, either Performance Guarantee or Security deposit should be released after handover of project and one should be released after DLP period.	The Perfromance Bank Guarantee (to be submitted within 15 days of issue of LoA) will be released after the expiry of Defect Liability Period.
6	Section- VIII- SCC- Page no-138 Clause 4.4.2	Security Deposit - 5% of the contract value, shall be released only after the completion of Maintenance Period or Defects Liability Period, whichever is later		The Security deposit will be released after the expiry of Defect Liability Period.
7	Section VI, TOR, Scope of work, clause no 3.1, page 64	"Bridge is mentioned 40x4.5 meter"	It is better and more clear to Upload DPR and remove this line. As it is creating confusion.	Refer reply at S.No-1
8	Section III- Data Sheet- Clause no 10 (Clause 6.3 of ITB)	Solvency certificate from any nationalized/scheduled bank in India should be 40% of Estimated cost of project	Solvency certificate in case of JV, can be from any one of JV member.	Solvency Certificate shall be satisfied by the lead bidder and/or either of first two bidder or jointly satisfied.
9	Clause no- 16.1.1 of ITB Page no. 25	"Similar Works related to Construction of Marine Structure viz., Jetties / Berths in Sea/Backwater/River"	Similar work experience must be in construction of bridge.	May kindly refer amendments at S.No 1

10	As per SSC, page 138;	As per SSC, page 138; Performance guarantee and security deposit both are hold till DLP period.	As per standard bidding document, either one should be released after handover of work and one should be released after DLP period.	Refer reply at S.No-5 & 6
11		General arrangement of drawings (GAD) is not uploaded with tender document.GAD is mandatory part of tender document in EPC mode.	Plz uploaded GAD for understanding of project work scope.	Refer reply at S.No 2
12		BOQ is uploaded and placed at many places in tender document. In EPC mode tender BOQ for individual items are not required. It is creating confusion in Tender document.	BOQ must be removed from tender documents.	Refer reply at S.No-3
13		There is no clarity about solvency certificate in case of JV.	In case of JV, solvency certificate requirement can be completed by any one member of JV.	Refer reply at S.No-8
14		Detail Project Report (DPR) is not uploaded with tender document.DPR is mandatory part of tender document in EPC mode,	Plz uploaded DPR for understanding of project work scope.	Refer reply at S.No-1
15	Section -II Clause no. 6.2	Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or Start-ups as recognized by Department for Inland Waterways Authority of India 13 Promotion of Industrial and Internal Trade (DPIIT) are exempt from submitting the Tender fee on submission of documents to the extent as per the Government of India rules.	Requesting for Exemption of Tender Fee and EMD	May kindly refer amendments at S.No 4
16		No DPR is attached in Tender document	Kindly upload DPR to analysis the project cost and standard	Refer reply at S.No-1
17		No GAD is attached in Tender document	Kindly upload GAD to analysis the project cost and standard	Refer reply at S.No-2
18		BOQis not required for EPC mode tender	Please remove BOQ as it is a EPC tender. Bidder must have to examine /Calculatethe cost of tender	Refere reply at S.No-3
19		Requirement of similar work is not in line work bridge work. "Similar Works related to Construction of Marine Structure viz., Jetties / Berths in Sea/Backwater/River"	Similar work should be construction of Bridge.	May kindly refer amendments at S.No 1
20	Section- VIII- SCC- Page no-138 Clause 4.4.1	Performance Guarantee – 5 % of the contract value, shall be released only after the completion of Maintenance Period or Defects Liability Period, whichever is later	Security deposit should be released after handover of project.	Refer reply at S.No-6 above
21	Section- VIII- SCC- Page no-138 Clause 4.4.2	Security Deposit - 5% of the contract value, shall be released only after the completion of Maintenance Period or Defects Liability Period, whichever is later	Performance Guarantee should be released after DLP	Refer reply at S.No-5 above

22	Data Sheet Page no. 31	30 days from the date of issue of letter of acceptence	As it is an EPC mode 9 month project, hence mobilisation time should be 15 days from approval of design and drawing	May kindly refer amendments at S.No 7
23		Submission of Hard copy of Bid document.	Is submission of a hard copy of the bid document required , if yes please mention with time.	The hard copy should include the proof of submission of EMD, tender fee and solvency certificate
24		Land acquisition for entire or part of project stretch. There is no clear indication that Land Acquisition of required area is completed or not for the project stretch (Entire/Partially)	Land acquisition clause must be declared as it is an EPC mode project otherwise progress of work/milestone may got affected due to the Land Acquisition process. If Land Acquisition is not completed ,then a clause " Letter to start will be given to the contractor after Land Acquisition" should be considered in the tender document.	Land accquisition if required, the milestone will be altered.
25	Clause no. 8.10 GCC Clause no. 6.2 TOR	LD is applicable for the whole of the work.	LD should be applicable for stage wise progress of work and amount.	The LD will be imposed on stagewise payment
26	ITB Clause 6.3 10.1.1 c Data Sheet- Clause no 10	Solvency certificate criteria not clarified, in case of JV	The JV /Consortium members together shall meet the overall qualification criteria of Solvency certificate.	Solvency Certificate shall be satisfied by the lead bidder and/or either of first two bidder or jointly satisfied.
27	Data Sheet Clause 20 GCC clause 4.4 SCC clause 4.4.1& 4.4.2	Performance Guarantee and Security Deposit	Is MSME policy and exemption allowed.	May kindly refer amendments at S. No 4 seperate sheet of

Dialani..

On tour to Bangladesh.

V C Dialani	Ashutosh Gautam	Praveen Nandwana
Chief Engineer	Member(Tech)	Member(Finance)

Ammendment Triggered due to Pre Bid dated15.12.2023			
Design and Construction of Single Lane Bridge at Swarupnagar, (WB) across Ichamati River (NW-44) including Approach Road and RE wall on EPC Mode			
TENDER No: - IWAI/KOL/NW-44(ICHAMATIRIVER)/SWARUPNAGARBRIDGE			
Sr.No	**Section No. Clause, Sub Clause No and Page No. of Tender**	**Existing tender clause**	**Amendment**
1	Clause no- 16.1.1 of ITB Page no. 25	Experience of similar work "Similar Works related to Construction of Marine Structure viz., Jetties / Berths in Sea/Backwater/River"	Similar work means construction of minor/major bridges/ROB/RUB. The work should be substantilly completed i.e. 80%
2	Section- VIII- SCC- Page no-138 Clause 4.4.1	Performance Guarantee – 5 % of the contract value, shall be released only after the completion of Maintenance Period or Defects Liability Period, whichever is later	Both Perfromance Bank Guarantee (5%) and Security Deposit (5%) shall be released only after the completion of the defect liability period, as specified at clause-3 at Table (sl. No.11, page-139) of SCC.
3	Fin Bid 2.1 Pg 60-61	Item wise BoQ	The Fin 2.1. form stands deleted and Revised BOQ uploaded.
4	Section -II Clause no. 6.2	Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or Start-ups as recognized by Department for Inland Waterways Authority of India 13 Promotion of Industrial and Internal Trade (DPIIT) are exempt from submitting the Tender fee on submission of documents to the extent as per the Government of India rules.	This clause stands deleted. MSME exemptions are not allowed in works contract / EPC tenders.
5	Clause no. 19.0 of ITB page no. 28	19.1 Mobilization Site The Contractor shall mobilize all the equipment, materials and manpower at site as required for the construction of the terminal as specified in Clause 19 of Data Sheet	19.1 Mobilization Site The Contractor shall mobilize all the equipment, materials and manpower at site as required for the construction of the **"Road Bridge"** as specified in Clause 19 of Data Sheet
		19.2 Mobilization Time The Contractor shall mobilize the desired equipment and manpower within the time frame as specified in Clause 20 of Data Sheet to start the works in full capacity.	19.2 Mobilization Time The Contractor shall mobilize the desired equipment and manpower within the time frame as specified in **Clause 19** of Data Sheet to start the works in full capacity.
6	S.No 20 of Data Sheet page no. 31	S.No. 20 placed 2 times	S.No 20 indicated at first stands deleted.
7	S.No 19.2 of Data Sheet page no. 31	30 days from the date of issue of Letter of Acceptance.	Mobilization time of 30 days shall be read as 15 days from the approval of design and drawing
8	Section VII, Clause 4.4.1	4.4.1 The successful bidder shall submit the total 3% Security Deposit in IWAI Fund through RTGS/NEFT before signing of the Agreement. Bank Gurantee will not be accepted as securuty deposit. The Security Bid (EMD) @ 2% submitted along with the bid will be adjusted with the Security Depost (thus works out to 5%).	The earnest money deposit of succesful bidder will be converted in to security deposit. A sum @ 10% of the net amount of the bill shall be deducted from each running bill of the contractor till the sum along with the sum already deposited as earnest money deposit, will amount to security deposit of 5% of the contract value of the of work.
9	New Clause included in SCC	4. Test and Completion	After Clause-3, new Clause no. 4 is incuded in SCC, as attached at Annex-1
10	New Clause included in SCC	5. Design and Drawings	After new Clause-4, additional Clause no. 5 is incuded in SCC, as attached at Annex-2
11	New Clause included in SCC	6. DPR	After new Clause-5, additional Clause no. 6 is incuded in SCC, as attached at Annex-3
12	Section-V: Financial Bid standard Forms	7 Reveised Fin- 2 : Bill of Quantities	Reveised Bill of Quantities as at Annex-4

Annex-1

Tests on Completion

1. Schedule for Tests

(i) The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority of its intent to subject the Project to Tests, and no later than 10(ten) days prior to the actual date of Tests, furnish to the Authority detailed inventory and particulars of all works and equipment forming part of Works.

(ii) The Contractor shall notify the Authority of its readiness to subject the Project to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with the contract.

2. Tests

(i) Visual and physical test: The Authority shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement.

(ii) Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Project Research Board on Non-destructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority'. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.

(iii) Other tests: The Authority' may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project with Specifications and Standards, except tests as specified in clause 5,but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

3. Agency for conducting Tests

All the aforesaid shall be conducted by the Authority' or such other agency or person as it may specify in consultation with the Authority.

4. Completion Certificate

Upon successful completion of Tests, the Authority shall issue the Completion Certificate.

Annex-2

1. Design and Drawings

(i) Design and Drawings shall be developed in conformity with the Specifications and Standards of Indian Road Congress and its specifications thereof;

(ii) In respect of the Contractor's obligations with respect to the design and Drawings of the Project the following shall apply:

(a) The Contractor shall prepare and submit the design and Drawings, duly vetted by IIT/NIIT/Government institution.

(b) within 15 (fifteen) days of the receipt of the Drawings, the Authority's Engineer shall review the same and convey its approval/observations to the Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards.

(iii) Any cost or delay in construction arising from review/approval by the Authority shall be borne by the Contractor.

(iv) Works shall be executed in accordance with the Drawings provided by the Contractor in and the approval of the Authority will be communicated to contractors. Such Drawings shall not be amended or altered without prior written notice to the Authority. If a Party becomes aware of an error or defect of a technical nature in the design or Drawings, that Party shall promptly give notice to the other Party of such error or defect.

(v) Within 90 (ninety) days of the Project Completion Date, the Contractor shall furnish to the Authority a complete set of as- built Drawings, in 2 (two) hard copies reflecting the Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project and setback lines, if any, of the buildings and structures forming part of Project Facilities.

DETAIL PROJECT REPORT ON DESIGN OF A PERMANENT BRIDGE OVER ICHAMATI RIVER (NW-44) [CHAINAGE – 48.70 KM] AT SWARUPNAGAR

Report prepared by:

Prof. Partha Bhattacharya

(Head of the Department)

Prof. Arup Guha Niyogi

Prof. Pritam Aitch

Civil Engineering Department

Jadavpur University

November 2023

CONTENT

Short description of the DPR prepared for the permanent bridge at Swaroopnagar on River Ichamati

1. Title of the Project: *Study / design, drawing & cost estimate for replacing of temporary bamboo bridge at Swaroopnagar (Ch. 48.70 Km) on Ichamati river (NW-44) with a Permanent Bridge*

2. District: *North 24 Parganas, PS – Swarupnagar, Block – Swarupnagar*

Connecting Khardda Singa and Barghoria villages

Other adjoining villages: Gopalpur and Malangapara

3. Implementing Agency: *Inland Waterways of India (IWAI)*

4. DPR Prepared by: *Jadavpur University*

5. Nature of Project*: New Bridge*

6. Present Status of Existing Bridges and Roads: *Presently there is a temporary bamboo bridge across Ichamati connecting the two villages through a 10 feet concrete road on either side*

7. Need for the project: *Details given in report*

8. Type of Bridge: *Steel Truss (through type) bridge on RCC pier*

Total span length of bridge: 64 m; Main Span 40 m, Viaduct – 12 m each
Overall and carriage way width: 6.0 m, 4.5 m
Provision of footpath: Yes
IRC loading class: Class B as per IRC:6 – 2017, Appendix A
Other details of proposed bridge: Height of Soffit – 4 m above HFL (RL 5.78 m)
Length of approach roads: 120 m + 150 m
Other details of approach roads: Embankment supported on RE wall

Details of investigations/surveys conducted
i. Topographical : Topography sheet attached
ii. Hydraulic : Sheet attached
iii. Geotechnical : Report separately provided (Appendix I)
iv. Traffic : Traffic survey details is given in the report

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

08/11/23

Introduction

Inland Waterways Authority of India (IWAI), a statutory body under the Ministry of Ports, Shipping and Waterways, Govt. of India (GoI) identified 106 new waterways apart from the existing 5 waterways as National Waterways (NW). The Ichamati river has been identified as NW-44 and necessary developmental activity has been undertaken to develop connectivity to the Indo-Bangladesh Protocol Route. The Ichamati river running through the Swarupnagar block within the Basirhat sub-division, North-24 Parganas has been classified under NW-Class-I. There exist a temporary bamboo bridge across the river Ichamati connecting the villages Khardasing and Barghoria which in its present state poses impediment to safe navigation through the designated waterway. It is in this context IWAI has proposed to undertake a feasibility study to replace the existing bamboo bridge with a permanent bridge across the river which should comply with the provision as per the relevant clause laid by the National Waterways Authority. IWAI and the Department of Civil Engineering, Jadavpur University has signed an agreement wherein the Civil Engineering Department has been entrusted to undertake the feasibility study of the proposed bridge project and design the bridge and the approach road as per the provision of Class I National Waterways guidelines.

Project Definition and Scope

As has been stated in the introduction the primary objective of the present project is to replace the existing temporary bamboo bridge with a permanent bridge satisfying the criteria as per NW rules. During the preliminary discussion with the IWAI it is understood that proposed bridge should cater to 2 – and 3-wheeler movement across the river. As per the Gazette Notification, GoI dated 20th – 26th January, 2007, for Class-I rivers the minimum vertical clearance for the bridge should be 4 m from the high flood level (HFL) and the horizontal clearance between the piers should be 30 m minimum. In order to achieve the stated objective the scope of the work is defined and are presented as follows –

1. To carry out a topographical survey of the area through which the bridge and the approach road is supposed to run.

2. To carry out the hydrographic survey of the river channel up to 300 m upstream and downstream from the proposed bridge site.

3. To carry out an extensive geotechnical exploration of the soil up to 50 m from the existing ground level (EGL) along the proposed alignment.

4. To carry out an extensive social survey for requirement/demand analysis

5. Engineering design of the bridge and the approach road as per the requirement and site condition

6. Financial estimate and cost projections

Status Feasibility Study

The geological information of the proposed project site suggests that it falls in the deltaic region of the lower Gangetic basin. There are several distributaries branching of from the river Ganges and Ichamati is one such distributary on the eastern plain of the Hooghly basin. Swarupnagar CD Block is part of the

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23
Head
Department of Civil Engineering
Jadavpur University

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Ichhamati-Raimangal Plain. The Ichamati river is severely meandering in nature and presently no direct connection with the Hooghly river is evident. The river is primarily rain fed in its upper reaches, whereas, in the lower reaches tidal nature is observed from the sea to the Basirhat town.

Swarupnagar CD Block has an area of 215.13 km^2. As per 2011 Census of India Swarupnagar CD Block had a total population of 256,075, of which 251,715 were rural and 4,360 were urban. There were 131,510 (51%) males and 124,565 (49%) females. Population below 6 years was 25,896. As per the census data available the decadal growth for the district was 22.40 per cent. As per the census data out of 66 inhabited villages in the Swarupnagar block, 25 are having a population of 5000 and higher. Of these 25 villages it is observed that the inhabitants of Gopalpur, Charghat, Malangapara, Sarapul and Swarupnagar-Baglani accesses this temporary bridge that is presently in place for their regular activity.

Presently the only permanent bridge that connects Swarupnagar Block with the adjoining Baduria Block is located at Tentulia. This is the only road connectivity from Swarupnagar to the nearest railway head, Maslandapur along the Sealdah-Bongaon Railway line. The existing road is one of the few connectivity to Kolkata via New Town which is about 74 Km. There is an alternate route to Kolkata via Basirhat which is about 95 Km.

The present permanent bridge at Tentulia is situated at a distance of 4.43 Km (approx.) from the proposed bridge location along land route and 8.15 Km along the river channel. If a permanent bridge is constructed at the proposed location some of the advantages one can have are as follows –

1. The motorable distance from Maslandapur which is the nearest rail head will be reduced from 19 Km to 14 Km up to Swaroopnagar PS

2. The motorable distance from Charghat outpost to Swaroopnagar PS will be reduced from 16.7 Km to 7.5 Km

With this reduction in distance will immensely benefit the population residing along the proposed route.

Need Analysis

A sample door to door socio-transport survey has been conducted across fifty households of the villages Khardda Singa and Barghoria regarding demography, daily travel need, vehicle availability and possible utilization of the proposed bridge in place of the bamboo crossover.

From the sample survey following points emerged –

- On an average the family sizes ranges from 2 to 6 wherein apart from managing homes majority of the sample population is associated with agriculture (mostly as agriculture labours or minor farmer) and studying. A small portion (less than 10%) has office works or other type of works like tailoring, carpentry etc. and very small sample (1-2%) works away from home.
- The average family income of sample population ranges from Rs. 5000 to Rs. 12000 per month. Most of the families (more than 80%) own bicycle and along with that majority (more than 90%) owns motorised 2-wheelers. A few sample families (less than 10%) owns Rickshaw, Non-motorised van etc.
- The entire sample surveyed depends strongly on the bridge for crossing the river daily for their livelihood. The average number of crossings per day per family ranges from as low as once to as

high as 7 to 8 times in an average. The major mode of crossing is by cycle (40 to 50%), motorcycle (80 to 90%) and sometimes by walking (20 to 25%).

- The sample population of Barghoria and its adjacent areas regularly cross the river towards Swarupnagar to reach the government establishments like police station, BDO office, banks, schools and big markets where as the peoplw of Khardda Singa and adjacent areas cross the river for reaching agricultural fields, local markets and other far away places of the district for, schools, higher educational institutes and offices. The personal trips are in addition to these.
- Apart from a very few people (less than 10% of sample), who did not respond to the query on possible benefit of the proposed project, all respondents expressed great need of a proper river crossing. For most of the respondents (around 80 to 90%) the makeshift bamboo cross over is unsafe one and a new permanent bridge will provide them a safe and convenient pathway for crossing the river. Most of the sample respondents expressed that a new permanent bridge will give them smooth crossover with their vehicles, however a very small number (less than 5%) expressed their desire of having public transport over the proposed bridge.

Overall it may be considered from the sample study that a proper permanent bridge structure over the river Ichamati in place of the existing makeshift bamboo cross over may be the solution with target of providing both way movement of Cycles, motorised Two-Wheelers and Pedestrian.

Engineering Surveys and Investigations

A preliminary visit to the proposed bridge site was undertaken by a team from Jadavpur University accompanied by a team from IWAI. The road leading to the existing bamboo bridge though found to be having concrete surface it was a single lane road without any provision of shoulder on either edges. It is found that there are a few non-engineered single and two storeyed structures on the either side of the road leading up to the river bank, particularly within the first 40-50 m. A reconnaissance survey was conducted and a few proposed alignment were thought of.

In the second stage of detailed surveying three important issues were identified – (a) To perform Topographical and Hydrographical Survey (b) To perform an extensive soil exploration along the proposed alignment and (c) Obtaining land records from the Swaroopnagar BL & LRO office. The detailed topographical and hydrographical map is provided along with this report and the report of the soil exploration is given in Appendix I.

Once the topographical survey plots were obtained, it was shared with the BL & LRO office to identify the plots without any encumbrances. On 3rd October, 2023 after visiting the BL&LRO office and while looking into the land map of the proposed site area, it was found that the course of the river has changed significantly over the years. It was conveyed by the officials of the BL&LRO office that the map available with them dates back to 1962. However, they could provide us with the land records as on 3rd October, 2023. It was informed that during the course of time the Irrigation and Waterways Department, Govt. of West Bengal acquired a significant amount of land and has cut the river channel along the path as it exists today. However, from the Google Maps the pre-existing river bed is clearly visible and is marked by RED lines shown in Figure 1. On further investigation it was found that only a narrow stretch of land along the pre-existing river channel is available which is without any encumbrance and is being since acquired by Irrigation and Waterways Dept., Govt. of West Bengal. The report from the BL&LRO office (Swaroopnagar) documenting the nature of the land along with a part land map from 1962 is provided in

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Head
Department of Civil Engineering
Jadavpur University

Appendix II. On consultation with the Director, IWAI (Kolkata) it was decided that the new bridge could be aligned only along the path in which the present bamboo bridge is positioned.

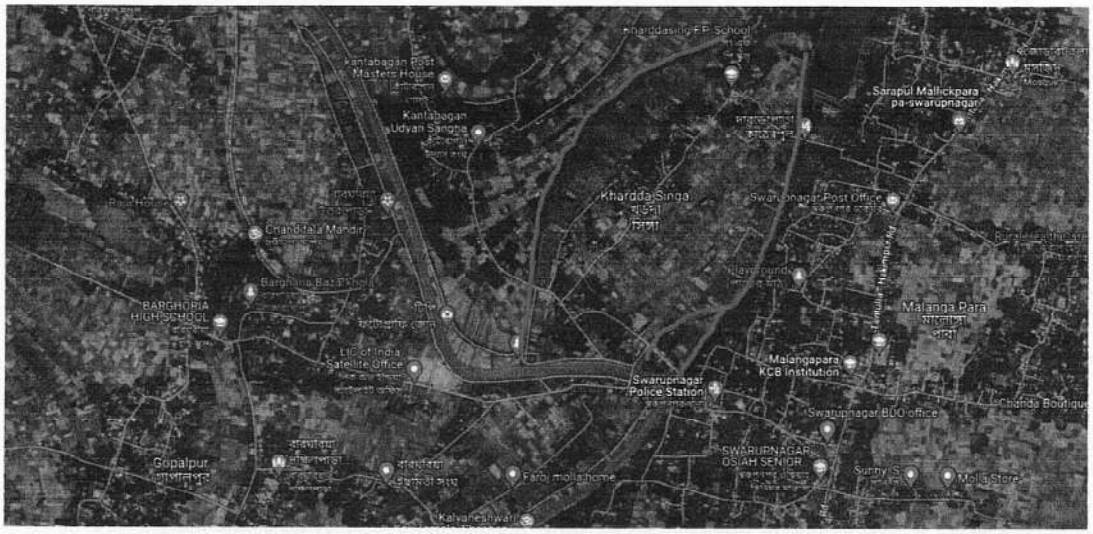


Figure 1: Proposed Bridge Site along with the Pre-existing Channel (As per BL&LRO Records of 1962) marked in Red

Design and detailing

Once the alignment of the new bridge was finalized it was decided to undertake the engineering design of the bridge proper and also that of the approach road. It is in this context a letter from Ministry of Jal Shakti, GoI dated 2nd August, 2023 having ref. No. LGD-3/CWC/DB-12/2023/920 was received wherein it is specified that the HFL at Taranipur (along Ichhamati River in the upstream side) recorded as on 01.08.2019 is 5.78 m. Subsequently, in concurrence with IWAI, the same HFL is considered for all subsequent design.

As per the NW regulation the pier to pier distance, i.e., clear navigable distance should be at least 30 m. However, if one goes by the stability analysis of the bridge with a 30 m span the initial proposal from IWAI for only a 2 – and 3 – wheeler bridge is not admissible. Furthermore, as per IRC regulation one should at least go for single-lane bridge with provisions of footpath. It is from this understanding the bridge width is considered to be 6.0 m with 4.5 m carriageway width. A Class-B load as per IRC 6-2014 is considered for the design of the bridge. The soffit height from the HFL is taken as 4.0 m. After considering all the aspects, a Steel Truss type bridge with 5 m height is considered. The center to center distance of the two main piers is taken as 40 m, thereby satisfying the NW regulation. Two viaducts at either end of the main bridge is also designed having a span of 12 m each. The deck slab on the bridge and the viaducts is designed as RCC deck slab. The detailed design report of the bridge super structure and the sub structure is given in Appendix III. The General Arrangement Drawing (GAD) is attached separately in this report.

The soil condition suggests that one should go for pile foundation and accordingly for each one of the main piers 4 no. of 1200 mm diameter piles are suggested. The abutment walls are supported by 6 no.

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

of 1000 diameter pile each. A detailed design and drawing of the bridge substructure and the superstructure is provided in the annexure.

As per the obtained topographical data it is understood that the bridge deck level has to be raised by 4 ~ 4.5 m from the existing GL. Hence, the approach road to the bridge has to be newly laid on an embankment. The soil beneath the embankment also needs strengthening to carry the load of the embankment and the Reinforced Earth Wall supporting the embankment. The sub-soil strengthening is done using Geo-grid. The detailed calculation of the same is shown in Appendix IV. It must be noted that the design of the RE wall has to be performed by the contractor who is awarded the work. This is because depending upon the Facia, the design of the same will vary. There is an option that if IWAI feels the design to be vetted, Jadavpur University might do the same.

For abutment wall protection against scouring it is suggested to provide and lay pitching on slopes laid over prepared filter media including boulder apron with Cement Concrete Blocks of size 0.3 m x 0.3 m x 0.3 m cast in cement concrete of Grade M15 for a distance up to 5 m up and downstream from the center line of the abutment wall. It is further suggested to lay a geotextile filter between pitching and embankment slopes on which pitching is laid to prevent escape of the embankment material through the voids of the stone pitching/cement concrete blocks as well as to allow free movement of water without creating any uplift head on the pitching.

It must be noted from the topography sheet and the site plan there is a narrow channel running parallel to the proposed approach road from the Kharda Sing village direction, i.e., on the north bank of the river. Necessary Sal Ballah piling with pitch drum walling needs to be undertaken along the entire length of the approach road, i.e., 120 m to prevent any soil destabilization. Necessary measurement of the same is provided in the estimated amount.

A detailed estimate of the entire project is provided in Appendix V which is arrived at based on the SOR given in PWD schedule of rates – 2015-16 and PWD (Roads & Bridges) schedule of rates – 2015 – 16. It must be mentioned that the estimate for manpower mobilization, machinery hiring, preparation of approach road, etc., is provided as 50% of the total material cost. This portion of the estimate may vary as per the prevailing situation.

Operation and Maintenance

The present road leading to the existing bamboo bridge is developed and maintained by the PMGSY scheme. The erection of a permanent bridge along the route will certainly increase traffic by manifold. It is in this regard necessary strengthening of the roadways leading to the proposed route must be given due importance. As the proposed bridge is designed for Class B loading (Refer IRC: 6 – 2017; Appendix A) bogic load and axle load must be monitored. It is better to provide a height bar of 4 m from the top of the deck slab in order to restrict movement of heavy vehicles over the bridge.

Regular painting of the steel members, monitoring of the joints against rusting, periodic maintenance of the pot bearing supporting the bridge should be done without fail. Though cement pitching is recommended to prevent scouring along the river bank adjoining the abutment wall, regular observation is mandatory.

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Conclusion

A detailed project report for the *Study / design, drawing & cost estimate for replacing of temporary bamboo bridge at Swaroopnagar (Ch. 48.70 Km) on Ichamati river (NW-44) with a Permanent Bridge* is prepared. Statement of rates are generally provided from the PWD schedule of rates but in certain cases it is provided based on discussion with the manufacturer. The Department of Civil Engineering, Jadavpur University requests IWAI to cross check the rates as per the prevailing market value and thereafter go for the final tendering process. Further it must be made clear that the design calculation is based on the reports available based on ground survey. During the construction process if the contractor faces any unforeseen circumstances, necessary guidance, if any can be provided on behalf of the team.

References:

1. IS 800: 2007
2. IRC: 6 – 2017
3. IRC: 78 - 2014
3. IS 4515: 2002 (Reaffirmed 2012)

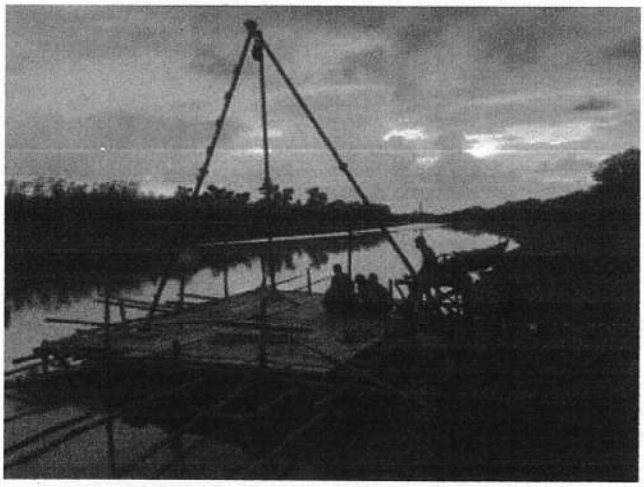
8/11

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

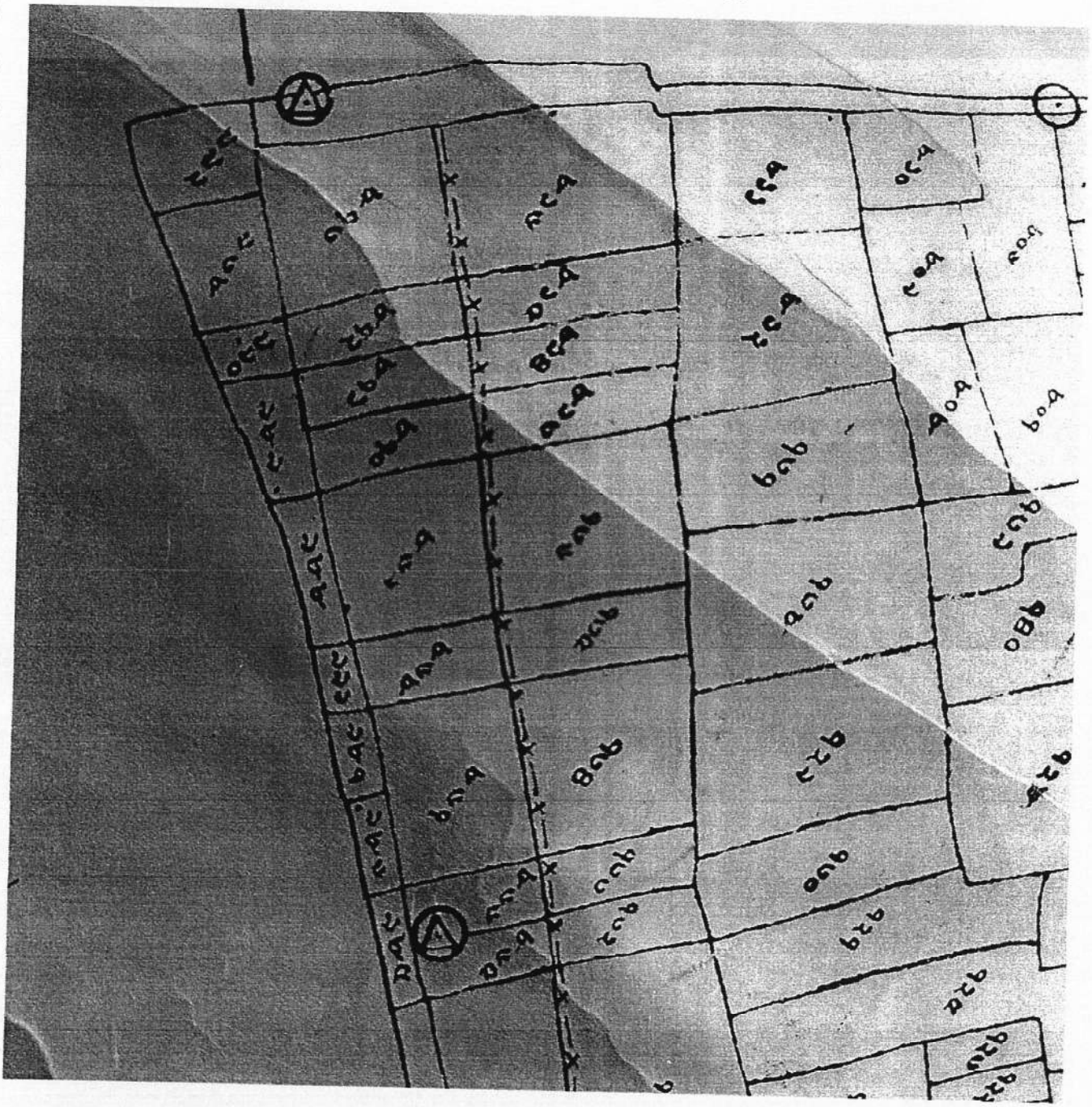
Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032



APPENDIX II



Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23
Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

জেলা- উত্তর ২৪ পরগণা খতিয়ান নং- ১৩৯১ [১৫১৯০৩৫]

মৌজা- খড়দমিং জে.এল.নং- ৩৫ থানা- স্বরূপনগর

(১) রাজস্ব- টাকা খতিয়ান তৈরির তারিখ - 26/02/2021

(২) জমির পরিমান(এ)- ৩.৫৩৬৭ (৩) মোট দাগের সংখ্যা- ১৪

	(৪) অত্রস্বত্বের দখলকারের বিবরণ	(৫) স্বত্ব	(৬) মন্তব্য
নাম-	সেচ ও পয়প্রনালী বিভাগ	রায়ত	
পিতা-	প ব সরকার		
ঠিকানা-	নিজ		

(৭) অত্রস্বত্বের নিজ দখলীয় জমি

দাগ নং	জমির শ্রেনী	মন্তব্য	দাগের মোট পরিমান(এ)	দাগের মধ্যে অত্রস্বত্বের অংশ	দাগের মধ্যে অত্রস্বত্বের জমির অংশের পরিমান	
					একর	হেক্টর
৮৬৪	ডাঙ্গা		০.৯২০০	১.০০০০	০.৯২০০	
		আগত খং নং - 30,146,172,278,326,386,465, 625,644				
৮৬৪/৯৮৪	বিলান		০.৩৫০০	০.৩৬১৮	০.১২০০	
		আগত খং নং - 28,132,135				
৮৬৫	ডাঙ্গা		০.১৮০০	১.০০০০	০.১৮০০	
		আগত খং নং - 141				
৮৬৬	ডাঙ্গা		০.২০০০	১.০০০০	০.২০০০	
		আগত খং নং - 141				
৮৬৬/৯৮৫	বিলান		০.১২০০	১.০০০০	০.১২০০	
		আগত খং নং - 141				
৮৬৭	ডাঙ্গা		০.৬০০০	১.০০০০	০.৬০৬৭	
		আগত খং নং - 173,1308				
৮৬৭/৯৮৬	ডাঙ্গা		০.০৯০০	১.০০০০	০.০৯০০	

জেলা- উত্তর ২৪ পরগণা খতিয়ান নং- ১৩৯১ [১৫১৯০৩৫]

মৌজা- খড়দসিং জে.এল.নং- ৩৫ থানা- স্বরূপনগর

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	(৪) অত্রস্বত্বের দখলকারের বিবরণ	(৫) স্বত্ব	(৬) মন্তব্য
নাম-	সেচ ও পয়প্রনালী বিভাগ	রায়ত	
পিতা-	প ব সরকার		
ঠিকানা-	নিজ		

দাগ নং	জমির শ্রেনী	মন্তব্য	দাগের মোট পরিমান(এ)	দাগের মধ্যে অত্রস্বত্বের অংশ	দাগের মধ্যে অত্রস্বত্বের জমির অংশের পরিমান একর	হেক্টর
৮৬৭/৯৮৬		আগত খং নং - 166,173,219/1,348				
৮৬৭/৯৮৭	ডাঙ্গা		০.০৯০০	১.৩৩৩৪	০.১২০০	
৮৬৮	ডাঙ্গা	আগত খং নং - 61,1308	০.২৬০০	১.০০০০	০.৩৪০০	
৮৬৮/৯৯১	ডাঙ্গা	আগত খং নং - 47,655,1308	০.০৮০০	১.০০০০	০.১১০০	
৮৬৯/৯৮৮	ডাঙ্গা	আগত খং নং - 61,792,1308	০.১৫০০	১.০০০০	০.১৫০০	
৮৭০/৯৮৯	বিলান	আগত খং নং - 1306	০.১৬০০	১.০০০০	০.১৬০০	
৮৭২/৯৯০	বিলান	আগত খং নং - 187,354,588	০.১০০০	১.০০০০	০.১০০০	
৮৭৩/৯৩৮	বিলান	আগত খং নং - 868	০.৩২০০	১.০০০০	০.৩২০০	
		আগত খং নং - 101,341				

মোট দাগের সংখ্যা- চোদ্দ মাত্র

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

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APPENDIX III

Design of deck Slab and Steel Truss Girder

General Design Consideration:

Basic Design Parameters:

General:

Span of bridge (C/C of Bearing) = 40.0 m

Width of bridge Inside of Road Kerb = 4.25 m

The bridge is a Single lane bridge with safety Kerb of 600 mm on both sides.

Dimension:

Railing – As per M.O.S.T. Specification (Drg. No. – SD-202)

Length of Bridge (C/C of Abutment = 40.0 m

Effective span (c/c of bearing) = 40.0 m

Wearing course – (Average thk.) = 0.075 m

C/c of Long Girder in across direction = 5.65 m

Width of expansion joint = 0.04 m

Cross slope in deck = 2.50 %

Reduced Level:

The R.L. of at top of wearing course at C.L. of each lane (Road Level) = (+) 5.056 m

The R.L. at soffit of superstructure =

Clear opening between H. F. Level & Soffit of Superstructure = 4.0 m

Material Data: **[Refer Table 9 & 10 of IRC: 21-2000]**

Grade of Concrete conforming to IRC: 112-2012 (for Deck) = M-30

Grade of HYSD bar conforming to IS:1786 = Fe 500

Permissible Stress in tension in flexure shear on combined bending for Fe500 HYSD bar = 240 N/mm^2

Modulus of elasticity of HYSD bar = 211000 N/mm^2

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/13

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Spacing of cross girder:

Effective length of longitudinal girder	= 40.0 m
Number of cross girder provided	= 9
Spacing of cross girder	= 5.0 m

Reference:

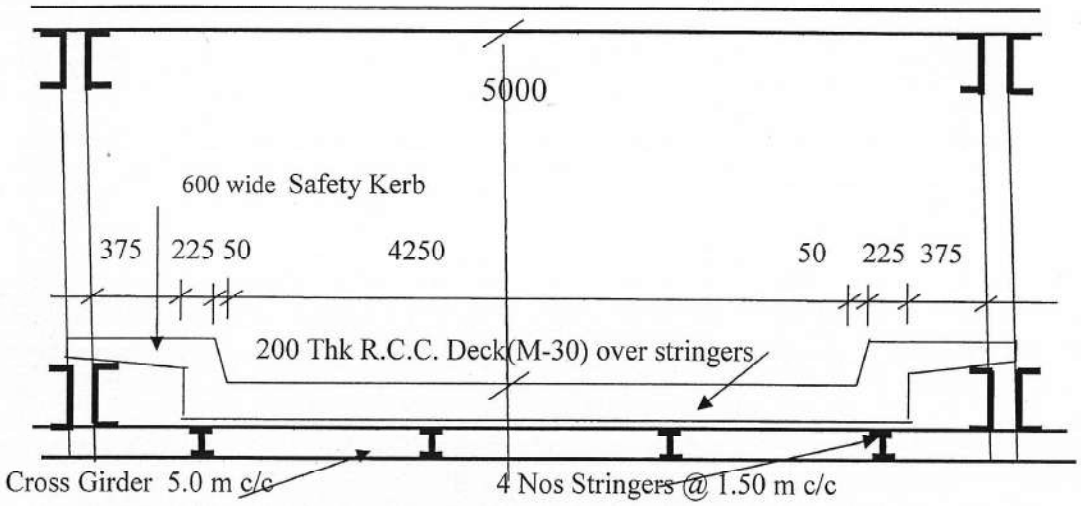
a) I.R.C. – 6
b) I.R.C. – 21
c) I.R.C. – 78
d) I.R.C. -- 24
e) I.S. – 456

8/11/23
Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Kolkata-700 032

Design of Deck slab



Typical Cross section of the Bridge

Load Calculation

Dead load

1.) Wt of Railing (3 rows of 32 n.b. G.I. pipe)
Wt = 2 x 3 x 5 = 30 Kg/m — say 0.030 T/m

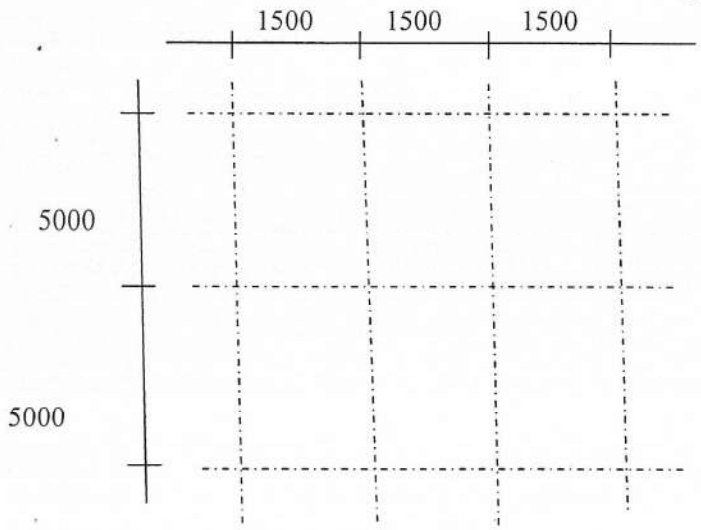
2.) Wt of wearing course = 0.075 x 4.25 x 2.40 = 0.765 T/m

3.) Wt of deck slab = 4.8 m x 0.2 x 2.5 = 2.400 T/m

4.) Wt of R.C.C.Road Kerb = 2 x ½ x(0.225 + 0.275) x 0.275 x 2.5 = 0.344 T/m

5) Wt of Footpath cum safety kerb = 2 x ½ x(0.15 + 0.20) x 0.525 x 2.5 = 0.460 T/m

Total = 3.999 say 4.0 T/m



Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor-in-Charge
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-700 032

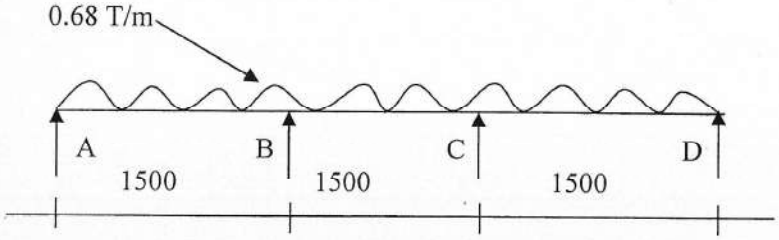
8/1/23

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Dead Load Analysis

Wt of deck slab = 0.2 m x 2.5 = 0.50 T/m^2
Wt of wearing course = 0.075 x 2.40 = 0.18 T/m^2
Total = 0.68 T/m^2

Panel of Slab: Ly = 5000 mm; Lx = 1500 mm;
So, ly/lx = 3.333 > 2.0 So, the slab is one way in nature.



Fixed End Moment

$MF_{AB} = MF_{BC} = MF_{CD} = - wl^2/12 = - 0.68 \times 1.5^2/12 = -0.128$ T-m

DistributionFactor:

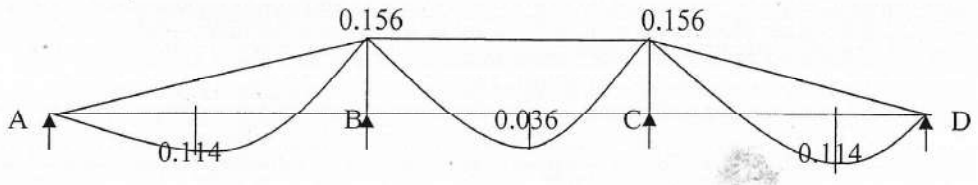
Joint	Member	Relative stiffness	Distribution Factor
B	BA	0.75 x I/1.5 = 0.50I	0.50/(0.50 + 0.666) = 0.43
	BC	I/1.5 = 0.666I	1- 0.43 = 0.57

Moment Distribution

Joint	A		B		C	D
Member	AB	BA	BC	CB	CD	DC
D.F.	0	0.43	0.57	0.57	0.43	0
F.E.M.	-0.128	+0.128	-0.128	+0.128	-0.128	+0.128
Bal A & D	+0.128					-0.128
C.O.		+0.064			-0.064	
Total	0	+0.192	-0.128	+0.128	-0.192	0
Bal		-0.028	-0.036	+0.036	+0.028	
C.O.			+0.018	-0.018		
Bal		-0.008	-0.01	+0.01	+0.008	
Final	0	+0.156	-0.156	+0.156	-0.156	0

Simply Supported Bending Moment

B.M. at midspan = $wl^2/8 = 0.68 \times 1.5^2/8 = 0.192$ T-m



DEAD LOAD BENDING MOMENT DIAGRAM

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

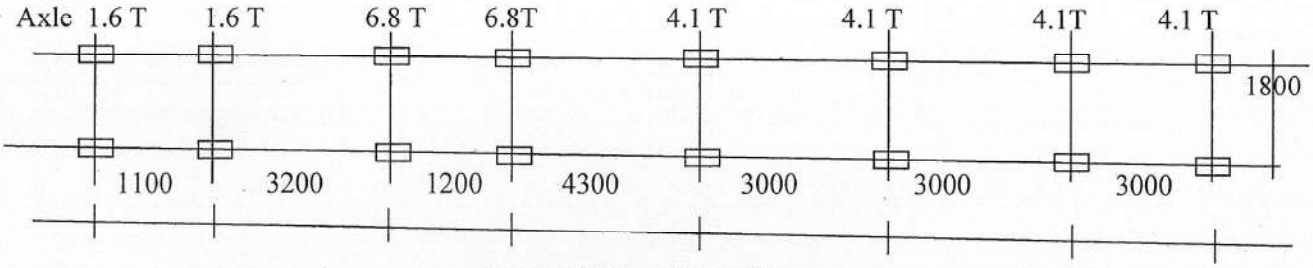
Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23
Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

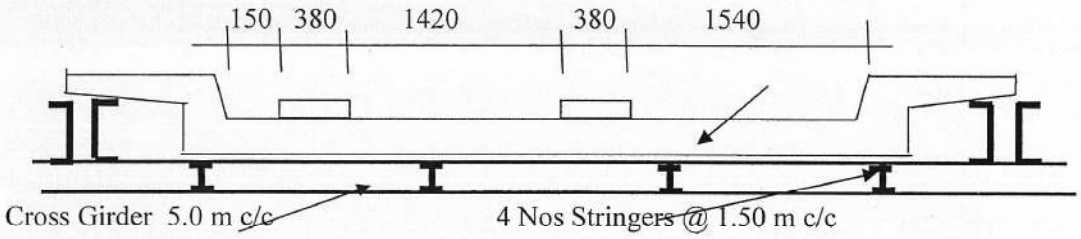
Support B.M.: Max Support B.M. = 0.156 T-m/m
Span B.M.: For Span AB and CD = 0.192 – 0.156/2 = 0.114 T-m/m
For Span BC = 0.192 – 0.156 = 0.036 T-m/m

Live Load Analysis

Class-B loading:

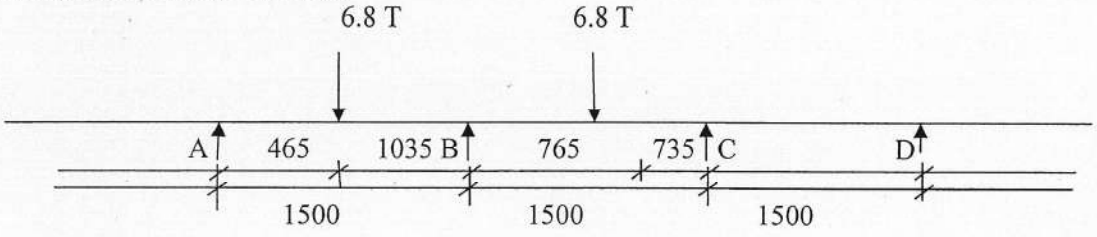


Plan of Class –B Load



Max Eccentric position of the load

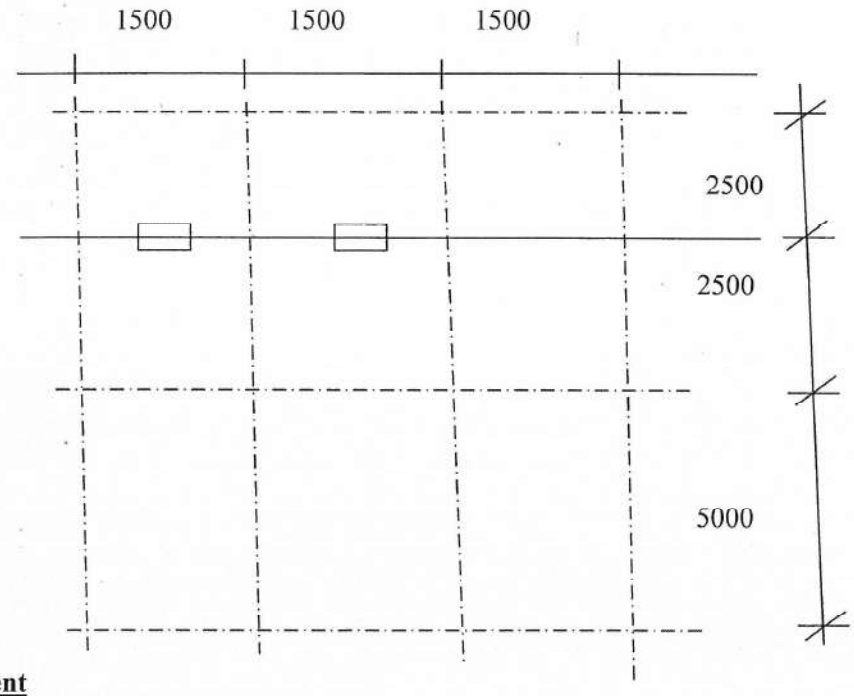
However to get max effect of tyre load let us place the 6.8 T axle load at centre of the panel as only one tyre can be located in one panel in across direction.



Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/13
Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032



Fixed End Moment

$MF_{AB} = - Pab^2/1.5^2 = - 6.8 \times 0.465 \times 1.035^2/1.5^2 = -1.506$ T-m
$MF_{BA} = + 6.8 \times 0.465^2 \times 1.035/1.5^2 = 0.676$ T-m
$MF_{BC} = - 6.8 \times 0.765 \times 0.735^2/1.5^2 = - 1.250$ T-m
$MF_{CB} = - 6.8 \times 0.765^2 \times 0.735/1.5^2 = - 1.300$ T-m

Moment Distribution

Joint	A		B		C	D
Member	AB	BA	BC	CB	CD	DC
D.F.	0	0.43	0.57	0.57	0.43	0
F.E.M.	-1.506	+0.676	-1.25	+1.30		
Bal A & D	+1.506					
C.O.		+0.753				
Total	0	+1.429	-1.25	+1.30		0
Bal		-0.077	-0.102	-0.741	-0.559	
C.O.			-0.371	-0.051		
Bal		+0.160	+0.211	+0.029	+0.022	
Final	0	+1.512	-1.512	+0.537	-0.537	0

Simply Supported Bending Moment

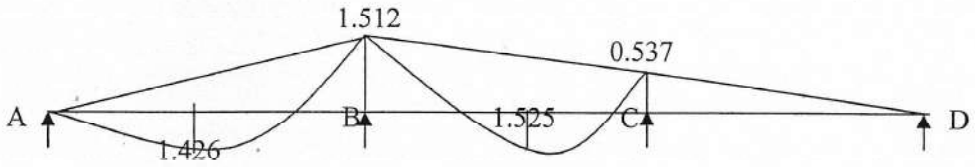
B.M. at midspan of AB = Pab/l = 6.8 x 0.465 x 1.035/1.5 = 2.182 T-m
B.M. at midspan of BC = Pab/l = 6.8 x 0.765 x 0.735/1.5 = 2.549 T-m

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032



LIVE LOAD BENDING MOMENT DIAGRAM

Support B.M.: Max Support B.M. at B = 1.512 T-m
Max Support B.M. at B = 0.537 T-m

Span B.M.: For Span AB and CD = 2.182 – 1.512/2 = 1.426 T-m/m
For Span BC = 2.549 – (1.512 + 0.537)/2 = 1.525 T-m/m

The wheel of tracked vehicle of Class B will create worst loadings.
Track contact length along short span W = 0.38 m; B = 0.20
Thickness of slab, H = 200 mm; Thickness of wearing course = 75 mm;
Width of load spread along short span,
b= width of slab = 5000 mm; l_0 = effective span of slab =1500 mm; So, $b/l_0 = 3.3333$
Width of dispersion of load $b_{ef} = \alpha (1 - a/l_0) + b_1$
Now $\alpha = 2.60$ for continuous slab; a = distance of c.g. of load from nearer support = 0.465 m;
b_1 = 380 mm + 2 x 75 mm = 530 mm
So, $b_{ef} = 2.60 \times (1 - 0.465/1.50) + 0.53 = 2.324$ m

Impact Factor

Since the deck slab is R.C.C. impact factor = 4.5/(6 +L) = 4.5/(6 + 1.5) = **0.60**

Design Live Load Moment:

Max. Support Moment per M with impact = 1.60 x 1.512/2.324 = 1.04 T-m/m
Max Span moment per M with impact = 1.60 x 1.525/2.324 = 1.05 T-m/m

Design Moment

Support Moment = 0.156 + 1.04 = 1.196 T-m/m
Span Moment = 0.114 + 1.05 = 1.154 T-m/m
Since the moments are almost same in magnitude let us design both support and span with 1.20 T-m/m moment.
Design moment in limit state = 2.0 x 1.2 = 2.40 T-m/m

Let us use M-30 grade concrete with Fe-500 steel.
So, σcbc = 10 MPa; σst = 200 MPa;
Modular ratio, m = 10; Stress ratio r = 200/10 = 20;
So, k = m/(m + r) = 10/(10 + 20) =0.33333; so. j = 1- k/3 = 1 – 0.3333/3 = 0.888;
So, $Q = \frac{1}{2} \times \sigma cbc \times j \times k = \frac{1}{2} \times 10 \times 0.333333 \times 0.8888 = 1.481$ MPa = 14.81 Kg/cm^2
So, effective depth required = $\sqrt{[2.40 \times 10^5/(14.81 \times 100)]}$ cm = 12.73 cm;
Provide 200 thk slab; So, d = 200 – 30 – 8 = 162 mm;
Ast required = $2.4 \times 10^5/(2000 \times 0.888 \times 16.2)$ cm^2/m = 8.35 cm^2/m
Provide 16 ϕ @ 150 mm c/c both at top and bottom along short span (13.40 cm^2/m) as main steel and 10 ϕ @ 150 mm c/c along long span as distribution steel.

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

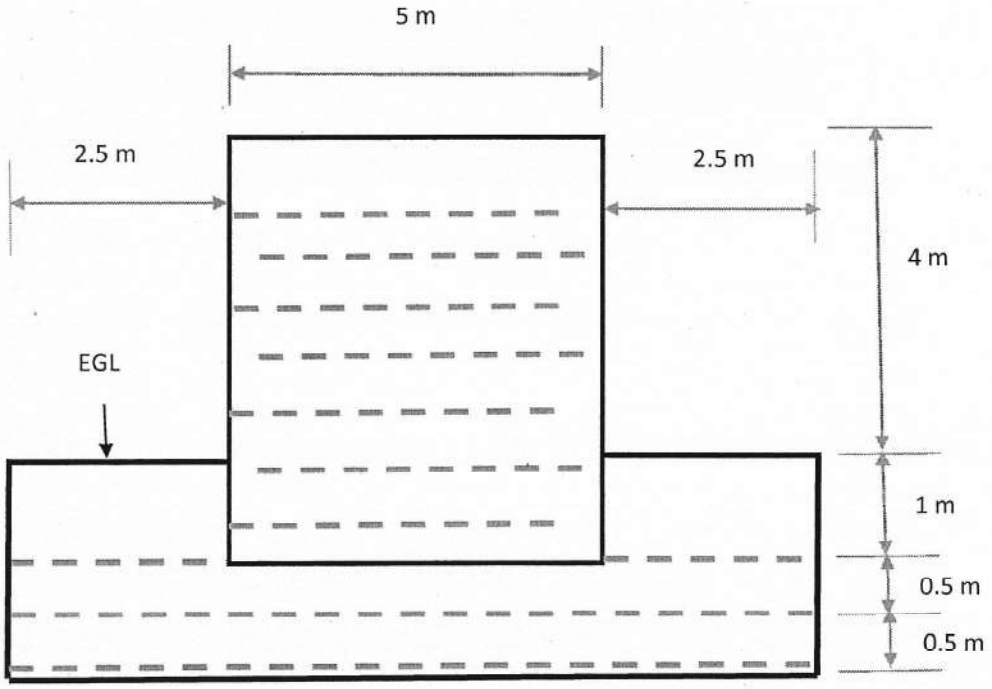
PROFESSOR
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/13

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

APPENDIX IV

Design for Soil improvement below the RE wall and the embankment



Geogrid/Geosynthetic

Embankment width = 5 m; Depth of cut = 2 m; Embankment height = 4 m;

Width of cut = 10 m

$q_{ult} = C_u N_c = 2.5 \times 5.0 = 12.5$ t/m^2

$q_{all} = 12.5/2.0$ (=FoS) $= 6.0$ t/m^2

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Additional requirement for ground improvement = 10-6 = 4 t/ m^2

Provide 3 layers of geosynthetics (Layer 1 – woven geotextile

Layer 2 & 3 – woven geotextile/geogrid)

Assume punching shear due to loading from RE wall (the wall is placed 1 m below the EGL and the 1st layer is placed at 2m below the EGL)

Load carrying capacity for layer 1

Friction per unit length mobilized at soil-geosynthetic interface due to deformation

= 2.0 x 1.0 x tan(30) x 2.5 x 2 (for both top and bottom)

X 2 (both sides of the wall)

= 11.5 ton = 11.5/5.0 t/ m^2

= 2.3 t/ m^2

Friction mobilized / m for the 2nd Layer

= 8.7 t = 8.7/5 t/ m^2

= 1.73 t/ m^2

Friction mobilized / m for the 3rd Layer

= 5.8 t = 5.8 t/m^2

= 1.15 t/m^2

Total increase in capacity = 2.3 + 1.73 + 1.15 = 5.2 t/m^2

Hence OK

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/13

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Appendix V

Detailed estimate

Main Bridge (one No. 40.0 m Span)

Deck Slab

Vol of Concrete =

[4.8 x 0.2 + 2 x ½ x (0.275 + 0.225)x0.275 + 2 x ½ x(0.20 + 0.15) x 0.525] x 40

= 38.4 + 5.50 + 7.35 = 50.85 M^3 say 51 M^3

Reinforcement = 50.85 x 175 Kg/M^3 = 8899 Kg say 9.0 T

Shuttering = 40 x [4.8 + 2 x 0.275 + 2 x 0.525 + 2 x 0.15] = 268 say 300 m^2

Bridge Girder

Structural Steel (as per Staad analysis) = 40.0 T

Pier Cap

Vol of concrete = 2 x 1.5 x 7.2 x 0.75 = 16.2 M^3

Reinf. @ 100 Kg/M^3 = 1.62 say 2.0 T

Shuttering = 2 x [7.2 x 1.5 + 2 x (7.2 + 1.5) x 0.75] M^2 = 47.70 say 50 M^2

Pier Shaft

Vol of Concrete = 2 x (π/4) x 1.5^2 x 4.5 = 15.91 say 16 M^3

Reinf. @ 100 Kg/M^3 = 1.62 say 2.0 T

Shuttering = 2 x π x 1.5 x 4.5 M^2 = 42.42 say 45 M^2

Pile Cap

Vol of concrete = 2 x 5.1 x 7.5 x 1.8 = 137.7 say 140 M^3

Reinf. @ 100 Kg/M^3 = 14.0 T

Shuttering = 2 x 2 x (7.5 + 5.1) x 1.8 M^2 = 90.72 say 95 M^2

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Piles

1200 dia R.C.C. (M-35) Bored cast-in-situ pile 35.0 m long – 8 Nos

i) Driving = 35 x 8 = 280.0 m

ii) Concrete = (π/4) x 1.2^2 x 33 x 8 = 298.6 say 300 M^3

CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

8/11/23
Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

iii) Reinf. @ 70 Kg/ M^3 = 21.0 T

Approach Span (Two Nos 12.0 m span)

Deck Slab

Vol of Concrete =

[4.8 x 0.2 + 2 x ½ x (0.275 + 0.225)x0.275 + 2 x ½ x(0.20 + 0.15) x 0.525] x 2 x 12

= 23.04 + 3.30 + 4.41 = 30.75 M^3 say 31 M^3

Reinforcement = 30.75 x 175 Kg/M^3 = 5382 Kg say 6.0 T

Shuttering = 24 x [4.8 + 2 x 0.275 + 2 x 0.525 + 2 x 0.15] = 160.8 say 170 m^2

Bridge Girder

Structural Steel = 24.00 T

Abutment Cap

Vol of concrete = 2 x 1.0 x 6.0 x 0.75 = 9.0 M^3

Reinf. @ 110 Kg/M^3 = 0.99 say 1.0 T

Shuttering = 2 x [2 x (6.0 + 1.0) x 0.75] M^2 = 21 M^2

Abutment Shaft

Vol of Concrete = 2 x [(1.0 +1.2)/2] x 4.0 x 6.0 = 52.8 say 53 M^3

Reinf. @ 100 Kg/M^3 = 5.30 say 6.0 T

Shuttering = 2 x [{2 x (1.2 + 1.0)/2}x 4.0 + 2 x 6.0 x 4.0] M^2 = 104.8 say 105 M^2

Pile Cap

Vol of concrete = 2 x 7.3 x 4.3 x 1.5 = 94.17 say 95 M^3

Reinf. @ 100 Kg/M^3 = 9.5 say 10 T

Shuttering = 2 x 2 x (7.3 + 4.3) x 1.5 M^2 = 69.60 say 70 M^2

Piles

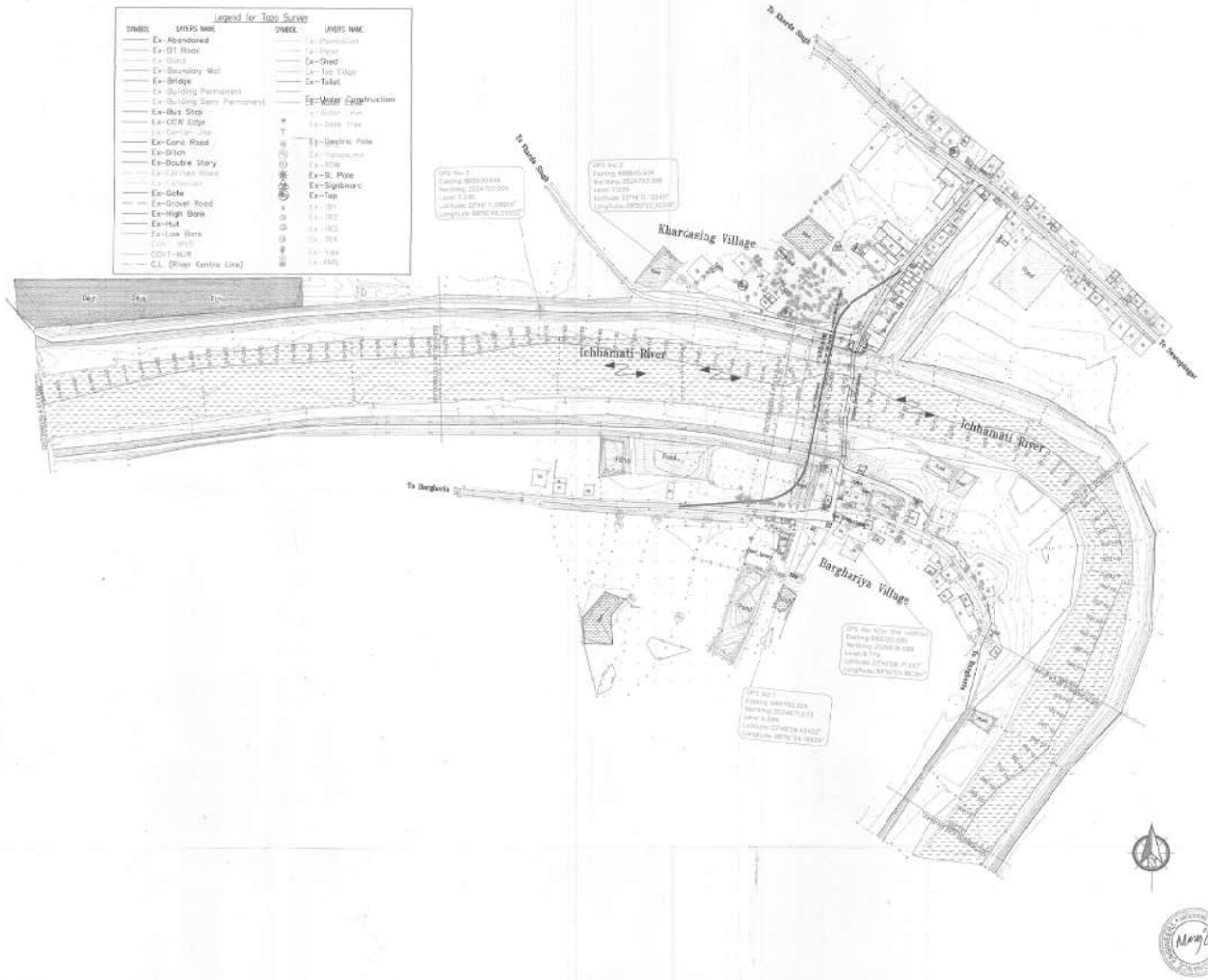
1000 dia R.C.C. (M-35) Bored cast-in-situ pile 35.0 m long – 12 Nos

i) Driving = 35 x 12 = 420.0 m
ii) Concrete = (π/4) x 1.0^2 x 33 x 12 = 311.02 say 312 M^3
iii) Reinf. @ 70 Kg/ M^3 = 21.84 say 22 T

Associate Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032



CHECKED BY	LEGEND/SYMBOL

GENERAL NOTES

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Head
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

30/10/23

REVISION/ISSUE	DATE
	21.10.2023

Proposed bridge at Swarupnagar(Chainage 48.7km) over Ichamati River of National Waterway No : 44 (Letter no-IWAI/PR/NW-44/2021-22, Dated-03/07/2023)

NAME OF THE CLIENT

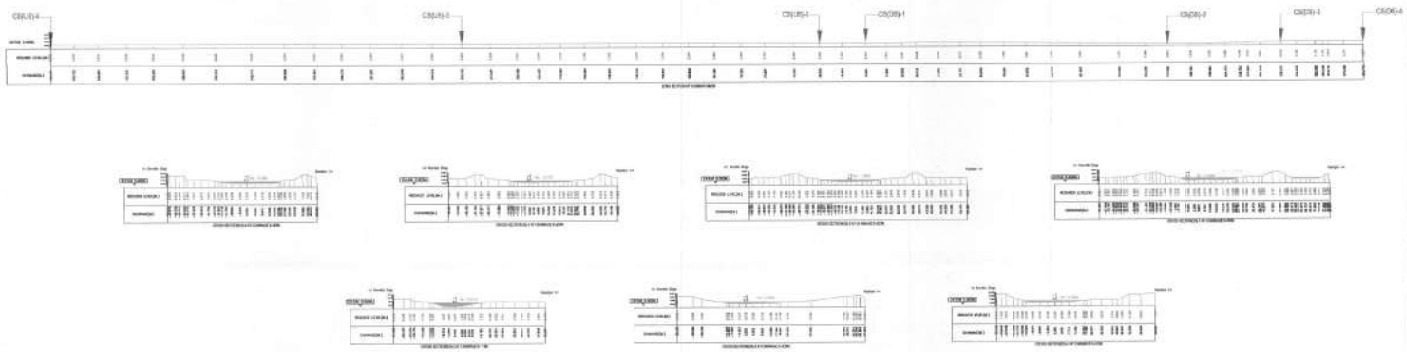
INLAND WATERWAYS AUTHORITY OF INDIA,P-78
GARDEN REACH ROAD,KOLKATA-700034

NAME OF THE SURVEYING AUTHORITY

CIVIL ENGINEERING DEPARTMENT,JADAVPUR UNIVERSITY

TOPOGRAPHY & PROPOSED BRIDGE LAYOUT PLAN

SCALE	A1/1:2
SHEET NO :	



GENERAL NOTES

	REVISION/ISSUE	DATE
		21.10.2023

NAME OF THE WORK

Proposed bridge at Swarupnagar(Chainage 48.7km) over Ichamati River of National Waterway No : 44 (Letter no-IWAI/PR/NW-44/2021-22, Dated-03/07/2023)

NAME OF THE CLIENT

INLAND WATERWAYS AUTHORITY OF INDIA,P-78 GARDEN REACH ROAD,KOLKATA-700034

NAME OF THE SURVEYING AUTHORITY

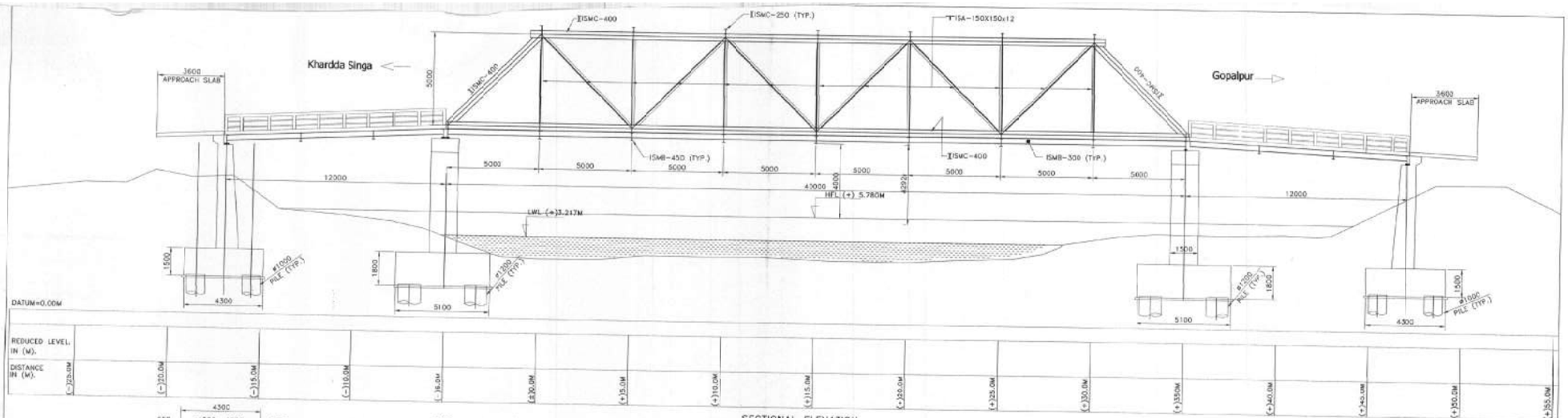
CIVIL ENGINEERING DEPARTMENT,JADAVPUR UNIVERSITY KOLKATA - 700032

DRAWING TITLE

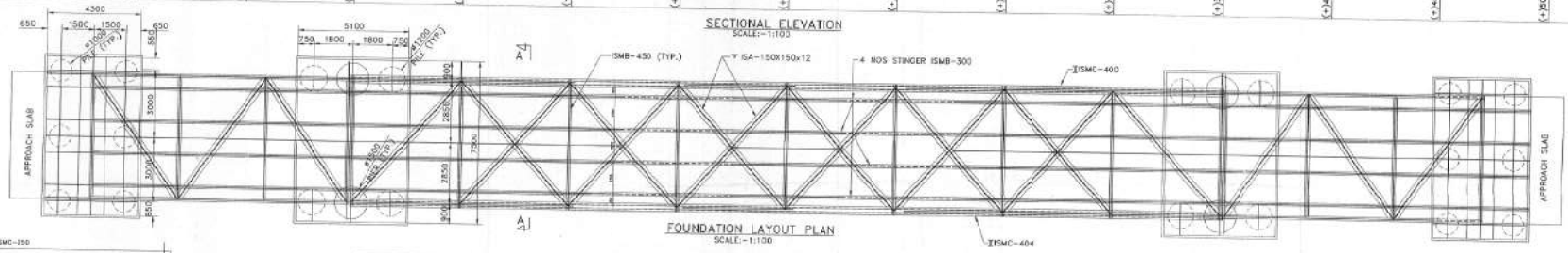
TOPOGRAPHY & PROPOSED BRIDGE LAYOUT PLAN

SCALE	A1/1:2
SHEET NO :	

	CHECKED BY	LEGEND/SYMBOL



SECTIONAL ELEVATION
SCALE:- 1:100



FOUNDATION LAYOUT PLAN
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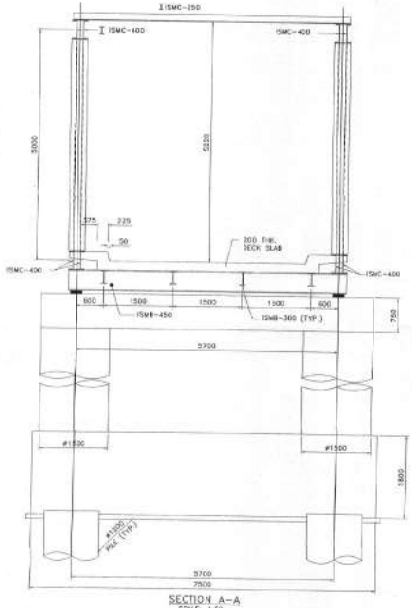

SECTION A-A
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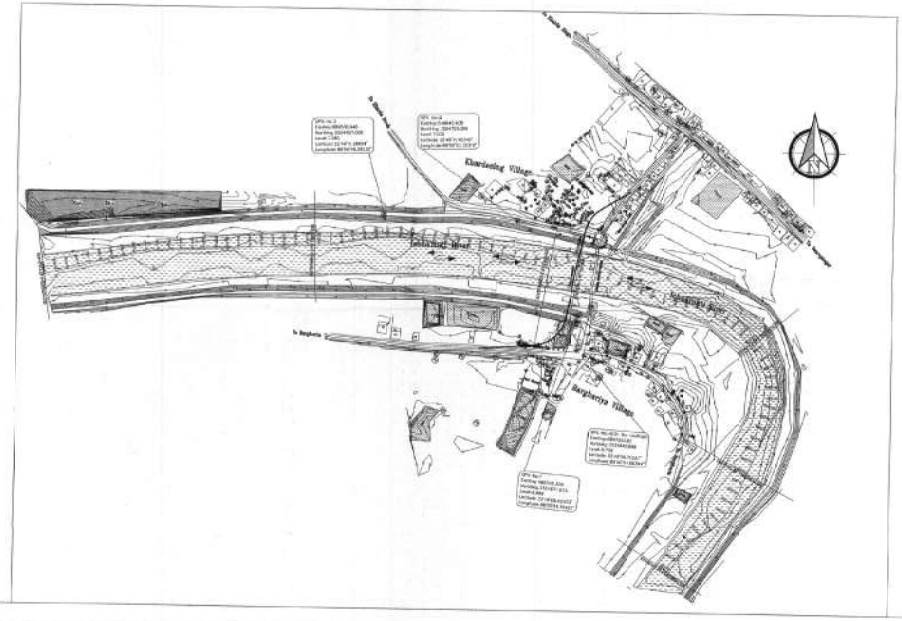

1. ALL DIMENSIONS ARE IN MM. U.O.M.
2. THE BRIDGE HAS BEEN DESIGNED FOR WHEELED VEHICLE OF LOADING CLASS- 'B' AS PER IRC:- CODE. VEHICLE HEAVIER THAN THIS LOADING CLASS SHALL BE RESTRICTED OVER THE BRIDGE.
3. THE RIVER PROFILE IS APPROXIMATE. CONTRACTOR TO CHECK THE PROFILE DURING CONSTRUCTION AND MAY CONTACT THE CONSULTANT FOR ANY PROBLEM WITH THE SECTION.

Professor
CIVIL ENGINEERING DEPARTMENT
JADAVPUR UNIVERSITY
KOLKATA-32

Assistant Professor
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

Head 30/10/23
Department of Civil Engineering
Jadavpur University
Kolkata-700 032

CLINT	INLAND WATERWAYS AUTHORITY OF INDIA,P-78 GARDEN REACH ROAD,KOLKATA-700034				
CONTRACTORE					
PROJECT	Proposed bridge at Swarupnagar(Chainage 48.7km) over Ichamati River of National Waterway No : 44 (Letter no-IWAI/PR/NW-44/202'-22, Dated-03/07/2023)				
CONSULTANT	M/S N.P. DESIGNERS 14, K.N. SEN ROAD, BLOCK-III, FLAT-2C KOLKATA-700042				
TITLE	STRUCTURAL LAYOUT PLAN, ELEVATION, AND SECTIONS.				
DRAWN	DSGD.	CHKD.	SCALE	DATE	DRAWING NO.
MANISH	PABAN MANDAL	PABAN MANDAL	AS NOTED	02.06.2023	REV.-0

Annex-4

FORM FIN – 2:

BILL OF QUANTITES

Tender Inviting Authority: Inland Waterways Authority of India (IWAI)
Name of Work: Design and Construction of Single Lane Bridge at Swarupnagar, (WB) across Ichamati River (NW-44) including Approach Road and RE wall on EPC Mode.
Contract No: IWAI/KOL/NW- 44(ICHAMATIRIVER)/SWARUPNAGAR BRIDGE
Name of the Bidder/ Bidding Firm / Company:……..

Sl. No.	Item Description	**Quantity**	**Units**	**(*) Bid Price in Figure Excluding GST to be entered by the bidder**	**Total Amount in figure excluding GST (Rs.)**	**Total Amount in word including GST @ 18% (Rs.)**
1.	Design and Construction of Single Lane Bridge at Swaroopnagar, (WB) across Ichamati River (NW-44) including Approach Road and RE wall on EPC Mode	1.00	Lump sum			
Total in Figures						
Quoted Rate-in words						

Authorized Signatory
Name :
Designation :
Name of Firm :
Address :