UTTARAKHAND
Office of Superintending Engineer,
Research Circle
Irrigation Research Institute Roorkee-247667
E-mail: uttarkhandwrd@gmail.com, Website: www.iriroorkee.res.in

e-Tender Notice No. : 07/SE(R)/NHP/e-Tender/2021-22, Dated 27.12.2021

Superintending Engineer, Research Circle, Irrigation Research Institute, Roorkee on behalf of "Governor of Uttarakhand" invites item wise rates for the following works through e-tenders in "Two Bid System" as given below.

S. No.	Name of work	Cost of tender form (Rs.)	Validity of Tender	Period of completion
1	2	3	4	5
1	Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand under National Hydrology Project	4,000.00+ GST @ 18%	120 Days	12 months plus 02 years of Operation and maintenance period and Comprehensive Warranty

Key Dates

1	Date of calling	27.12.2021	-
2	Date of online publication	06.01.2022	03.30 PM
3	Documents downloads start date	06.01.2022	05.00 PM
4	Pre-bid meeting date	16.01.2022	01.30 PM
5	Bid submission start date	26.01.2022	03.30 PM
6	Bid submission end date	07.02.2022	03.00 PM
7	Physical Submission of bid security and cost of bidding document	07.02.2022	03.00 PM
8	Date of opening of Technical bid	07.02.2022	03.30 PM
9	Date of opening of financial bid	To be declared later	

For further details please log on to *www.uktenders.gov.in*

27/12/2021

Superintending Engineer
Research Circle
Irrigation Research Institute, Roorkee

Bid Reference. – 07/SE(R)/NHP/e-Tender/2021-22

Package No. - NHP-2021-2022-UK-413641

NATIONAL COMPETITIVE BIDDING

Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room

at

Gaula, Barrage, Haldwani, Uttarakhand

Under National Hydrology Project (NHP)

[Two-Envelope Bidding Process with e-Procurement]

27th December 2021

OFFICE OF THE SUPERINTENDING ENGINEER
RESEARCH CIRCLE
IRRIGATION RESEARCH INSTITUTE, ROORKEE
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NATIONAL COMPETITIVE BIDDING FOR

Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand under National Hydrology Project

(Two-Envelope Bidding Process with e-Procurement)

(a)	Bid Reference	07/SE(R)/NHP/e-Tender/2021-22 Package No. - NHP-2021-2022-UK-413641
(b)	Date & time for Availability of the bid document on website	06-01-2022 From 15:30 Hours onwards
(c)	Date and time of Pre bid meeting	16-01-2022 From13:30 Hours
(d)	Bid Submission Start Date	26-01-2022 From 15:30 Hours
(e)	Last Date for e-Bid submission with supporting documents in PDF/XLS format	07-02-2022 Upto 15:00 Hours
(f)	Period up to which Hard copy of supporting documents (if required) will be deposited in the office concerned	07-02-2022 Upto15:00 Hours
(g)	Online opening date & time of Part "A" i.e. Technical Bid.	07-02-2022 at 15:30 Hours
(h)	Online opening date & time of Part "B" i.e. Financial Bid.	7 Days after informing to the Bidder.
(i)	Place of Pre bid meeting	Office of the Superintending Engineer (Research Circle), Irrigation Research Institute, Roorkee-247667 (Uttarakhand) or Online
(j)	Place of opening of e-Bids	Office of the Superintending Engineer (Research Circle), Irrigation Research Institute, Roorkee-247667 (Uttarakhand)
(k)	Bid document Fee (through e-tender portal by internet banking only)	INR 4000.00 + GST@18% (Rupees One Thousand One Hundred Eighty only)
(l)	Period of Completion (from the date of issue of acceptance letter)	12 Months + 2 Years (O&M)

Note:
1. In the event of the specified date of opening of bids being declared a holiday for Purchaser the bids shall be opened on the next working day at the same time and venue.
2. Completed bids shall be uploaded on the e-tendering platform by the Bidders using their user ID and addressed to the Chief Engineer, in the manner described under Instructions to Bidders Section II of Bid Documents on or before the stipulated last date & time.

INVITATION FOR BIDS (IFB)

National Competitive Bidding for
Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand Under National Hydrology Project (NHP)

INVITATION FOR BID (IFB)

Date	:	27-12-2021
IFB No.	:	07/SE(R)/NHP/e-Tender/2021-22
Package No.	:	NHP-2021-2022-UK-413641
Loan No	:	8725-IN

1. This Invitation for Bid follows the General Procurement Notice for this Project that appeared in Development Business on 21-09-2016
2. The Government of India has received a loan from The World Bank (IBRD) amounting to USD 175 Million towards the cost of **National Hydrology Project** and **Uttarakhand** being one of the implementing agencies intends that part of the proceeds of the loan will be used for eligible payments under the contract for which that Invitation of Bids is issued.
3. *The Superintending Engineer (Research Circle), Irrigation Research Institute, Roorkee-247667 (Uttarakhand) (Purchaser)* now invites Bids under e-tender system from eligible bidders, for the supply of the equipment listed below:

   (i) Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand Under National Hydrology Project (NHP).

4. Bidding will be conducted through the National Competitive Bidding (NCB) procedures agreed with World Bank. The bidding is open to all eligible bidders as defined in the Bank's Procurement Guidelines. In addition, please refer to paragraphs 1.6 and 1.7 of the Guidelines setting forth the World Bank's policy on conflict of interest.
5. The bid document is available online and bids are to be submitted online through the e-procurement portal http://uktenders.gov.in only. Bids submitted in any other manner will not be accepted. Bidders are required to obtain Digital signature from designated firms (available on e-Procurement Portal and then register with the Government of Uttarakhand e-procurement platform and submit bids by using their user ID and Digital Signature.
6. Bidding documents are available online on Government e-procurement website, https://uktenders.gov.in for a non-refundable fee as indicated below, in the form of Demand Draft on any Scheduled/Nationalized bank payable at Roorkee in favour of "Executive Engineer, Design Division, IDO, Roorkee". Bidders will be required to register in the website, which is free of cost. The bidder would be responsible for ensuring that any addenda available on the website is also downloaded and incorporated.

   The bidders are required to submit (a) Original demand drafts towards the cost of bid document (Rs. 4000.00) and for GST (applicable @18% of tender cost); (b) original bid securing deceleration in approved form; (c) original affidavit regarding correctness of information furnished with bid document and (d) original affidavit regarding validity of rates for 120 days from the date of opening of financial bid, either by registered post/speed post/courier or by hand, failing which the bids will be declared non-responsive. Due to valid unavoidable circumstances, if bidder(s) fails to submit the hard copies of aforesaid original documents before the opening of technical bid, the bidder must submit these original documents within the stipulated time as intimated by the Purchaser. If bidder(s) will not

provide these original documents within prescribed time as given by the Purchaser, his/their bid(s) will be declared as non-responsive and in such situation, Purchaser may take any action against such bidder(s).

7. A pre-bid meeting will be held on 16.01.2022 at 1.30 PM through video conferencing to clarify the issues and to answer questions on any matter that may be raised at the stage as stated in ITB clause 7.1 of "Instructions to Bidders" of the bidding documents. All prospective bidder(s) are requested to submit his query, if any, through email before 16.01.2022.
8. Other details can be seen in the bidding document. The Purchaser shall not be held liable for any delays due to system failure beyond its control. Even though the system will attempt to notify the bidders of any bid updates, the Purchaser shall not be liable for any information not received by the bidder. The bidder would be responsible for ensuring that any addenda available on the website is also downloaded and incorporated. It is the bidders' responsibility to verify the website for the latest information related to this bid.

Seal of Office & Address

Office of the Superintending Engineer,
Research Circle, SPMU, NHP,
Irrigation Research Institute, Roorkee,
District – Haridwar, Uttarakhand

TABLE OF CONTENT

PART 1 - BIDDING PROCEDURES

SECTION I - INSTRUCTIONS TO BIDDERS [ITB]

Section I. Instructions to Bidders

Table of Clauses

Section I. Instructions to Bidders

A. General

1 Scope of Bid

1.1 The Purchaser **indicated in the Bidding Data Sheet (BDS),** issues these Bidding Documents for the supply of Goods and Related Services incidental thereto as specified in Section VII, Schedule of Requirements. The name, identification and number of lots (contracts) of this National Competitive Bidding (NCB) procurement are **specified in the BDS.**

1.2 Throughout these Bidding Documents:

(a) the term "in writing" means communicated in written form (e.g. by mail, e-mail, fax, telex, including if **specified in the BDS**, distributed or received through the electronic-procurement system used by the Employer) with proof of receipt;

(b) if the context so requires, "singular" means "plural" and vice versa; and

(c) "Day" means calendar day.

2 Source of Funds

2.1 The Government of India (hereinafter called "Borrower") **specified in the BDS** has applied for or received financing (hereinafter called "funds") from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called "the Bank") in an amount **specified in BDS** toward the project **named in the BDS.** The Borrower intends to apply a portion of the funds to eligible payments under the contract for which these Bidding Documents are issued.

2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the loan or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the funds.

3 Corrupt & Fraudulent Practices

3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.

3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers and to permit the Bank to inspect all accounts, records and other documents relating to the submission of the application, bid submission (in case prequalified), and contract performance (in the case of award), and to have them audited by auditors

appointed by the Bank.

4 Eligible Bidders

4.1 A Bidder may be a firm that is a private entity, or a government owned entity subject to ITB 4.5.

4.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

a. directly or indirectly controls, is controlled by or is under common control with another Bidder; or

b. receives or has received any direct or indirect subsidy from another Bidder; or

c. has the same legal representative as another Bidder; or

d. has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Purchaser regarding this bidding process; or

e. participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or

f. any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the goods/equipment that are the subject of the bid; or

g. any of its affiliates has been hired (or is proposed to be hired) by the Purchaser or Borrower for the Contract implementation; or

h. would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any of its affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or

i. has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.

4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles

of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.

4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic address **specified in the BDS.**

4.5 Bidders that are Government-owned enterprises or institutions in the Purchaser's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Purchaser. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

4.6 A Bidder shall not be under suspension from bidding by the Purchaser as the result of the operation of a Bid–Securing Declaration.

4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.

4.8 A bidder shall provide such evidence of eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.

5 Eligible Goods 5.1 All the Goods and Related Services to be supplied under the

and Related Services

Contract and financed by the Bank may have their origin in any country in accordance with Section V, Eligible Countries.

5.2 For purposes of this Clause, the term "goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "related services" includes services such as insurance, installation, training, and initial maintenance.

5.3 The term "origin" means the country where the goods have been mined, grown, cultivated, produced, manufactured or processed; or, through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

B. Contents of Bidding Document

6 Sections of Bidding Documents

6.1 The Bidding Documents consist of Parts 1, 2, and 3, which include all the Sections indicated below, and should be read in conjunction with any Addendum issued in accordance with ITB Clause 8.

PART 1 Bidding Procedures

- Section I. Instructions to Bidders (ITB)
- Section II. Bidding Data Sheet (BDS)
- Section III. Evaluation and Qualification Criteria
- Section IV. Bidding Forms
- Section V. Eligible Countries
- Section VI Bank Policy-Corrupt and Fraudulent Practices

PART 2 Supply Requirements

- Section VII. Schedule of Requirements

PART 3 Contract

- Section VIII. General Conditions of Contract (GCC)
- Section IX. Special Conditions of Contract (SCC)
- Section X. Contract Forms

6.2 The Invitation for Bids issued by the Purchaser is not part of the Bidding Document.

6.3 Unless obtained directly from the Purchaser, the Purchaser is not responsible for the completeness of the document, responses to requests for clarification, minutes of pre-bid meeting (if any), or Addenda to the Bidding Document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Purchaser shall prevail.

6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents and to furnish with its Bid all information or documentation as is required by the Bidding Documents.

7 Clarification of Bidding Documents

7.1 The electronic bidding system **specified in the BDS** provides for online clarifications. A prospective Bidder requiring any clarification on the Bidding Documents may notify the

Purchaser online**.** Clarifications requested through any other mode shall not be considered by the Purchaser. The Purchaser will respond to any request for clarification, provided that such request is received no later than fifteen (15) days prior to the deadline for submission of bids. Description of clarification sought and the response of the Purchaser shall be uploaded for information of all Bidders without identifying the source of request for clarification. Should the Purchaser deem it necessary to amend the Bidding Documents as a result of a clarification, it shall do so following the procedure under ITB Clause 8 and ITB Sub-Clause 22.2. It is the bidder's responsibility to check on the e-procurement system, for any addendum/ amendment/ corrigendum to the bidding document.

8 Amendment of Bidding Documents

8.1 At any time prior to the deadline for submission of bids, the Purchaser may amend the Bidding Documents by issuing addendum. The addendum will appear on the e-procurement system under "Latest Corrigendum" and email notification is also automatically sent to those bidders who have started working on the tender, or as **otherwise specified in BDS**.

8.2 Any addendum thus issued shall be part of the Bidding Documents and shall be deemed to have been communicated to all the bidders.

8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB Sub-Clause 22.2

C. Preparation of Bids

9 Cost of Bidding

9.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

10 Language of Bid

10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, shall be written in English language. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into English language**,** in which case, for purposes of interpretation of the Bid, such translation shall govern.

11 Documents Comprising the Bid

11.1 The Bid shall comprise two Parts, namely the Technical Part and the Financial Part. These two Parts shall be submitted simultaneously.

11.2 **The Technical Part** shall contain the following:

(a) Letter of Bid – Technical Part, in accordance with ITB Clause 12;

(b) Bid Securing Declaration, in accordance with ITB Clause 19.1, if required;

(c) Alternative bids – Technical Part, if permissible, in

accordance with ITB 13, the Technical Part of any Alternative Bid;

(d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB Clause 20.2;

(e) documentary evidence in accordance with ITB Clause 17 establishing the Bidder's qualifications to perform the contract if its bid is accepted;

(f) documentary evidence in accordance with ITB 17 establishing the Bidder's eligibility to bid;

(g) documentary evidence in accordance with ITB Clause 16, that the Goods and Related Services to be supplied by the Bidder are of eligible origin;

(h) documentary evidence in accordance with ITB Clauses 16, that the Goods and Related Services conform to the Bidding Documents;

(i) Manufacturer's authorization form; and

(j) Any other document **required in the BDS.**

11.3 The **Financial Part** shall contain the following:

(a) Letter of Bid – Financial Part: prepared in accordance with ITB 12 and ITB 14;

(b) Price Schedules: completed prepared in accordance with ITB 12 and ITB 14;

(c) Alternative Bid - Financial Part; if permissible in accordance with ITB 13, the Financial Part of any Alternative Bid; and

(d) Any other document **required in the BDS.**

11.4 The Technical Part shall not include any financial information related to the Bid price. Where material financial information related to the Bid price is contained in the Technical Part, the Bid shall be declared non-responsive.

11.5 The Bidder shall furnish in the Letter of Bid, information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

12 Process of Bid Submission

12.1 The Letter of Bid – Technical Part, Letter of Bid – Financial Part and Price Schedules shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.2. All blank spaces shall be filled in with the information requested.

12.2 Entire Bid including the Letter of Bid and filled-up Price Schedules shall be submitted online on e-procurement system specified in ITB 7.1. Details and process of online submission of the tender and relevant documents are given in the website mentioned above. Scanned copies of documents listed in clauses 11 and 12.3 should also be uploaded on this website.

12.3 **Submission of Original Documents:** The bidders are required to submit (a) Original demand drafts towards the cost of bid document (Rs. 4000.00) and for GST (applicable @18% of tender cost); (b) original bid securing deceleration in approved form; (c) original affidavit regarding correctness of information furnished with bid document and (d) original affidavit regarding validity of rates for 120 days from the date of opening of financial bid, either by registered post/speed post/courier or by hand, failing which the bids will be declared non-responsive. Due to valid unavoidable circumstances, if bidder(s) fails to submit the hard copies of aforesaid original documents before the opening of technical bid, the bidder must submit these original documents within the stipulated time as intimated by the Purchaser. If bidder(s) will not provide these original documents within prescribed time as given by the Purchaser, his/their bid(s) will be declared as non-responsive and in such situation, Purchaser may take any action against such bidder(s).

13 Alternative Bids

13.1 Unless otherwise **specified in the BDS,** alternative bids shall not be considered.

14 Bid Prices and Discounts

14.1 The prices and discounts quoted by the Bidder in the Letter of Bid – Financial Part and in the Price Schedules shall conform to the requirements specified below.

14.2 All lots (contracts) and items must be listed and priced separately in the Price Schedules.

14.3 The price to be quoted in the Letter of Bid – Financial Part, in accordance with ITB 12.1, shall be the total price of the bid, excluding any discounts offered.

14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid – Financial Part in accordance with ITB 12.1.

14.5 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account, **unless otherwise specified in the BDS. A** bid submitted with an adjustable price quotation shall be treated as nonresponsive and shall be rejected, pursuant to ITB 31. However, if in accordance with the BDS, prices quoted by the Bidder shall be subject to adjustment during the performance of the Contract, a bid submitted with a fixed price quotation shall not be rejected, but the price adjustment shall be treated as zero.

14.6 If so specified in ITB 1.1, bids are being invited for individual lots (contracts) or for any combination of lots (packages). Unless otherwise **specified in the BDS,** prices quoted shall correspond to 100 % of the items specified for each lot and to 100% of the quantities specified for each item of a lot. Bidders wishing to offer discounts for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4 provided the bids for all lots

(contracts) are submitted and opened at the same time.

14.7 The terms EXW and other similar terms shall be governed by the rules prescribed in the current edition of Incoterms, published by The International Chamber of Commerce, **as specified in the BDS.**

14.8 Prices shall be quoted as specified in the Price Schedule included in Section IV, Bidding Forms. The dis-aggregation of price components is required solely for the purpose of facilitating the comparison of bids by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms offered. In quoting prices, the Bidder shall be free to use transportation through carriers registered in any eligible country, in accordance with Section-V Eligible Countries. Similarly, the Bidder may obtain insurance services from any eligible country in accordance with Section-V Eligible Countries. Prices shall be entered in the following manner:

(a) **For Goods**:

(i) the price of the Goods quoted EXW (ex-works, ex-factory, ex-warehouse, ex-showroom, or off-the-shelf, as applicable), including all duties, and GST and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Goods;

(ii) any GST and other taxes which will be payable in India on the Goods, if the contract is awarded to the Bidder; and

(iii) The price for inland transportation, insurance, and other local services required to convey the Goods to their final destination (Project Site) **specified in the BDS.**

(b) **For the Related Services**, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in the Schedule of Requirements:

(i) The price of each item comprising the Related Services (inclusive of any applicable taxes).

14.9 **Deemed Export Benefits**

Bidders may like to ascertain availability of tax/duty exemption benefits, available for contracts financed under World Bank Credits/ Loans. They are solely responsible for obtaining such benefits, which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the Purchaser will not compensate the bidder.

Where the bidder has quoted taking into account such benefits, it must give all information required for issue of necessary Certificates in terms of the Government of India's relevant Notification along with its bid as per form stipulated in Section IV Bidding Forms. Where the Purchaser issues such Certificates, such taxes and duties will not be reimbursed

separately.

If the Bidder has considered the Deemed Export Benefits in its bid, the Bidder shall confirm and certify that the Purchaser will not be required to undertake any responsibilities of the deemed export scheme or the benefits available during contract execution except issuing the required certificates. Bids which do not conform to this provision or any condition by the Bidder which makes the bid subject to availability of deemed export benefits or compensation on withdrawal of or any variations in the deemed export benefits scheme will make the bid non responsive and hence liable to rejection.

15 Currencies of Bid& Payment

15.1 The Bidder shall quote the Price in Indian Rupees only.

16 Documents Establishing the Eligibility and conformity of the Goods and Related Services

16.1 To establish the eligibility of the Goods and Related Services in accordance with ITB Clause 5, Bidders shall complete the country of origin declarations in the Price Schedule Forms, included in Section IV, Bidding Forms.

16.2 To establish the conformity of the Goods and Related Services to the Bidding Documents, the Bidder shall furnish as part of its Bid the documentary evidence that the Goods conform to the technical specifications and standards specified in Section VII, Schedule of Requirements.

16.3 The documentary evidence may be in the form of literature, drawings or data, and shall consist of a detailed item by item description of the essential technical and performance characteristics of the Goods and Related Services, demonstrating substantial responsiveness of the Goods and Related Services to the technical specification, and if applicable, a statement of deviations and exceptions to the provisions of the Section VII Schedule of Requirements.

16.4 The Bidder shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period **specified in the BDS** following commencement of the use of the goods by the Purchaser.

16.5 Standards for workmanship, process, material, and equipment, as well as references to brand names or catalogue numbers specified by the Purchaser in the Schedule of Requirements, are intended to be descriptive only and not restrictive. The Bidder may offer other standards of quality, brand names, and/or catalogue numbers, provided that it demonstrates, to the Purchaser's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII Schedule of Requirements.

17 Documents Establishing the Eligibility &

17.1 To establish Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid – Technical Part, included in Section IV, Bidding Forms.

17.2 The documentary evidence of the Bidder's qualifications to

Qualifications of the Bidder

perform the contract if its bid is accepted shall establish to the Purchaser's satisfaction:

(a) that the Bidder meets each of the qualification criterion Criteria specified in Section III, Evaluation and Qualification;

(b) (i) that, if **required in the BDS,** a Bidder that does not manufacture or produce the Goods it offers to supply shall submit the Manufacturer's Authorization using the form included in Section IV, Bidding Forms to demonstrate that it has been duly authorized by the manufacturer or producer of the Goods to supply these Goods in the Purchaser's Country;

(ii) Supplies for any particular item in each schedule of the bid should be from one manufacturer only**.** Bids from agents offering supplies from different manufacturers for the same item of the schedule in the bid will be treated as non-responsive.

(iii) that, if **required in the BDS,** the Bidder is or will be (if awarded the contract) represented by an Agent in the country equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications;

(c) Bids from Joint Ventures are not acceptable.

18 Period of Validity of Bids

18.1 Bids shall remain valid for the period **specified in the BDS** after the bid submission deadline date prescribed by the Purchaser in accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Purchaser as non-responsive.

18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Purchaser may request bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a Bid Security is requested in accordance with ITB Clause 19, it shall also be extended for a corresponding period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in ITB Sub-Clause 18.3.

18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be determined as follows:

(a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS** for each week or part of the week that has elapsed from the expiration of the initial bid validity to the date of notification of award to the successful bidder.

(b) In the case of adjustable price contracts, no adjustment

shall be made.

(c) In any case, bid evaluation shall be based on the bid Price without taking into consideration the applicable correction from those indicated above.

19 Bid Security

19.1 The Bidder shall furnish as part of its bid, a Bid Security and a Bid-Securing Declaration, if required, as **specified in the BDS.**

19.2 Not used

19.3 The Bid Security shall be in the amount **specified in the BDS** and denominated in Indian Rupees or a freely convertible currency, and shall:

(a) at the bidder's option, be in the form of either a Bankers check, demand draft or a bank guarantee from a Nationalized /Scheduled Bank in India.

(b) be substantially in accordance with one of the forms of Bid Security included in Section IV, Bidding Forms, or other form approved by the Purchaser prior to bid submission;

(c) be payable promptly upon written demand by the Purchaser in case the conditions listed in ITB Clause 19.7 are invoked;

(d) be submitted in its original form; copies will not be accepted;

(e) remain valid for a period of 45 days beyond the original validity period of the bids, or beyond any period of extension of bid validity, if so requested under ITB Clause 18.2;

19.4 If a Bid Security is required in accordance with ITB Sub-Clause 19.1, any bid not accompanied by a substantially responsive Bid Security shall be rejected by the Purchaser as non-responsive.

19.5 The Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the Performance Security pursuant to ITB Clause 42.

19.6 The Bid Security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the contract and furnished the required performance security

The Bid Security may be forfeited:

(a) If a Bidder

(i) Withdraws its bid during the period of bid validity specified by the Bidder on the Bid Submission Form, except as provided in ITB Sub-Clause 18.2;

or

(ii) Does not accept the correction of errors in pursuant to ITB 31,

or,

(b) If the successful Bidder fails to:

(i) Sign the Contract in accordance with ITB Clause 41; or

(ii) Furnish a Performance Security in accordance with ITB Clause 42.

19.8 Not used

19.9 If a bid security is **not required in the BDS**, and

(a) If a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid Form, except as provided in ITB 18.2, or does not accept the correction of errors pursuant to ITB 31; or

(b) If the successful Bidder fails to sign the Contract in accordance with ITB 41; or furnish a performance security in accordance with ITB 42; the Borrower may, **if provided for in the BDS**, declare the Bidder disqualified to be awarded a contract by the Purchaser for a period **as stated in the BDS**.

20 Format and Signing of Bid

20.1 The Bidder shall prepare the Bid as per details given in ITB 21.

20.2 The bid shall be signed by a person duly authorized to sign on behalf of the Bidder. The authorization shall consist of a written confirmation **as specified in the BDS** and shall be uploaded along with the bid.

20.3 Not used.

20.4 Corrections if any in the bid can be carried out by editing the information before electronic submission on e-procurement portal.

D. Online Submission of Bids

21 Preparation of Bids

21.1 Bids, both Technical and Financial Parts, shall be submitted online on the e-procurement system specified in BDS 7.1. Detailed guidelines for viewing bids and submission of online bids are given on the website. The Invitation for Bids under this Project is published on this website. Any citizen or prospective bidder can logon to this website and view the Invitation for Bids and can view the details of goods for which bids are invited. A prospective bidder can submit its bid online; however, the bidder is required to have enrolment/registration in the website, and should have valid Digital Signature Certificate (DSC) in the form of smart card/e-token obtained from any authorised certifying agency of Government of India (for class of DSC **specified in BDS**). The bidder should register in the website using the relevant option available. Then the Digital Signature registration has to be done with the e-token, after logging into the website. The bidder can then login the website through the secured login by entering the password of the e-token & the user id/ password chosen during registration. After getting the bid schedules, the Bidder should go through them carefully and submit the specified documents, along with the bid, otherwise the bid will be rejected.

21.2 The completed bid comprising of documents indicated in ITB

12, should be uploaded on the e-procurement portal along with scanned copies of requisite certificates as are mentioned in different sections in the bidding document and scanned copy of the bid security.

21.3 All the documents are required to be signed digitally by the bidder. After electronic on line bid submission, the system generates a unique bid identification number which is time stamped as per server time. This shall be treated as acknowledgement of bid submission.

21.4 Physical, Email, Telex, Cable or Facsimile bids will be rejected as non-responsive.

22 Deadline for Submission of Bids

22.1 Bids must be uploaded online no later than the date and time **specified in the BDS**.

22.2 The Purchaser may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents in accordance with ITB Clause 8, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23 Late Bids

23.1 The electronic bidding system would not allow any late submission of bids after due date & time as per server time.

24 Withdrawal, Substitution, and Modification of Bids

24.1 Bidders may modify their bids by using appropriate option for bid modification on the e-procurement portal, before the deadline for submission of bids. For this the bidder need not make any additional payment towards the cost of bid document. For bid modification and consequential re-submission, the bidder is not required to withdraw his bid submitted earlier. The last modified bid submitted by the bidder within the bid submission time shall be considered as the bid. For this purpose, modification/withdrawal by other means will not be accepted. In online system of bid submission, the modification and consequential re-submission of bids is allowed any number of times. A bidder may withdraw his bid by using appropriate option for bid withdrawal, before the deadline for submission of bids, however, if the bid is withdrawn, re-submission of the bid is not allowed (or allowed **if specified in BDS).**

24.2 Bids requested to be withdrawn in accordance with ITB Sub-Clause 24.1 shall not be opened.

24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid (Technical Part and/or Financial Part) or any extension thereof.

E. Public Opening of Technical Parts of Bids

25 Public Opening of Technical Parts of Bids

25.1 The Purchaser shall publicly open Technical Parts of all bids received by the deadline, at the date, time and place **specified in the BDS**, in the presence of Bidder's designated

representatives and anyone who chooses to attend, and this could also be viewed by the bidders online. The Financial Parts of the bids shall remain unopened in the e-procurement system, until the subsequent public opening, following the evaluation of the Technical Parts of the Bids. In all cases, original documents submitted as specified in ITB 12.3 shall be first scrutinized, and Bids that do not comply with the provisions of ITB 12.3 will be declared non-responsive and will not be opened. Thereafter, bidder's names, and such other details as the Purchaser may consider appropriate will be notified online as Technical Part bid opening summary.

In the event of the specified date of bid opening being declared a holiday for the Purchaser, the bids will be opened at the appointed time and location on the next working day.

25.2 The electronic summary of the bid opening will be generated and uploaded online. The Purchaser will also prepare minutes of the Bid opening, including the information disclosed and upload the same for viewing online. Only Technical Parts of Bids, alternative bids - Technical Parts if permitted in ITB 13 that are opened at Bid opening shall be considered further for evaluation.

E. Evaluation of Bids – General Provisions

26 Confidentiality

26.1 Information relating to the examination, evaluation, comparison, and post-qualification of bids, and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process until information on Contract Award is communicated to all Bidders in accordance with ITB 42.

26.2 Any effort by a Bidder to influence the Purchaser in the examination, evaluation, comparison, and post-qualification of the bids or contract award decisions may result in the rejection of its Bid.

26.3 Notwithstanding ITB Sub-Clause 26.2, from the time of bid opening to the time of Contract Award, if any Bidder wishes to contact the Purchaser on any matter related to the bidding process, it should do so in writing.

27 Clarification of Bids

27.1 To assist in the examination, evaluation, comparison of the bids and post-qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid, that is not in response to a request by the Purchaser shall not be considered. The Purchaser's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the Evaluation of the bids, in accordance with ITB Clause 35.

27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Purchaser's request for clarification, its bid may be rejected.

28 Deviations, Reservations, Omissions

28.1 During the evaluation of bids, the following definitions apply:

(a) "Deviation" is a departure from the requirements specified in the Bidding Documents;

(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Documents; and

(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Documents.

29 Nonconformities, Errors and Omissions

29.1 Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformities or omissions in the Bid which do not constitute a material deviation, reservation or omission.

29.2 Provided that a Bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price or substance of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

29.3 Provided that a Bid is substantially responsive, the Purchaser shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified **in the BDS.**

G. Evaluation of Technical Parts of Bids

30 Evaluation of Technical Parts

30.1 In evaluating the Technical Parts of each Bid, the Purchaser shall use the criteria and methodologies listed in ITB 31, ITB 32, and Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted.

31 Determination of Responsiveness

31.1 The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself as defined in ITB 11.

31.2 A substantially responsive Bid is one that meets the requirements of the Bidding Documents without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:

(a) If accepted, would

(i) affect in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or

(ii) limit in any substantial way, inconsistent with the Bidding Documents, the Purchaser's rights or the Bidder's obligations under the Contract; or

(b) If rectified would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

31.2.1 Bids from Agents, without proper authorization from the manufacturer as per Section IV, shall be treated as non-responsive.

31.3.1 The Purchaser shall examine the bids to confirm that all documents and technical documentation requested in ITB Clause 11 have been provided, and to determine the completeness of each document submitted.

31.3.2 The Purchaser shall examine the bid to confirm that the Bidder has accepted all terms and conditions specified in GCC and the SCC without material deviations or reservations. Deviations from or objections or reservations to critical provisions such as those concerning Performance Security (GCC Clause 18). Warranty (GCC Clause 28), Force Majeure (Clause 32), Limitation of liability (GCC Clause 30), Governing law (GCC Clause 9) and Taxes & Duties (GCC Clause 17) will be deemed to be a material deviation. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

31.4 If a bid is not substantially responsive to the Bidding Documents, it shall be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation, or omission.

32 Qualification of the Bidders

32.1 The Purchaser shall determine, to its satisfaction, whether all eligible Bidders, whose Bids have been determined to be substantially responsive to the bidding document, meet the Qualification Criteria specified in Section III, Evaluation and Qualification Criteria.

32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than specialized subcontractors if permitted in the bidding document), or any other firm(s) different from the Bidder.

32.3 If a Bidder does not meet the qualifying criteria specified in Section III, Evaluation and Qualification Criteria, its Bid shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

32.4 Only Bids that are both substantially responsive to the bidding document, and meet all Qualification Criteria shall have the Financial Parts of their Bids opened at the second public opening

H. Public Opening of Financial Parts of Bids

33 Public Opening of Financial Parts

33.1 Following the completion of the evaluation of the Technical Parts of the Bids, and the Bank has issued its no objection (if applicable), the Purchaser shall notify in writing those Bidders who have failed to meet the Qualification Criteria and/or whose Bids were considered non-responsive to the requirements in the bidding document, advising them of the following information:

(a) Their Technical Part of Bid failed to meet the requirements of the bidding document;

(b) Their Financial Part of the Bid shall not be opened; and

(c) Notify them of the date and time for public opening of the Financial Parts of the Bids. Financial Parts of the bids shall not be opened earlier than seven (7) days from the communication of technical evaluation results to the bidders.

33.2 The Purchaser shall, simultaneously, notify in writing those Bidders whose Technical Parts have been evaluated as substantially responsive to the bidding document and met the Qualification Criteria, advising them of the following information:

(a) their Bid has been evaluated as substantially responsive to the bidding document and met the Qualification Criteria;

(b) their Financial Part of Bid will be opened at the public opening of Financial Parts;

(c) Notify them of the date and time of the second public opening of the Financial Parts of the Bids, as **specified in the BDS**.

33.3 The opening date should allow Bidders sufficient time to make arrangements for attending the opening. The Financial Part of the Bid shall be opened publicly in the presence of Bidders' designated representatives and anyone who chooses to attend, and this could also be viewed by the bidders online. The bidder's names, the Bid prices, the total amount of each bid, including any discounts and Alternative Bid – Financial Part, and such other details as the Purchaser may consider appropriate will be notified online by the Purchaser at the time of bid opening.

In the event of the specified date of bid opening being declared a holiday for the Purchaser, the bids will be opened at the appointed time and location on the next working day.

33.4 The electronic summary of the bid opening will be generated and uploaded online. The Purchaser will also prepare minutes of the Bid opening, including the information disclosed and upload the same for viewing online. Only Financial Part of Bids, Financial Parts of Alternative Bids and discounts that are opened and read out at Bid opening shall be considered further for evaluation.

I. Evaluation of Financial Parts of Bids

34 Evaluation of Financial Parts

34.1 To evaluate the Financial Part of each Bid, the Purchaser shall consider the following:

(a) evaluation will be done for Items or Lots (contracts), as specified **in the BDS;** and the Bid Price as quoted in accordance with ITB 14;

(b) Not used;

(c) price adjustment due to discounts offered in accordance with ITB 14.4;

(d) Not used;

(e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 29.3; and

(f) The additional evaluation factors specified in Section III, Evaluation and Qualification Criteria.

34.2 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.

34.3 If this bidding document allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated cost of the lot (contract) combinations, including any discounts offered in the Letter of Bid - Financial Part, is specified in Section III, Evaluation and Qualification Criteria.

34.4 The Purchaser's evaluation of a Bid will exclude and not take into account:

(a) in the case of Goods manufactured in India or goods of foreign origin already located in India, GST and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder;

(b) Not used;

(c) Any allowance for price adjustment during the period of execution of the contract, if provided in the Bid.

34.5 The Purchaser's evaluation of a Bid may require the consideration of other factors, in addition to the Bid price quoted in accordance with ITB 14. These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of Bids, unless otherwise specified **in the BDS** from amongst those set out in Section III, Evaluation and Qualification Criteria. The criteria and methodologies to be used shall be as specified in ITB 34.1 (f).

35 Correction of Arithmetical Errors

35.1 The e-procurement system automatically calculates the total amount from unit rates and quantities and the system also automatically populates the amount in words from the amount in figures and therefore there is no scope of discrepancy and need

for arithmetic correction.

36	**Conversion to Single Currency**	36.1	Not applicable.
37	**Margin of Domestic Preference**	37.1	Not applicable.
38	**Comparison of Financial Parts**	38.1	The Purchaser shall compare the evaluated prices of all substantially responsive bids to determine the lowest-evaluated bid, in accordance with ITB Clause 34.
39	**Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids**	39.1	The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all documents submitted and specifically, bid securities, shall be promptly returned to the Bidders.

J. Award of Contract

40	**Award Criteria**	40.1	Subject to ITB 39.1, the Purchaser shall award the Contract to the Bidder whose bid has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Documents, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
41	**Purchaser's Right to Vary Quantities at Time of Award**	41.1	At the time the Contract is awarded, the Purchaser reserves the right to increase or decrease the quantity of Goods and Related Services originally specified in Section VII, Schedule of Requirements, provided this does not exceed the percentages **specified in the BDS,** and without any change in the unit prices or other terms and conditions of the bid and the Bidding Documents.
42	**Notification of Award**	42.1	Prior to the expiration of the period of bid validity, the Purchaser shall notify the successful Bidder, in writing, that its Bid has been accepted. The notification letter (hereinafter called "Letter of Acceptance") shall specify the sum that the purchaser will pay in consideration of the supply of Goods (hereinafter called "the Contract Price").
	Publication of Award	42.2	At the same time the Purchaser shall publish in a National website (GOI web site-http://tenders.gov.in or on the Purchaser's website with free access if available, or in the official gazette, the results identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the successful Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded.
	Recourse to Unsuccessful Bidders	42.3	The Purchaser shall promptly respond in writing to any

unsuccessful Bidder who, after Publication of contract award, requests in writing the grounds on which its bid was not selected.

42.4 Until a formal Contract is prepared and executed, the notification of award shall constitute a binding Contract.

42.5 Upon the successful Bidder's furnishing of the performance security and signing the Contract Form pursuant to ITB Clause 43, the Purchaser will promptly notify each unsuccessful Bidder and will discharge its bid security, pursuant to ITB Clause 19.5

43 Signing of Contract

43.1 Promptly after notification, the Purchaser shall send the successful Bidder the Contract Agreement.

43.2 Within twenty-one (21) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Purchaser.

44 Performance Security

44.1 Within twenty-one (21) days of the receipt of notification of award from the Purchaser, the successful Bidder, if required, shall furnish the Performance Security in accordance with the GCC, using for that purpose the Performance Security Form included in Section X Contract forms, or another Form acceptable to the Purchaser. Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. In that event the Purchaser may award the Contract to the next lowest evaluated Bidder, whose bid is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract satisfactorily.

SECTION II - BIDDING DATA SHEET

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

ITB Clause Reference	A. General
ITB 1.1	The Purchaser is: The Chief Engineer, Equipment & Material Management, Irrigation & Water Resource Department, U.P., Lucknow.
ITB 1.1	The name and identification number of the NCB are: "**Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand Under National Hydrology Project (NHP)"** **Bid Ref. No. 07/SE(R)/NHP/e-Tender/2021-22** **Package No. NHP-2021-2022-UK-413641** The number, identification and names of the lots (contracts) comprising this NCB are: (One) lot.
ITB 1.2(a)	The Purchaser shall use the electronic-procurement system specified in BDS 7.1 to manage this Bidding process.
ITB 2.1	The Borrower is : Government of India Loan Agreement Amount : US$ 175 million
ITB 2.1	The name of the Project is: **National Hydrology Project.**
ITB 4.3	A list of firms debarred from participating in World Bank projects is available at http://www.worldbank.org/debarr
	B. Contents of Bidding Documents
ITB 7.1	**Electronic –Procurement System** The Purchaser shall use the following electronic-procurement system to manage this Bidding process: http://uktenders.gov.in A Pre-bid meeting shall be held shall be held at the following date, time and place to clarify issues with respect to the bidding document : Date : 16.01.2022 Time : 01:30 PM Place : Office of the Superintending Engineer, Research Circle, Irrigation Research Institute, Roorkee, District – Haridwar, Uttarakhand. **Contact Persons:** Sh. Shankar Kumar Saha (Mobile: 8826758368)

	Sh. Manish Shankar Sant (Mobile: 9760884452) email : **uttarkhandwrd@gmail.com**
ITB 7.1a	**A pre-bid meeting will be held**: **YES** **Date of Pre Bid Meeting: 16.01.2022** **Time: 13:30 Hrs** **Place: Roorkee**
ITB 8.1	The addendum will appear on the e-procurement system https://uktenders.gov.in under latest corrigendum and email notification is also automatically sent to those bidders who have started working on this tender.
	C. Preparation of Bids
ITB 11.1(i)	The Bidder shall submit the following additional documents in its bid: 1. Certification of incorporation of the bidder 2. The Bidder shall furnish, cost of Bid Document (Non-Refundable) for this particular goods in the form of Demand Draft on any Scheduled/Nationalized bank payable at Roorkee in favour of "Executive Engineer, Design Division, IDO, Roorkee". 3. The bidder shall clearly confirm that all facilities exist with him (or manufacturer, as applicable) in his factory for inspection and testing and these can be accessed by the Purchaser or his representative for inspection. 4. Technical schedules of goods as required by technical specifications. 5. Descriptive Documents, drawings, notes and references of operating and assembly of mechanical parts 6. A detailed description of the Goods essential technical and performance characteristics. 7. A clause-by-clause commentary on the Purchaser's technical specifications demonstrating substantial responsiveness of the Goods and Services to those specifications in the format provided as "Annexure-1" in Section VII Schedule of Requirements. In case of any deviation, it shall be clearly stated failing which offer of the firm may be considered as non-responsive. 8. **Evaluation and Qualification Criteria including firm's financial capability, experience and technical capability shall be submitted** in the format provided as "Annexure-2" in Section VII Schedule of Requirements**.** 9. For purposes of the commentary to be furnished pursuant to Paragraph 6 above, the Bidder shall note that standards for workmanship, material and goods, and references to brand names or catalogue numbers designated by the Purchaser in its Technical Specifications are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalogue numbers in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications

	10. The documentary evidence of the goods and services eligibility shall consist of a statement in the Price Schedule on the country of origin of the goods and services offered which shall be confirmed by a certificate of origin at the time of shipment 11. Non-manufacturer bidders will submit the manufacturer's authorization Form as per Proforma in Section IV. 12. The following details shall also be provided by Indian Bidders: a. Name, address, PAN and ward/circle where they are being assessed of the Directors of the Bidding Company. b. Company's PAN and Income Tax clearance certificate and ward/circle where it is being assessed, c. Registration details of the company under /GST d. The bidders from outside India shall provide the corresponding details of Income Tax registration, Social Security Number, details regarding Registration under Value Added Tax or sale of goods (as may be applicable) etc. 13. The bidder shall disclose instance of previous past performance that may have resulted into adverse actions taken against the bidder during the last five years. 14. All document required in Section 3: Evaluation & Qualification Criteria
ITB 11.3 (a)	**Note for Bidders: Bidders have to submit filled up format of 'Letter of Bid – Financial Part' in 'Financial Folder' only.**
ITB 11.3(d)	No additional documents other than those required in ITB 11.1, ITB 11.2 and 11.3 are required to be submitted along with Financial Bid.
ITB 12	Note for Bidders: Bidders have to submit the bids on the e-procurement portal along with the relevant required documents. For this purpose, the bidders shall fill up online, the forms that are available for online filling on the e-portal. The rest of the forms shall be download by the bidders and filled up. The filled up pages shall then be scanned and uploaded on the e-procurement portal along with the scanned copies of the supporting documents.
ITB 12.3	For submission of original documents, the Purchaser's address is: ***Office of the Superintending Engineer, Research Circle,*** ***Irrigation Research Institute, Roorkee,*** ***District – Haridwar, Uttarakhand- 247667*** ***email: uttarkhandwrd@gmail.com***
ITB 13.1	Alternative Bids shall not be considered.
ITB 14.5	The prices quoted by the Bidder shall not be subject to adjustment during the performance of the Contract.
ITB 14.7	The Incoterms edition is Incoterm 2010.
ITB 14.8 (a) (iii)	"Final destination (Project Site)" as mentioned in Schedule of Requirement in Section VI.

ITB 14.9	As per latest instructions from Government of India.
ITB 16.4	**Period of time the Goods are expected to be functioning (for the purpose of spare parts): minimum period of 10 years after commissioning).**
ITB 17.2 (b) (i)	Manufacturer's authorization is: required as per Proforma in Section IV. Bidding Forms
ITB 17.2 (b) (iii)	After Sales service is required which shall be provided by the Supplier or alternatively by its Agent in case of a foreign bidder.
ITB 18.1	The bid validity period shall be 120days.
ITB 18.3 (a)	The factor will be 1.0007692 (multiplicative) per week.
ITB 19.1	Bid security not required however, a Bid-Securing Declaration ***shall be*** requiredBid Securing Deceleration in approved form
ITB 19.3	Not applicable
ITB 19.9	If the Bidder incurs any of the actions prescribed in subparagraphs (a) or (b) of this provision, the Borrower will declare the Bidder ineligible to be awarded contracts by the Purchaser for a period of Three years.
ITB 20.2	All the documents are required to be signed digitally by the bidder. After electronic on-line bid submission, the system generates a unique bid identification number which is time stamped. This shall be treated as acknowledgement of bid submission. The written confirmation of authorization to sign on behalf of the Bidder shall consist of: Power of Attorney
	D. Online Submission and Opening of Bids
ITB 21.1	Class of DSC required is: Class-II
ITB 21.2 (c)	The inner and outer envelopes shall bear the following additional identification marks: Not applicable because e-tendering system will take place. However, the Envelope for submitting Document as per ITB 12.3 shall bear the following: **ORIGINAL DOCUMENTS AS PER CLAUSE 12.3 for** **IFB No. 07/SE(R)/NHP/e-Tender/2021-22** **Supply, Installation, Testing, Commissioning, Training, Maintenance, Electrification and Automation with SCADA System including Renovation & Furnishing of existing Barrage Control Room at Gaula, Barrage, Haldwani, Uttarakhand Under National Hydrology Project (NHP)**
ITB 22.1	The deadline for uploading of bids is: Date: 07.02.2022 Time: upto 15:00 Hours
ITB 24.1	Re-submission of the bid is not allowed, if withdrawn.
	E. Public Opening of Technical Parts of Bids
ITB 25.1	The online opening of the Technical Parts of Bids shall take place at:

	Office of the Superintending Engineer, Research Circle, ***Irrigation Research Institute, Roorkee,*** ***District – Haridwar, Uttarakhand- 247667*** ***email: uttarkhandwrd@gmail.com*** **Date: 07-02-2022** **Time: 15:30 Hours** ***Website :https://utktenders.gov.in***
	F. Evaluation of Bids – General Provisions
ITB 29.3	The adjustment shall be based on the highest price of the item or component as quoted in other substantially responsive Bids, subject to a maximum of the estimated price of the item. If the price of the item or component cannot be derived from the price of other substantially responsive Bids, the Purchaser shall use its best estimate.
	H. Public Opening of Financial Parts of Bids
ITB 33.2 (c)	Following the completion of the evaluation of the Technical Parts of the Bids, the Purchaser will notify all Bidders of the date and time of the public opening of Financial Parts. The online opening of the Financial Parts of bids (for technically qualified bidders) shall take place at: ***Office of the Superintending Engineer, Research Circle,*** ***Irrigation Research Institute, Roorkee,*** ***District – Haridwar, Uttarakhand- 247667*** ***email: uttarkhandwrd@gmail.com*** Date: 7 Days after informing to the Bidder. (To be decided after technical bid evaluation and will be communicated on line to successful bidders in technical bid.) ***Website: https://uktenders.gov.in***
	I. Evaluation and Comparison of Bids
ITB 34.1 (a)	Evaluation will be done for whole lot in one package.
ITB 34.3	Bidders shall not be allowed to quote separate prices for one or more lots.
ITB 34.4	Replace with the following: The Purchaser's evaluation of a bid will exclude and not take into account: (a) In the case of Goods manufactured in India or goods of foreign origin already located in India, GST and other similar taxes, which will be payable on the goods if a contract is awarded to the Bidder; (b) Not Used.

	(c) any allowance for price adjustment during the period of execution of the contract, if provided in the bid. But, the purchaser's evaluation of a bid will include (i) price for inland transportation, insurance, and other local services required to convey the Goods to their Final Destination; and (ii) price for Related Services, if any.
ITB 34.5	The adjustments shall be determined using the following criteria, from amongst those set out in Section III, Evaluation and Qualification Criteria: Deviation in Delivery schedule: Not Applicable (a) Deviation in payment schedule: Not Applicable (b) The cost of major replacement components, mandatory spare parts, and service: *Not Applicable'.* (c) the availability in the Purchaser's Country of spare parts and after-sales services for the equipment offered in the bid *'Not Applicable',* (d) the projected operating and maintenance costs during the life of the equipment *'Not Applicable',* (e) The performance and productivity of the equipment offered; *'Not Applicable'.*
	J. Award of Contract
ITB 41.1	The maximum percentage by which quantities may be increased is: *15%* The maximum percentage by which quantities may be decreased is: *15%*

SECTION III. EVALUATION AND QUALIFICATION CRITERIA

Contents

TECHNICAL PART

1. Qualification (ITB 32)

1.1. Qualification Criteria (ITB 32.1)

The Purchaser shall assess each Bid against the following Qualification Criteria. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications.

I. General:

i) Bidder should be in continuous business of supplying and after sale services of products similar to that specified in the 'Schedule of requirement' during the last 5 years prior to date of bid submission.

* similar here is referred as, the bidder must have supplied, installed, commissioned & successfully completed PLC/RTU based SCADA control system in water sector (Irrigation, water supply, water utility applications in Power industry).

ii) Bidder shall furnish the legal status, place of registration and principal place of business of the company or firm or partnership, etc.;

iii) Details of experience and past performance on equipment (PLC/RTU based SCADA system) offered within the past five years (Prior to the date of bid submission) and details of current contracts in hand and other commitments (suggested Performa given in Section IV).

iv) The bidder should furnish a brief write-up, backed with adequate data, explaining his available capacity and experience (both technical and commercial) for the supply of the required equipment within the specified time of completion after the meeting all their current commitments.

v) Reports on financial standing of the bidder such as profit and loss statements, balance sheets and auditor's report for the past three years, banker's certificate, etc.

vi) A firm can submit only one bid in the same bidding process as a bidder. A bidder who submits or participates in more than one bid will cause all the bids in which the bidder has participated to be disqualified.

vii) Should possess GST Registration. In case of foreign bidder, if presently bidder is not having any office(s) in India, he has to provide the GST registration certificate within one month of award of contract.

viii) The SCADA based PLC/RTU system must have been fully type tested as per relevant IS/international standards during any year in last 10 years from the date of bid opening. Photo copies of such type of type test reports/certificates must be submitted.

II. Financial Capability

i) The Bidder shall furnish documentary evidence that it meets the following financial requirement(s):

ii) Capacity to have a cash flow - The Bidder must provide a letter from a reputed bank stating the availability of liquid assets and/or credit facilities exclusively for this Contract only, of not less than **INR 125.00 Lacs** or its equivalent amount in a freely convertible currency. (The availability of liquid assets and/or credit facilities should be clearly certified by Bank (Nationalized or Scheduled Bank In India) in Form-9 provided in Section IV- Bidding forms)

Or

iii) In case the bidder does not prefer to have support from a Bank and does not require credit facilities from the Bank exclusively for the contract, the bidder shall have to submit the cash resources certificate amounting to **INR 125.00 Lacs** taking into consideration existing projects being executed by him from its Statutory Chartered Accountant.

iv) The Minimum required annual turnover in respect of supply, installation and commissioning of goods and services for the successful Bidder in any one of the last five (5) years shall be **INR 250.00 Lacs or its equivalent amount in a freely convertible currency.** Period of 5 years shall be reckoned from 31st march of financial year preceding the year in which bid is published.

III. Experience and Technical Capacity of Bidder

The Bidder shall furnish documentary evidence to demonstrate that it meets the following experience requirement(s):

The bidder must have supplied, installed and commissioned & successfully completed PLC/RTU based SCADA system in water sector (Irrigation, water supply, water utility applications in Power industry) with satisfactory operation for at least one year period in any one contract of PLC/RTU based SCADA system of total contract value not less than **Rs.125.00 Lac**

Bidder shall invariably furnish self-attested copies of Work Orders, Completion Certificate and Performance Certificate for one year from the date of installation support of above equipment's for water sector (Irrigation, water supply, water utility applications in Power industry) under Govt./Public sector/Private sector.

IV. Manufacturer Authorization for equipment's

If the bidder is not the manufacturer of PLC/RTU & SCADA, VFD, Gate Sensor & Level Sensor (i.e. listed in schedule of requirements), the bidder shall furnish a legally enforceable authorization from manufacturer in the prescribed Form [Section-IV] assuring full guarantee and warranty obligations as per GCC and SCC for the goods offered;

If the bidder, himself is a manufacturer of the equipment's (listed in Schedule of requirements), then a self-authorization suffices.

Further, bidder should furnish the documentary evidence from the manufacturer of the equipment's (PLC/RTU and SCADA, VFD, Gate Sensor & Level Sensor) to establish that the manufacturer has manufactured and supplied the 100% quantity of the equipment as specified in schedule of requirements in any one year during a period of last 5 years from the last date of submission of bid document.

The bidder should have after sales support in the region (within a radius of 500 km from the State Capital). If bidder does not have any after sales support office within 500 km from state Capital at the time of bidding, he shall require to establish the same within one month after successful award of contract.

2. Margin of Preference (ITB 37) – Not Applicable

3. Evaluation (ITB 30, 31, and 34)

3.1 Evaluation Criteria (ITB 34.5)

The Purchaser shall use the criteria and methodologies listed in this Section to evaluate Bids. By applying the criteria and methodologies, the Purchaser shall determine the substantially responsive lowest-evaluated bid.

3.2 Multiple Contracts (ITB 34.3)-Deleted

SECTION IV – BIDDING FORMS

TABLE OF FORMS

1A. LETTER OF BID – TECHNICAL PART

The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address.

Note: All italicized text is for use in preparing these forms and shall be deleted from the final products.

No alterations to the text except as provided in ITB 20.2 shall be permitted and no substitutions shall be accepted except as provided in ITB 12.]

Date: *[insert date (as day, month and year) of Bid Submission]*
NCB No.: *[insert number of bidding process]*
Invitation for Bid No.: *[insert No of IFB]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To:

The Superintending Engineer, Research Circle,
Irrigation Research Institute, Roorkee,
District – Haridwar, Uttarakhand- 247667
email: uttarkhandwrd@gmail.com.

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda No. issued in accordance with ITB 8: *[insert the number and issuing date of each Addenda];*

(b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;

(c) We have not been suspended nor declared ineligible by the Purchaser based on execution of a Bid Securing Declaration in the Purchaser's country in accordance with ITB 4.6;

(d) We offer to supply in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods and Related Services ***[insert a brief description of the Goods and Related Services];***

(e) Our bid shall be valid for the period of time specified in ITB Sub-Clause 18.1, from the date fixed for the bid submission deadline in accordance with ITB Sub-Clause 22, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;

(g) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.2(e), other than alternative bids submitted in accordance with ITB 13;

(h) We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and

other development banks. Further, we are not ineligible under the Purchaser's Country laws or official regulations or pursuant to a decision of the United Nations Security Council;

(i) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB 4.5;[1]

(j) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;

(k) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive;

(l) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption; and

(m) We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely, "Prevention of Corruption Act 1988."

Name of the Bidder

[*insert complete name of person signing the Bid*]

Name of the person duly authorized to sign the Bid on behalf of the Bidder** **[*insert complete name of person duly authorized to sign the Bid]***

Title of the person signing the Bid **[*insert complete title of the person signing the Bid]***

Signature of the person named above ***[insert signature of person whose name and capacity are shown above]***

Date signed **[*insert date of signing*]** day of **[*insert month*]**, **[*insert year*]**

**: Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid Schedules.

[1] *Bidder to use as appropriate*

1B. LETTER OF BID - FINANCIAL PART

The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address.

Note: All italicized text is for use in preparing these forms and shall be deleted from the final products.

No alterations to the text except as provided in ITB 20.2, shall be permitted and no substitutions shall be accepted except as provided in ITB 12.]

Date: *[insert date (as day, month and year) of Bid Submission]*
NCB No.: *[insert number of bidding process]*
Invitation for Bid No.: *[insert No of IFB]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To:

The Superintending Engineer, Research Circle,
Irrigation Research Institute, Roorkee,
District – Haridwar, Uttarakhand- 247667
email: uttarkhandwrd@gmail.com.

We, the undersigned Bidder, hereby submit the second part of our Bid, the Financial Part. In submitting our Financial Part we make the following additional declarations:

(a) Our bid shall be valid for the period of time specified in ITB Sub-Clause 18.1, from the date fixed for the bid submission deadline in accordance with ITB Sub-Clause 22, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(b) The total price of our Bid, excluding any discounts offered in item (c) below, is:

In case of only one lot, total price of the Bid **[*insert the total price of the bid in words and figures*];**

In case of multiple lots, total price of each lot **[*insert the total price of each lot in words and figures*];**

In case of multiple lots, total price of all lots (sum of all lots) **[*insert the total price of all lots in words and figures*]**;

(c) The discounts offered and the methodology for their application are:

(i) The discounts offered are: [Specify in detail each discount offered.]

(ii) The exact method of calculations to determine the net price after application of discounts is shown below: [***Specify in detail the method that shall be used to apply the discounts];Discounts.***

(d) The following commissions, gratuities, or fees have been paid or are to be paid with respect to the bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(If none has been paid or is to be paid, indicate "none.")

(e) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.

Name of the Bidder **[*insert complete name of person signing the Bid*]**

Name of the person duly authorized to sign the Bid on behalf of the Bidder** ***[insert complete name of person duly authorized to sign the Bid]***

Title of the person signing the Bid ***[insert complete title of the person signing the Bid]***

Signature of the person named above ***[insert signature of person whose name and capacity are shown above]***

Date signed _ **[*insert date of signing*]** day of **[*insert month*]**, **[*insert year*]**

**: Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid Schedules.

2. BIDDER INFORMATION FORM

[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: *[insert date (as day, month and year) of Bid Submission*]
NCB No.: *[insert number of bidding process]*
Page _____ of_____ pages

1. Bidder's Legal Name *[insert Bidder's legal name]*
2. Bidder's actual or intended Country of Registration: *[insert actual or intended Country of Registration]*
3. Bidder's Year of Registration: *[insert Bidder's year of registration]*
4. Bidder's Legal Address in Country of Registration: *[insert Bidder's legal address in country of registration]*
5. Bidder's Authorized Representative Information Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's Address]* Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]* Email Address: *[insert Authorized Representative's email address]*
6. Attached are copies of original documents of: *[check the box(es) of the attached original documents]* ☐ Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Sub-Clauses 4.3. ☐ In case of government owned entity from the Purchaser's country, documents establishing legal and financial autonomy and compliance with commercial law and not dependent agency of borrower or sub-borrower or purchaser, in accordance with ITB Sub-Clause 4.5. ☐ Included are the organizational chart ,a list of Board of Directors, and the beneficial ownership

3. FORM OF AFFIDAVIT FOR CORRECTNESS OF INFORMATION AND DOCUMENTS SUBMITTED WITH BID

[Reference ITB 20.2]

[This affidavit should be on a non-judicial stamp paper of Rs.10/- and shall be attested by Magistrate/ Sub-Judge/ Notary Public]

I, …… (*name of the authorised representative of the Bidder*) solemnly affirm and state as under:

1. I hereby certify that all the information and documents furnished with the Bid submitted online in response to IFB number ……..…… date ……..… issued by ……. (*authority inviting bids*) for ……..…… (*name and identification of Goods & Related Services*) are true and correct.

2. *I hereby certify that I have been authorised by …… ……..…….. (*the Bidder*) to sign on their behalf, the Bid mentioned in paragraph 1 above.

Deponent

Place: …….
Date: ……

****This sub-paragraph is not applicable if the Bidder is an individual and is signing the Bid on his own behalf.***

4. PRICE SCHEDULE FORMS

*[The Bidder shall fill in these Price Schedule Forms in accordance with the instructions indicated. The list of line items in column 1 of the **Price Schedules** shall coincide with the List of Goods and Related Services specified by the Purchaser in the Schedule of Requirements.]*

Price Schedule – Table:1

A. PRICE SCHEDULE FOR SUPPLY OF GOODS AS PER SCHEDULE OF REQUIREMENT

Date: _____ NCB No: _____
Price in Rs. Alternative No: _____
Page No _____ of _____

Line Item	Description of Goods	Country of Origin	Delivery Date	Quantity and physical unit	Unit price EXW [Excluding GST]	Total EXW price per line item [Excluding GST] (Col. 5×6)	Price per line item for inland transportation, insurance and other services required to convey the Goods to their final destination (ITB 14.8 (a)(iii))	GST and other taxes payable per item if Contract is awarded (in accordance with ITB 14.8(a)(ii)	Total Price per line item [Excluding GST] (Col. 7+8)
1	2	3	4	5	6	7	8	9	10
	LOCAL CONTROL SYSTEM for Gola Barrage Control								
1	Supply of PLC/RTU system with software development of PLC/RTU, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Suitable power supply to power up PLC/RTU panel, 7" or above HMI display & Industrial type electrical fitting & cabling with suitable conduits complete for all related field instruments, as per technical specification.		6 months from date of signing of contract	03 No					
2	Supply of Shaft Encoder based rotary position sensor with local digital Display & Proximity limit switches type Gate Position Sensors for indication and monitoring of Spillway gates, Intake Gates, Silt flushing gates including cabling & integration with PLC/RTU as per technical specifications.		6 months from date of signing of contract	09 No					
3	Supply of 3 Phase VFD Starter panel for each motor of Barrage gates which shall consists of VFD, S.P.P, MCB, OLR, Timer, Main Switches including cabling & Electronic Digital Indicator complete as per technical specifications.		6 months from date of signing of contract	06 No					
4	Supply of LTE Surveillance IP based 3G/4G Bullet Camera with Sim Card Slot, 2 Mega Pixel 2 OR 4 Array/ 72 LED		6 months from date of	10 No					

	Color Camera. 6 or 8 or 12mm (according to site suitability) with storage facility of at least 24-hour video recording, in elegant metal Die cast housing. Outdoor weather resistant IP 66, for monitoring the gates operation at Barrage & head regulators complete as per Technical Specifications.		signing of contract						
5	Supply of Pan Tilt Zoom (PTZ) 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP based (DIGITAL) camera, 500 meters. Night Vision (Multiple Intelligent Array system) in IP66 Weather Resistant Outdoor Metallic Housing. Outdoor weather resistant IP 66 including cabling required for monitoring. As per technical specifications.		6 months from date of signing of contract	02 No					
6	Supply of Water Level transmitter non-contact RADAR type having 30 m range for measuring Barrage Pond level including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.		6 months from date of signing of contract	01 No					
7	Supply of Water Level transmitter non-contact RADAR/Ultrasonic type having 10 m range for measuring downstream discharge of head regulator of main canal, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.		6 months from date of signing of contract	02 No					
8	Supply of Water Level transmitter non-contact RADAR type having 35m range for measurement level/ discharge at remote monitoring stations, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.		6 months from date of signing of contract	04 No					
9	Supply of Datalogger/RTU with 8 channel input type with GPRS/GSM based telemetry & IP65 enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.		6 months from date of signing of contract	01 No					
10	Supply of Datalogger/RTU with 2 channel input type with GPRS/GSM based telemetry & IP65 enclosure including antenna and all necessary equipment for data transmission for		6 months from date of signing of contract	05 No					

	remote monitoring stations, as per technical specifications.								
11	Supply of solar panel, charger regulator, batteries, lightening arrestor with all connectors, cables and conduit for cables for providing un interrupted power supply to each PLC/RTU and instrumentation system, as per technical specifications.		6 months from date of signing of contract	11 No					
12	Supply of intelligent field controller / RTU as Early flood warning station with software development with metallic front door opening cabinet, fitted with GPRS/GSM modem& siren at specified location, along with industrial grade electrical fitting & cabling with suitable conduits complete, as per technical specification.		6 months from date of signing of contract	02 No					
13	Supply & installation of Air conditioning system with requisite furniture, Renovation & Furnishing of existing Barrage Control Room for establishment of SCADA Control room long with necessary electrical fittings as per technical specification.		6 months from date of signing of contract	01 Job					
14	Supply of Early Streamer Emission (ESE) Lightning Arrestor (Protection radius 87 meter) with all necessary accessories as per technical specifications		6 months from date of signing of contract	01 No					
	Barrage control room Equipment's								
15	Supply of Main PLC Controller system with firm ware based hot redundancy which shall include software development of PLC, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. All the Electrical fittings will be Industrial type. Including suitable switch mode power supply (SMPS), 12" or above display & interconnection with related PLC/RTU's, complete as per technical specification.		6 months from date of signing of contract	01 No					
16	Supply, engineering and development of customized SCADA software for complete System with life time licensed version as per technical specifications.		6 months from date of signing of contract	01 No					
17	Supply of Master server which includes Server with server Rack and industrial grade monitor with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to		6 months from date of signing of	02 No					

	SCADA System complete as per technical specifications.		contract						
18	NETWORK VIDEO RECORDER (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in Compression Format. With HDD along with dedicated sufficient Hard Drive to have memory of at least 30 days as per technical Specifications.		6 months from date of signing of contract	01 No					
19	Supply of IT Hardware which includes required Static IP, Router with modem, Switch, firewall system and A3 color printer as per technical specifications.		6 months from date of signing of contract	01 No					
20	supply of 75" LED Display/ Video wall/ DLP based System for monitoring of SCADA & surveillance system at Barrage Control Room as per technical specifications		6 months from date of signing of contract	01 No					
21	Supply of laptops & 4G/3G internet dongle along with licensed version Client SCADA software for remote viewing & monitoring of Complete SCADA system as per technical specifications.		6 months from date of signing of contract	01 No					
22	Supply of online 3 KVA UPS with Battery system for power back up of barrage control room equipment's including all necessary cabling & electrical fittings complete as per the technical specifications		6 months from date of signing of contract	01 No					
23	Supply of Diesel Generator Set 3phase 10.0 KVA with 04 Earth Pits for earthing along with accessories complete as per technical specifications.		6 months from date of signing of contract	01 No					
			TOTAL						

A. PRICE AND COMPLETION SCHEDULE – RELATED SERVICES

Prices in Rs						Date: _____ NCB No: _____ Alternative No: _____ Page No _____ of _____			
1	**2**	**3**	**4**	**5**	**6**	**7**		**8**	**9**
Service no.	**Description of services (excludes inland transportation and other services required in India to convey the goods to their final destination)**	**Country of origin**	**Delivery date at place of final destination**	**Quantity and physical unit**	**Unit price EXW [Excluding GST]**	**Total EXW price per line item [Excluding GST] (Col. 5×6)**	**Price per line item for inland transportation, insurance and other services required to convey the Goods to their final destination (ITB 14.8 (a)(iii))**	**GST and other taxes payable per item if Contract is awarded (in accordance with ITB 14.8(a)(ii)**	**Total Price per line item [Excluding GST] (Col. 7+8)**
	Local Control System for Barrage and Head Regulator								
1	Installation, testing & Commissioning of PLC/RTU system with software development of PLC/RTU, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Suitable power supply to power up PLC/RTU panel, including 7 inches or above HMI display & Industrial type electrical fitting & cabling with suitable conduits complete for all related field instruments, as per technical specification.		*12 months from date of signing of contract*	03 No.					
2	Installation, testing & commissioning of Shaft Encoder based rotary position sensor with local Digital Display & Proximity limit switches type Gate Position Sensors for indication and monitoring of Spillway gates, Intake Gates, Silt flushing gates including cabling & integration with PLC/RTU as per technical specifications.		*12 months from date of signing of contract*	9 No.					

3	Installation, testing & commissioning of 3 Phase VFD Starter panel for each motor of Barrage gates which consists of VFD, S.P.P, MCB, OLR, Timer, Main Switches including cabling & Electronic Digital Indicator complete as per technical specifications.		*12 months from date of signing of contract*	06 NO.					
4	Installation, testing and Commissioning & integration of LTE Surveillance IP based 3G/4G Bullet Camera with Sim Card Slot, 2 Mega Pixel 2 OR4 Array/ 72 LED Color Camera. 6 or 8 or 12mm (according to site suitability) with storage facility of at least 24-hour video recording, in elegant metal Die cast housing. Outdoor weather resistant IP 66, communication with NVR located at Barrage control room for monitoring the gates operation complete as per Technical Specifications.		*12 months from date of signing of contract*	10 No.					
5	Installation, Testing & Commissioning & integration with NVR Located at Barrage Control Room of Pan Tilt Zoom (PTZ) Cameras, 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP (DIGITAL) Camera, 500 meters. Night Vision (Multiple Intelligent Array system) in IP66 Weather Resistant Outdoor Metallic Housing. Outdoor weather resistant IP 66 including cabling & conducting required for monitoring. As per technical specifications.		*12 months from date of signing of contract*	02 No.					
6	Installation, testing & Commissioning of Water Level transmitter non-contact RADAR type having 30 m range for measuring Barrage Pond level. Including all necessary cabling, conduits, electrical fitting & mast complete, as per technical specifications.		*12 months from date of signing of contract*	01 No.					

7	Installation, testing & Commissioning of Water Level transmitter non-contact RADAR/ ultrasonic type having 10 m range for measuring downstream water level/discharge of head regulator of main canal system. Including all necessary cabling, conduits, electrical fitting & mast complete, as per technical specifications.		*12 months from date of signing of contract*	02 No.					
8	Installation testing and commissioning of Water Level transmitter non-contact RADAR type having 35m range for measurement level/ discharge at remote monitoring stations, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.		*12 months from date of signing of contract*	04 No.					
9	Installation testing and commissioning of Datalogger/RTU with 8 channel input type with GPRS/GSM based telemetry & enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.		*12 months from date of signing of contract*	01 No.					
10	Installation testing and commissioning of Datalogger/RTU with 2 channel input type with GPRS/GSM based telemetry & enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.		*12 months from date of signing of contract*	05 No.					
11	Installation testing and commissioning of solar panel, charger regulator, batteries, lightening arrestor with all connectors, cables and conduit for cables for providing un interrupted power supply to Instrumentation system, as per technical specifications.		*12 months from date of signing of contract*	11No.					
12	Installation of Chain-link fencing of (5m x 5m) x 3m along with lockable gates for external protection of Monitoring station for remote monitoring & Early warning stations, per technical specifications.		*12 months from date of signing of contract*	2No.					

13	Installation testing and commissioning of intelligent field controller/ RTU as Early flood warning station, with software development with metallic front door opening cabinet, fitted with GPRS/GSM modem & Siren at Bareli town, along with industrial grade electrical fitting & cabling with suitable conduits complete, as per technical specification.		*12 months from date of signing of contract*	2 No.					
14	Installation, testing & Commissioning of Early Streamer Emission (ESE) Lightning Arrestor with all connectors, cabling and all required accessories etc. As per technical specifications		*12 months from date of signing of contract*	01 No.					
	Barrage Control Room Equipment's								
15	Installation, Testing & Commissioning of Main PLC Controller system with firm ware based hot redundancy which shall include software development of PLC, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Including suitable switch mode power supply (SMPS), 12" or above display & cabling with Industrial grade type electrical fittings for related remote PLC/RTU's, as per technical specification.		*12 months from date of signing of contract*	01 No.					
16	Installation, testing, Commissioning and development of customized SCADA software for complete System with life time licensed version as per technical specifications.		*12 months from date of signing of contract*	01 No.					
17	Installation, Testing & Commissioning of Master server with SCADA Software which includes Server with server Rack and industrial grade PC with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to SCADA System complete as per technical specifications		*12 months from date of signing of contract*	02 No.					

18	Installation, testing & commissioning of NETWORK VIDEO RECORDER (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in Compression Format with dedicated Hard Drive to have memory of at least 30 days as per technical Specifications.		*12 months from date of signing of contract*	01 No.					
19	Installation, Testing & Commissioning of IT Hardware which includes required Static IP, Router with modem, Switch, firewall system and A3 color printer as per technical specifications		*12 months from date of signing of contract*	01 Lot.					
20	Installation, testing and commissioning of 75" LED Display for monitoring of SCADA & surveillance system at Control Room as per technical specifications		*12 months from date of signing of contract*	01 No.					
21	Charges for high speed synchronous internet connection (min. 8 mbps upload and download speed) & Static IP for Five years.		*ongoing activity for 5 years after acceptance of the system*	01 No.					
22	Charges for High speed 4G/3G internet dongle for laptop with Client SCADA software for remote viewing & monitoring of system for Five years.		*ongoing activity for 5 years after acceptance of the system*	01 No.					
23	Installation, Testing & Commissioning of Online 3 KVA UPS with Battery system for power back up of Barrage control room equipment's as per the technical specifications		*12 months from date of signing of contract*	01 No					
24	Installation, Testing and Commissioning of Diesel Generator Set 3phase 10.0 KVA with 04 Earth Pits for earthing, Starter Panel, Energy meter & cabling Complete in all respects as per technical specifications.		*12 months from date of signing of contract*	01 No.					

25	Five Years Operation & Maintenance and Comprehensive Warranty for Gola Barrage & head regulator SCADA based system as per Price schedule after final acceptance of SCADA & Surveillance system. This includes replacement of material & consumable as & when required at bidders' cost. The cost of Communication for GPRS & SIM charges for data transmission, maintenance and other related charges. Minimum one Service Engineer shall be placed at Barrage Control room for Operation of SCADA & Surveillance system.		*ongoing activity for 5 years after acceptance of the system*	01 Job					
26	Training of the purchaser's personnel at the supplier's plant and/or/onsite in assembly, start up, operation, maintenance and/or repair of the supplied goods. Course topics will include sensor calibration, PLC/RTU & SCADA configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies.		*ongoing activity for 5 years after acceptance of the system*	08 Trainings					
				SUM					
				TOTAL					
			Total Bid Price Rs (A+B)						

Name of Bidder [*insert complete name of Bidder] Signature* of Bidder *[signature of person signing the Bid] Date [insert date]*

5. Form of Bid-Securing Declaration

[The Bidder shall fill in this Form in accordance with the instructions indicated.]

Date: *[date (as day, month and year)]*
Bid No.: *[number of bidding process]*
Alternative No.: *[insert identification No if this is a Bid for an alternative]*

To:

The Superintending Engineer, Research Circle,
Irrigation Research Institute, Roorkee,
District – Haridwar, Uttarakhand- 247667
email: uttarkhandwrd@gmail.com.

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the Purchaser for the period of time of *[5 years]* starting on *[from bid submission end date],* if we are in breach of our obligation(s) under the bid conditions, because we:

(a) have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or

(b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract; or (ii) fail or refuse to furnish the Performance Security, if required, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) forty-five days after the expiration of our Bid.

Name of the Bidder*_____

Name of the person duly authorized to sign the Bid on behalf of the Bidder**_____

Title of the person signing the Bid_____

Signature of the person named above_____

Date signed _____ day of _____, _____

*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

**: Person signing the Bid shall have the power of attorney given by the Bidder attached to the Bid

[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all members to the Joint Venture that submits the bid.]

6. MANUFACTURER'S AUTHORIZATION

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are legally binding on the Manufacturer shall include it in its bid.

Date: *[insert date (as day, month and year) of Bid Submission]*
NCB No.: *[insert number of bidding process]*

To:

The Superintending Engineer, Research Circle,
Irrigation Research Institute, Roorkee,
District – Haridwar, Uttarakhand- 247667
email: uttarkhandwrd@gmail.com.

WHEREAS

We *[insert complete name of Manufacturer],* who are official manufacturers of *[insert type of goods manufactured],* having factories at [insert full address of Manufacturer's factories], do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods],* and to subsequently negotiate and sign the Contract against the above IFB.

We hereby extend our full guarantee and warranty in accordance with Clause 28 of the General Conditions of Contract, with respect to the Goods offered by the above firm against this IFB.

We as a manufacturer of *[insert type of goods manufactured]* confirm to provide the spare & service support for a minimum period of ten years after commissioning.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*
Title: *[insert title]*

Duly authorized to sign this Authorization on behalf of: *[insert complete name of Bidder]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Note – Modify this format suitably in cases where manufacturer's warranty and guarantee are not applicable for the items for which bids are invited. If the supply consists of number of items, indicate the specific item (s) for which alone the above authorization is required.

Authorization required for (PLC, SCADA, data logger/RTU, Level sensors, Gate sensor, VFD)

7. DECLARATION FOR CLAIMING TAX/ DUTY EXEMPTION

National Hydrology Project

Bid No. ……
Description of item to be supplied ……
.....

(Information for issue of certificate for claiming exemption of Tax/ Duty in terms of Government of India's relevant notification)

(Bidder's Name and Address):

To
(Name of Purchaser)

Dear Sir:

1. We confirm that we are solely responsible for obtaining deemed export benefits which we have considered in our bid and in case of failure to receive such benefits for reasons whatsoever, Purchaser will not compensate us.

2. We are furnishing below the information required by the Purchaser for issue of necessary certificate in terms of Government of India's relevant notification.

   (i) Ex-factory price per unit on which the tax/duty is payable: *Rs. _____

   (ii) No of Units to be supplied: _____
   _____

   (iii) Total cost on which the tax/duty is payable (Rs.) _____

   (*The requirements listed above are as per Current notifications. These may be modified, as necessary, in terms of the rules in force*)

   (Signature)_____
   (Printed Name) _____
   (Designation) _____
   (Common Seal) _____

** Please attach details item-wise with cost, if there are more than one items. The figures indicated should tally with what is given in the price schedule.*

8. PERFORMA FOR PERFORMANCE STATEMENT

[Please see ITB Clause 36.2 and Section III-Evaluation and Qualification Criteria]

Proforma for Performance Statement (for a period of last three/five years)

Bid No. _____ Date of opening _____ Time _____ Hours

Name of the Firm _____

Order placed by (full address of Purchaser)	Order No. and date	Description and quantity of ordered equipment	Value of order	Date of completion of delivery		Remarks indicating reasons for late delivery, if any	Has the equipment been satisfactorily functioning? (Attach a certificate from the Purchaser/Consignee)
				As per contract	Actual		
1	2	3	4	5	6	7	8

Signature and seal of the Bidder _____

_____

SECTION V. – ELIGIBLE COUNTRIES

Public Information Center

Eligibility for the Provision of Goods, Works and Non-Consulting Services in Bank-Financed Procurement

In reference to ITB 4.7 and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7(a) and 5.1: None

Under ITB 4.7(b) and 5.1: None

SECTION VI . BANK POLICY - CORRUPT AND FRAUDULENT PRACTICES

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

"**Fraud and Corruption:**

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.5 In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "Corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;[6];

ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;[7]

(iii) "Collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;[8]

(iv) "Coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;[9]

(v) "Obstructive practice" is:

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to

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5 In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

6 For the purpose of this sub-paragraph, "*another party*" refers to a public official acting in relation to the procurement process or contract execution. In this context, "*public official*" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

7 For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

8 For the purpose of this sub-paragraph, "parties" refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

9 For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.

investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.

(b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare mis-procurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

(d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,10 including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated11;

(e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

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10 A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

11 A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

PART 2 - SUPPLY REQUIREMENTS

SECTION VI – SCHEDULE OF REQUIREMENTS

1. LIST OF GOODS AND DELIVERY SCHEDULE

Line Item No	Description of Goods	Quantity	Physical Unit	Final (Site Destination) as per technical specifications	Delivery (As per Incoterm) date			
					Earliest Delivery Date	Latest Delivery Date	Bidder's offered Delivery date	Bid Security in Indian Rupees
	LOCAL CONTROL SYSTEM for Gola Barrage Control							
1	Supply of PLC/RTU system with software development of PLC/RTU, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Suitable power supply to power up PLC/RTU panel, 7" or above HMI display & Industrial type electrical fitting & cabling with suitable conduits complete for all related field instruments, as per technical specification.	03	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
2	Supply of Shaft Encoder based rotary position sensor with local digital Display & Proximity limit switches type Gate Position Sensors for indication and monitoring of Spillway gates, Intake Gates, Silt flushing gates including cabling & integration with PLC/RTU as per technical specifications.	09	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
3	Supply of 3 Phase VFD Starter panel for each motor of Barrage gates which shall consists of VFD, S.P.P, MCB, OLR, Timer, Main Switches including cabling & Electronic Digital Indicator complete as per technical specifications.	06	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
4	Supply of LTE Surveillance IP based 3G/4G Bullet Camera with Sim Card Slot, 2 Mega Pixel 2 OR 4 Array/ 72 LED Color Camera. 6 or 8 or 12mm (according to site suitability) with storage facility of at least 24-hour video recording, in elegant metal Die cast housing. Outdoor weather resistant IP 66, for monitoring the gates operation at Barrage & head regulators complete as per Technical Specifications.	10	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
5	Supply of Pan Tilt Zoom (PTZ) 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP based (DIGITAL) camera, 500 meters. Night Vision (Multiple Intelligent Array system) in IP66	02	*No.*	Gola Barrage	*4 months from date of signing of*	*6 months from date of signing of*		

	Weather Resistant Outdoor Metallic Housing. Outdoor weather resistant IP 66 including cabling required for monitoring. As per technical specifications.				*contract*	*contract*		
6	Supply of Water Level transmitter non-contact RADAR type having 30m range for measuring Barrage Pond level including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
7	Supply of Water Level transmitter non-contact RADAR/Ultrasonic type having 10m range for measuring downstream discharge of head regulator of main canal, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
8	Supply of Water Level transmitter non-contact RADAR type having 35m range for measurement level/ discharge at remote monitoring stations, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.	04	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
9	Supply of Datalogger/RTU with 8 channel input type with GPRS/GSM based telemetry & IP65 enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
10	Supply of Datalogger/RTU with 2 channel input type with GPRS/GSM based telemetry & IP65 enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.	05	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
11	Supply of solar panel, charger regulator, batteries, lightening arrestor with all connectors, cables and conduit for cables for providing un interrupted power supply to each PLC/RTU and instrumentation system, as per technical specifications.	11	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
12	Supply of intelligent field controller / RTU as Early flood warning station with software development with metallic front door opening cabinet, fitted with GPRS/GSM modem& siren at specified location, along with industrial grade electrical fitting & cabling with suitable conduits complete, as per technical specification.	02	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
13	Supply & installation of Air conditioning system with requisite	01	*No.*	Gola Barrage	*4 months*	*6 months*		

	furniture, Renovation & Furnishing of existing Barrage Control Room for establishment of SCADA Control room long with necessary electrical fittings as per technical specification.				*from date of signing of contract*	*from date of signing of contract*		
14	Supply of Early Streamer Emission (ESE) Lightning Arrestor (Protection radius 87 meter) with all necessary accessories as per technical specifications	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
	Barrage Control Room Equipment's							
15	Supply of Main PLC Controller system with firm ware based hot redundancy which shall include software development of PLC, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. All the Electrical fittings will be Industrial type. Including suitable switch mode power supply (SMPS), 12" or above display & interconnection with related PLC/RTU's, complete as per technical specification.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
16	Supply, engineering and development of customized SCADA software for complete System with life time licensed version as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
17	Supply of Master server which includes Server with server Rack and industrial grade monitor with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to SCADA System complete as per technical specifications.	02	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
18	NETWORK VIDEO RECORDER (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in Compression Format. With HDD along with dedicated sufficient Hard Drive to have memory of at least 30 days as per technical Specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
19	Supply of IT Hardware which includes required Static IP, Router with modem, Switch, firewall system and A3 color printer as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
20	supply of 75" LED Display/ Video wall/ DLP based System for monitoring of SCADA & surveillance system at Barrage Control Room as per technical specifications	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
21	Supply of laptops & 4G/3G internet dongle along with licensed version Client SCADA software for remote viewing &	01	*No.*	Gola Barrage	*4 months from date of*	*6 months from date of*		

	monitoring of Complete SCADA system as per technical specifications.				*signing of contract*	*signing of contract*		
22	Supply of online 3 KVA UPS with Battery system for power back up of barrage control room equipment's including all necessary cabling & electrical fittings complete as per the technical specifications	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		
23	Supply of Diesel Generator Set 10.0 KVA with 04 Earth Pits for earthing along with accessories complete as per technical specifications.	01	*No.*	Gola Barrage	*4 months from date of signing of contract*	*6 months from date of signing of contract*		

[The Purchaser shall fill in this table, with the exception of the column "Bidder's offered Delivery date" to be filled by the Bidder]

2. LIST OF RELATED SERVICES [ITB CLAUSE 14.8 B] AND COMPLETION SCHEDULE

1	2	3	4	5	6
Service No.	**Description of Services (excludes inland transportation and other services required in India to convey the goods to their final destination)**	**Quantity**	**Physical Unit**	**Place where Services shall be performed**	**Final Completion Date of Services**
	LOCAL CONTROL SYSTEM for Gola Barrage Control				
1	Installation, testing & Commissioning of PLC/RTU system with software development of PLC/RTU, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Suitable power supply to power up PLC/RTU panel, including 7 inches or above HMI display & Industrial type electrical fitting & cabling with suitable conduits complete for all related field instruments, as per technical specification.	03	Nos.	Gola Barrage	12 months from the date of signing of The Contract
2	Installation, testing & commissioning of Shaft Encoder based rotary position sensor with local Digital Display & Proximity limit switches type Gate Position Sensors for indication and monitoring of Spillway gates, Intake Gates, Silt flushing gates including cabling & integration with PLC/RTU as per technical specifications.	09	Nos.	Gola Barrage	12 months from the date of signing of The Contract
3	Installation, testing & commissioning of 3 Phase VFD Starter panel for each motor of Barrage gates which consists of VFD, S.P.P, MCB, OLR, Timer, Main Switches including cabling & Electronic Digital Indicator complete as per technical specifications.	06	Nos.	Gola Barrage	12 months from the date of signing of The Contract
4	Installation, testing and Commissioning & integration of LTE Surveillance IP based 3G/4G Bullet Camera with Sim Card Slot, 2 Mega Pixel 2 OR4 Array/ 72 LED Color Camera. 6 or 8 or 12mm (according to site suitability) with storage facility of at least 24-hour video recording, in elegant metal Die cast housing. Outdoor weather resistant IP 66, communication with NVR located at Barrage control room for monitoring the gates operation complete as per Technical Specifications.	10	Nos.	Gola Barrage	12 months from the date of signing of The Contract
5	Installation, Testing & Commissioning & integration with NVR Located at Barrage Control Room of Pan Tilt Zoom (PTZ) Cameras, 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP (DIGITAL) Camera, 500 meter. Night Vision (Multiple Intelligent Array system) in IP66 Weather Resistant Outdoor Metallic Housing. Outdoor weather resistant IP 66 including cabling & conducting required for monitoring. As per technical specifications.	02	Nos.	Gola Barrage	12 months from the date of signing of The Contract
6	Installation, testing & Commissioning of Water Level transmitter non-contact RADAR type having 30 m range for measuring Barrage Pond level. Including all necessary cabling, conduits, electrical fitting & mast complete, as per technical specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract

7	Installation, testing & Commissioning of Water Level transmitter non-contact RADAR/ ultrasonic type having 10 m range for measuring downstream water level/discharge of head regulator of main canal system. Including all necessary cabling, conduits, electrical fitting & mast complete, as per technical specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
8	Installation testing and commissioning of Water Level transmitter non-contact RADAR type having 35m range for measurement level/ discharge at remote monitoring stations, including all necessary cabling with suitable conduits & electrical fittings & mast complete as per technical specifications.	04	Nos.	Gola Barrage	12 months from the date of signing of The Contract
9	Installation testing and commissioning of Datalogger/RTU with 8 channel input type with GPRS/GSM based telemetry & enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
10	Installation testing and commissioning of Datalogger/RTU with 2 channel input type with GPRS/GSM based telemetry & enclosure including antenna and all necessary equipment for data transmission for remote monitoring stations, as per technical specifications.	05	Nos.	Gola Barrage	12 months from the date of signing of The Contract
11	Installation testing and commissioning of solar panel, charger regulator, batteries, lightening arrestor with all connectors, cables and conduit for cables for providing un interrupted power supply to Instrumentation system, as per technical specifications.	11	Nos.	Gola Barrage	12 months from the date of signing of The Contract
12	Installation of Chain-link fencing of (5m x 5m) x 3m along with lockable gates for external protection of Monitoring station for remote monitoring & Early warning stations, per technical specifications.	02	Nos.	Gola Barrage	12 months from the date of signing of The Contract
13	Installation testing and commissioning of intelligent field controller/ RTU as Early flood warning station, with software development with metallic front door opening cabinet, fitted with GPRS/GSM modem & Siren at Bareli town, along with industrial grade electrical fitting & cabling with suitable conduits complete, as per technical specification.	02	Nos.	Gola Barrage	12 months from the date of signing of The Contract
14	Installation, testing & Commissioning of Early Streamer Emission (ESE) Lightning Arrestor with all connectors, cabling and all required accessories etc As per technical specifications	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
	Barrage control room Equipment's				

15	Installation, Testing & Commissioning of Main PLC Controller system with firm ware based hot redundancy which shall include software development of PLC, Control Panel with front door opening cabinet, fitted with Power buses, MCBs & modem. Including suitable switch mode power supply (SMPS), 12" or above display & cabling with Industrial grade type electrical fittings for related remote PLC/RTU's, as per technical specification.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
16	Installation, testing, Commissioning and development of customized SCADA software for complete System with life time licensed version as per technical specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
17	Installation, Testing & Commissioning of Master server with SCADA Software which includes Server with server Rack and industrial grade PC with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to SCADA System complete as per technical specifications	02	Nos.	Gola Barrage	12 months from the date of signing of The Contract
18	Installation, testing & commissioning of NETWORK VIDEO RECORDER (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in Compression Format with dedicated Hard Drive to have memory of at least 30 days as per technical Specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
19	Installation, Testing & Commissioning of IT Hardware which includes required Static IP, Router with modem, Switch, firewall system and A3 color printer as per technical specifications	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
20	Installation, testing and commissioning of 75" LED Display for monitoring of SCADA & surveillance system at Control Room as per technical specifications	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
21	Charges for high speed synchronous internet connection (min. 8 mbps upload and download speed) & Static IP for Five years.	01	Nos.	Gola Barrage	ongoing activity for 5 years after acceptance of the system
22	Charges for High speed 4G/3G internet dongle for laptop with Client SCADA software for remote viewing & monitoring of system for Five years.	01	Nos.	Gola Barrage	ongoing activity for 5 years after acceptance of the system

23	Installation, Testing & Commissioning of Online 3 KVA UPS with Battery system for power back up of Barrage control room equipment's as per the technical specifications	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
24	Installation, Testing and Commissioning of Diesel Generator Set 10.0 KVA with 04 Earth Pits for earthing, Starter Panel, Energy meter & cabling Complete in all respects as per technical specifications.	01	Nos.	Gola Barrage	12 months from the date of signing of The Contract
25	Five Years Operation & Maintenance and Comprehensive Warranty for Gola Barrage & head regulator SCADA based system as per Price schedule after final acceptance of SCADA & Surveillance system. This includes replacement of material & consumable as & when required at bidders' cost. The cost of Communication for GPRS & SIM charges for data transmission, maintenance and other related charges. Minimum one Service Engineer shall be placed at Barrage Control room for Operation of SCADA & Surveillance system.	01	Job	Gola Barrage	ongoing activity for 5 years after acceptance of the system
26	Training of the purchaser's personnel at the supplier's plant and/or/onsite in assembly, start up, operation, maintenance and/or repair of the supplied goods. Course topics will include sensor calibration, PLC/RTU & SCADA configuration, data downloading, data retrieval, collection, Trouble shooting, processing maintenance requirements and procedure for equipment configuration, installation, site testing and commissioning including training kit containing course material in soft and hard copies.	08	Trainings	Gola Barrage	ongoing activity for 5 years after acceptance of the system

3. TECHNICAL SPECIFICATIONS

1. About Gaula Barrage, Haldwani

The Gaula River is a river which originates in Uttarakhand State of India flows south past Kathgodam, Haldwani, and Shahi, finally joining the Ramganga River about 15 km (9.3 miles) northwest of Bareilly in Uttar Pradesh. Ramganga in turn is a tributary of the river Ganges. A barrage on this river, known as the Gaula Barrage, is located at Kathgodam in Nainital district of Uttarakhand. It is erected over Gaula River (also known as Gaula river). It coordinates on latitudes 29°16'18"N and longitudes 79°32'51"E. The barrage serves as a prominent landmark for the local people. The Gaula Barrage is a vital source of water and is used for irrigating. It provides drinking water to Haldwani city & irrigation water for the bhabar fields.

LOCATION OF BARRAGE (LATITUDE AND LONGITUDE)

Brief Details of Gaula Barrage are as follows -:

1. Construction year - 1984

(i)	Location	Latitude & Longitude 29º16'18" N & 79º3251" E
ii)	Type of Gates in barrage	Vertical, Manual & Motorized Operation
iii)	Design Discharge Capacity of Spillway	3250 cumec
iv)	No & Size of Gates (Barrage /reservoir)	No. of Gates- 06 Size of Gates -11.5 m x 4.50 m
V)	Length of Dam/ Barrage at top total (in m)	81.00 m
Vi)	Maximum water Level (MWL)	513.25 mEL.
Vii)	Full Reservoir Level FRL	510.75 mEL.
Viii)	Spillway Crust Level	506.50 mEL
ix)	Minimum Drawdown Level MDDL	0.0 METER
xii)	Operation of Gates	Manual/motorized
x)	Motor rating on Gates	03 HP, 03 Phase
xi)	Power Supply availability	Feeder supply /D.C supply through Generator
xii)	Existing Starter Panel details (Starter panel for Motors)	Ac Magnetic starter
xiii)	Any existing gate Sensors	No.
xiv)	Any existing level sensor for monitoring Barrage Level	No.
xv)	Location & distance of Control Room from barrage	40 meter
xvi)	Major INFLOW Rivers	Gaula
xvii)	Name of Rivers /Nallah	Gaula
xviii)	Flood Prone areas in downstream of barrage	Haldwani Town, Lalkuan
xix)	Canal gate no. & size (Right Bank)	2 no. (3.5 m x 2.7 m each) – Manual gates
xxi)	Canal discharge	875 cusec
xix)	Canal gate no. & size (Left Bank)	1 no. (1.8 m x 2.0 m each) – Manual gates
xxi)	Canal discharge	150 cusec

2. Objective

The broad objective of the project is monitoring and control of water flow through the Gaula barrage and its head regulator, real time monitoring of water inflow discharge(AWLR station), outflow discharge, gauging sites, & development of early warning station for flood at various location based on water level/Discharge released from dam & real time data of rainfall (from existing Hydrological Information system).

The SCADA system will receive Upstream Pond level & downstream discharge information of Barrage & head regulator and decide on the desired level of discharge requirement as per water scheduling to river & head regulator.

Further, the gates of barrage & head regulator are required to be operated from the Barrage control room as per the dynamic operational schedule to be incorporated in SCADA system to achieve automatic gate operation in order to remove the siltation and arrest further accumulation of silt at upstream location from Barrage.

To achieve this objective, an agency will be engaged for the following:

2.1 Automation of the Barrage by installing a suitable SCADA system with remote viewing facility & control the parameters online from the Barrage control room located at barrage site.

2.2 Real time monitoring of specified inflow Gauging site, Outflow gauging site, & Online monitoring of Early warning stations based on water discharge from Gaula Barrage and water level at river form Barrage Control Room.

2.3 The control system along-with SCADA Software shall be provided in the Barrage control room (BCR) and the information available at control room should also be available on 01 (One) client laptop which shall have licensed monitoring Client software installed in it having all features for real time monitoring of data from BCR. The Data provided in BCR should be displayed in complete explicit way and can be extracted in different formats it shall have capability of monitoring the real time data of BCR & trend analysis etc.

Also, through web server all reports (hourly, daily, weekly, monthly, quarterly, half yearly & yearly etc.) shall be available at any PC/Laptop and on mobile located at any place through web with user name & password protection.

2.4 One client SCADA software with real time monitoring function of BCR shall be provided along with laptop with latest configuration as per technical specifications. Client laptop along with high speed internet connection (4G/3G dongles) & A4 size Color printer shall be provided at Xen office.

2.5 The bidder shall supply, install & commission all instruments, terminal boxes, cabling & conduits etc. necessary to make the tendered services complete and ready for operation even if these are not indicated explicitly in this document.

2.6 The main items of control & equipment to be supplied and installed under this section comprise the following:

i) **Three (3) no. RTU/PLC** based remote control system complete in all respect located at Barrage top for Control and operation of spillway gates and silt flushing gates. (Offer of the Bidder shall contain complete proposed SCADA schematic view & control methodology)

ii) **Datalogger/ Remote Terminal Unit (RTU)** for data logging & transmission of real time water level/discharge data from inflow/outflow gauging sites & AWLR station at XXXX Junction using GPRS & GSM communication. Data logger/RTU shall have mathematical function/algorithm feature to evaluate the real rime discharge at field, based on the instrument data and same shall be transmitted to the SCADA system

iii) **Gate position Sensors** for indication and monitoring of Barrage & head regulator gates.

iv) ADCP for calculation and display of total discharge through spillway gates will be provided by the department & it is bidder's responsibility to provide the necessary rating curves & integrate the same in SCADA system.

v) One (1) set of **RADAR** based Non-contact water Level sensor equipment's along with necessary accessories to be installed at downstream of Gaula Barrage to measure the water level & downstream discharge by developing the necessary discharge rating curves using ADCP.

vi) Two (2) set of **RADAR** based Non-contact water Level sensor equipment's along with necessary accessories to be installed at downstream of Gaula Barrage to measure the water level & discharge at XXXX for early flood warning. Bidder shall develop the rating curve using ADCP to determine the rate of discharge.

vii) One (1) set of **RADAR** based Non-contact water Level sensor equipment's along with necessary accessories to be installed at inflow gauging site for monitoring the inflow water level/ discharge to Gaula Barrage. Bidder shall have to develop the necessary rating curve to determine the discharge.

viii) One (1) set of **RADAR** based Non-contact water Level sensor equipment's along with necessary accessories to be installed for pond level measurement.

ix) **Two (2)** set of **RADAR/Ultrasonic** based non-contact water Level sensor cum discharge & indication equipment along with necessary alarms function to be installed at downstream of head regulator discharge measurement.

x) **VFD (Variable frequency drive)** panel for each motor of Barrage gates to control the RPM. Torque for smooth gate operation. (Motor Rating: main Barrage 3.0 HP,3 Phase).

xi) **Two (2) no. PTZ & 10 no. Bullet cameras** for surveillance of Gola Barrage & head regulator gates respectively & complete overview of Gola barrage.

xii) Two (2) No. intelligent field controller/RTU systems with siren for flood alarming (Early warning station) shall be installed by bidder at XXXX .

xiii) **Main PLC controller** at Barrage Control Room which shall be interconnected with Local PLC/RTU's installed at barrage through hard wiring & Wireless GPRS/GSM communication.

xiv) SCADA system complete in all respects including Servers, monitor, UPS system, printer, 75" LED Display & IT hardware (static IP, router with modem, firewall system) etc. for Barrage control room located at barrage site.

xv) **Solar Power system** for powering the Local PLC/RTU's/Dataloggers, instrumentation system with the power backup of 36 hr. without sunshine/charging.

xvi) DG Set of 10 KVA as power back for SCADA system & instrumentation system installed at BCR for Barrage automation.

xvii) Supply of Early Streamer Emission (ESE) Lightning Arrestor (Protection radius =87 meter) with all necessary accessories.

xviii) 3 KVA online UPS also provided by the bidder as power back for SCADA & instrumentation system installed at Barrage Control Room.

The Work shall be complete with all necessary auxiliaries such as primary elements (Position transmitters, limit switches etc.), cabling, conducting etc., as well as frames, cantilever (as required), cable trays including all spare parts and special tools required. All the Equipment shall be standard-type from well-known manufacturers.

3. Scope of Work

Scope of work shall include supply, installation, testing and commissioning of all components necessary for implementation of the functional requirements described in Objectives. This will include but will not be limited to Hardware, System Software and Utilities, Application Software, Computers, Switches, Controlling Devices (e.g. RTU/PLC), Data Communication Devices, Field Instruments and Sensors, Device Drivers, Power and Signal Cabling including necessary trenching and junction boxes, Power Supplies, and all structures and fittings necessary for installation of all subsystems and Instruments and Sensors in Control Room and in Field. The following will include in the scope of work:

Supply, installation, testing and commissioning of hardware and software necessary for the SCADA system for:

i) The Automatic Gate Operation and Control of Gola Barrage real time monitoring of head regulator based on water Level/ discharge from SCADA system located at Barrage control room.

ii) Real time monitoring of inflow & outflow gauging site/river discharge located at various places from Barrage control room.

iii) Access Gate opening control via Remote location (Control Room) and also troubleshoot problems in gate control systems, unauthorized user protection, information storage of all the events regarding operation of gates, pond levels, reporting system and log information in real time.

iv) Controlling of Barrage by SCADA system at BCR and real time monitoring & reporting of various parameters of Barrage through client software & web server using latest technology of GPRS & GSM.

v) Electrical grounding for all electronic and electrical equipment should be done by following standard CPWD procedure & all equipment's (Sensor, Controllers etc.) shall be protected using lightening arrestors.

vi) Comprehensive Warranty & Operations of SCADA based System for each Dam for a period of 4 years is in scope of bidder.

vii) Security of installed equipment's including theft and vandalism will be the responsibility of the Bidder till successful installation, commissioning & site acceptance testing

3.1 SCADA System Control Methodology

The Contractor shall supply and install all equipment's along with necessary accessories & installation hardware etc. necessary to make the Automation of Barrage gates & Head regulators Gates through SCADA to run the gates from Barrage control room and acquiring all data of Barrage head regulators, inflow gauging site, outflow gauging sites & early flood warning station at Dam control room and viewing at various designated locations as per specifications, Complete and ready for operation even if these are not indicated explicitly in this document. This proposal is

for Design, Supply, Installation, Testing & Commissioning of a SCADA System based on Programmable Logic Controllers/ Remote Terminal Units for the following functions: -

i) Automatic Control of Gates of Gaula Barrage, Haldwani, Uttarakhnad and real time monitoring of head regulator. Besides Automatic Control through Automatic Reservoir Monitoring And Control (ARMAC), Provision for Manual operation of Gates shall be provided at site within RTU/PLC panel & through push buttons.

ii) Real time monitoring of gate positions & various site operations & safety aspects of the Barrage structures and head regulator via. CCTV system at BCR.

iii) Online Measurement & Display of water Level/discharge in SCADA system

iv) Recording of all the above parameters on line & storage of records for analysis.

v) Generation of customized reports as per the input of Engineer in Charge.

vi) Reporting of all acquired/calculated variables on web pages for information sharing with all authorized personnel.

vii) Real Time data monitoring of SCADA system & BCR via client software's by Executive engineer using laptop & high-speed internet connection (3G/4G dongle).

viii) The spillway operation shall be based on a strategy of balancing the Reservoir inflow and outflow by continuously checking and comparing real time measurements.

ix) The specified measuring system shall provide the data (reservoir level, gate position and spillway discharge) to determine the three above-mentioned parameters by the main Server in the Barrage Control Room.

3.2 Design Criteria

The spillway operation shall be based on a strategy of balancing the Reservoir inflow and outflow by checking and comparing real time measurements.

The specified measuring system shall provide the data (reservoir level, gate position and spillway discharge) to determine the three above-mentioned parameters by the main Server in the BCR (Barrage control room).

Design Data:

i. Rated voltage: 230AC/110V, D.C.
ii. Maximum ambient temperature: 55ºC
iii. Degree of protection for Panels: IP 54
iv. Degree of protection for transducers/sensors: IP 67 /IP65 (as per specification)
v. Special treatment Tropicalized
vi. Transmitter Output Signal - analogue 4-20 mA (2-wire)/ RS485/ output compatible with RTU/PLC.
vii. All sensors & control instruments being supplied shall be CE/UL certified.

3.3 Equipment for Remote Control System

All the real-time data from all instruments specified above shall be provided and incorporated in the control system located at Barrage control room.

At Barrage control room Operator station / workstations shall include of Server and monitor of latest configuration and latest operating system preferably windows, with hard disk and LED display of 75" /Video wall screen as per specifications for operation and indication of gate movement. The operator shall be able to view the gate positions or any gate status with the help of graphic display in the screen.

The Operator station shall have Master PLC controller with firm ware based hot redundancy so that the failure of one of the controller shall not cause any discontinuity in the control system and shall ensure that no loss of data takes place during change over. The bidder shall also provide A3 size color printer for printing various logs, instructions and reports. Interlocking shall be provided between Operator's station and local PLC/RTU control panels located near the individual gates via hard wiring and GPRS/GSM based wireless technology.

At any time individual gates shall be allowed to be switched over from the automatic mode to local mode of operation, and vice versa, however the operation from the local panel cannot be overruled by the remote/automatic operation stage once the selector switch is set on the local position. Manually adjusted gates shall, when returned to automatic mode of operation, be adapted to their normal functioning in the automatic mode. The automatic system shall work independent of the number of available gates with the same characteristic. If all gates have been changed over to MANUAL, the master controller shall be reset so as to permit a smooth switching-over to MANUAL operation.

All the input data from field instruments including existing instrumentation system provided by the existing contractor shall be displayed at the Screen. The department and existing contractor will facilitate the bidder by providing the necessary interface to import the real time data of existing instrumentation system from Data acquisition system & WIMS (developed under NHP project). The system shall continuously monitor the Dam levels, inflow discharges and depending upon these parameters it shall be able to calculate the input discharge in to the Dam depending upon the profile made available by the user.

In addition to this the gate opening of Barrage, pond level should be displayed in the form of graphic display. The system shall be able to display the output discharge through gates so that operation of gates can be carried out in auto mode. This will be achieved using standard SCADA software. Necessary inputs for using SCADA Software to calculate the discharge through gates will be provided by the user department.

Formats for various reports & screen displays will be finalized during the detailed engineering stages and bidder shall submit their reporting and screen formats for prior approval from Engineer in charge along with Schematic & control methodology . The software supplied by the bidder should allow modifications at site without involvement of any other special software.

The 3-phase power supply at barrage is available through dedicated feeder line for barrage gate operations. The instrumentation system shall be powered from the mains power supply however, a backup power supply system using solar power shall be provided by bidder with minimum back up of 36 hours (without sun shine) for each PLC/RTU & Datalogger system and interconnected instrumentation. Also, DG Set of 10 KVA shall be provided by bidder as a backup for main power supply to BCR equipment if power failure is more than 4 hours. Early Streamer Emission (ESE) Lightning Arrestor (Protection radius =87 mtr) with all necessary accessories required to capture (never to attract) lightning and conduct it safely to the ground.

For BCR equipment bidder shall provide a 3 KVA online UPS system with 4 hours back up.

3.4 Control of the Barrage Gates

Main Barrage 06 Gates
Minimum Control Inputs: 3 for each Gate- RAISE, LOWER and STOP

Note: In case of any problem with the control of the automated system, it should be possible to revert to the manual system of Gate immediately.

3.5 Data Acquisition from Barrage Site

The system will acquire the following parameters at specified intervals and store them in a data base. The parameters will be displayed in wide screen monitor.

- **Gate Position and Gate Status (Moving UP/Moving Down/Static) of the following:**
  Main Barrage 06 Gates
  Head Regulator 03 Gates

- **Barrage/Pond Level:**
  Pond Level in Main Barrage 01 Sensing Unit

- **Upstream & downstream level**
  Barrage downstream discharge 01 Sensing Unit
  Head Regulator discharge 02 Sensing Unit

- **Inflow & outflow Gauging Discharge:**
  Inflow River 01 Sensing Unit
  Flood warning gauging 02 Sensing Unit

- **Video Surveillance System**
  Barrage Gates, HR gates and BCR 10 Bullet Cameras
  Complete Barrage Overview 02 PTZ Cameras

The location of the camera should be decided in consultation with site Engineer of the purchaser such that operation of each gate is clearly visible by cameras.

In general, while designing the SCADA system, the Bidder will conform to:

- Use of state of the art and reliable technology suitable for 24x7 operations
- Modular design and ease of maintenance

No. of gates controlled by a field level gate control unit shall not exceed 2. The device should preferably be an intelligent device (named here as Slave Gate Control).

It is mandatory that the Successful Bidder will submit a detailed description of the proposed system in each location complete with Block Diagram clearly indicating individual subsystems /units /instruments /sensors and their interconnections and how the proposed system will address the requirements referred in the technical specifications and features.

4. TECHNICAL SPECIFICATIONS OF SCADA & INSTRUMENTATION SYSTEM

4.1 Water Level Measuring Systems

The bidder shall design, supply and install best quality Level sensors considering the following points.

a) Radar / Ultrasonic type level measuring system shall comprise of level transmitter, and any other item required to complete the level measurement loop.

b) Radar based level transmitters shall be installed at upstream & downstream of reservoir/Barrage for pond level & downstream discharge measurement and RADAR/ultrasonic level transmitters shall be installed at downstream of canal head regulator for downstream discharge measurement.

c) These points are to be selected so that most accurate measurement level is obtained. All accessories along-with cage to avoid theft and Monkey Menace and also proper mounting arrangement (cantilever etc.) of these instruments shall be supplied by the bidder.

d) The level sensor shall be suitable for flange or thread mounting as required. The installation shall avoid any degradation of instrument performance due to spurious reflections, absorption and condensation. Facilities shall be provided for rejection of spurious reflection.

e) The RADAR/ Ultrasonic type level instrument shall have the facility for dampening/ averaging the effect of waves, undulations on the water surface and discriminate the rate of change of levels to provide steady readings.

f) All necessary instruments, interconnecting wiring, HDPE/GI pipe work, housing, cabling, panel, etc., shall be provided according to the type of equipment proposed to supply in the bid document and accepted in the Contract. Adequate safety measures shall be included in the design of these sensors to negate the effects of disturbances due to turbulence of water levels, strong air currents & electromagnetic waves etc. The Technical Details are as follows:

4.1.1 Specifications of RADAR Level Transmitters

Feature	Value
Site Conditions	
Ambient Temperature	From -5ºC to + 55ºC
Humidity	5 to 95 %
Sensor	
Sensor Type	Microwave non-contact sensor,
Range	30 & 35 meters (As per schedule of requirement)
Resolution	3 mm or better
Accuracy	0.02 % FSO
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU

Power Supply	2 wire type, to be powered from PLC/RTU panel (locally)
Protection	IP67 or better
Enclosure	Die cast aluminium or any corrosion resistant metallic enclosure
Isolation	Circuits shall be galvanic ally isolated from each other.
Display	Digital Read out at site LCD / LED Display
Manufacturer Calibration Certificate	Required
Beam angle	Less than 12 degrees.
General Features	
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	Sensor Mounting support with proper HDPE/ GI Pipe conducting, cables and other accessories as required
Mounting/Installation Arrangements	Above FRL, below a bridge girder wherever available otherwise horizontal cantilever arrangement from a mast/wall/pedestal to be provided
RADAR Sensor should have inbuilt diagnostic feature & averaging function	

4.1.2 Specifications of RADAR/Ultrasonic Level Transmitters

Feature	Value
Site Conditions	
Ambient Temperature	From 0ºC to + 55ºC
Humidity	5 to 95% (non-condensing)
Sensor	
Sensor Type	RADAR/Ultrasonic non-contact sensor
Range	10 meters
Resolution	5 mm or better
Accuracy	Better than 0.25 % of FSO
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU
Power Supply	to be powered from PLC/RTU panel (locally)
Protection	IP67 or better
Enclosure	Die cast aluminum or any corrosion resistant metallic enclosure
Isolation	circuits shall be galvanically isolated from each other.
Display	Digital Read out at site LCD / LED Display
Manufacturer Calibration Certificate	Required

Beam angle	Less than 12 degrees.
General Features	
Sensor Material	PVDF/PP
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.
Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Accessories	Sensor Mounting support with proper HDPE/ GI Pipe conduits, cables and other accessories as required
Mounting Arrangement	horizontal cantilever arrangement from a mast/wall/pedestal to be provided

4.2 Gate Position Measuring System

Suitable sensors shall be provided for exact measurement & indication of position of Barrage Gates & Head regulator gates. These sensors shall be equipped with suitable shaft couplings and electronic circuits to transmit the signals to the SCADA System via local PLC/RTU for indication in Barrage Control Room & for further processing. All sensors & display units are to be mounted in the outdoor locations. Hence, suitable protection class of the enclosures shall be ensured for sensor and field mounted display. Minimum IP65 protection class shall be provided. Suitable safe & reliable arrangements of coupling with the motors of gates shall be provided. It shall be ensured that there is no slippage between the motor shaft & the transducers.

In case of head regulator gates are being manually operated so necessary retrofitting required for mounting of gate sensors shall be executed by bidder. The gate sensor shall be connected to the nearest PLC/RTU's located at barrage top through hard wire.

Feature	Value
Site Conditions	
Ambient Temperature	0 to 55 Degree Celsius
Humidity	5 to 95% (non-condensing)
Sensor	
Sensor Type	Shaft Encoder based rotary position sensor with Digital Display
Range	0-20 meters
Resolution	3 mm or better for gate position
Accuracy	5 mm or better
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU
Power Supply	2 wire type, to be powered by RTU/PLC
General Features	
Material	Corrosion Resistance Metal (Stainless steel or Aluminum)
Enclosure	Lockable (key) box provided by the supplier to be mounted on sensor, with IP65 or better protection

Tools	Complete tool kit for operation and routine maintenance
Manuals	Full Documentation and maintenance manual in English
Mounting	Wiring from sensor to RTU/PLC must be through HDPE/ GI Pipe Conduits and flexible metallic conduits wherever applicable
Display	Read out LCD / LED field mounted Display
Process connections	through suitable coupling
Manufacturer's Calibration Certificate	Required

4.3 Surveillance System

Primary Purpose of Surveillance system is to view gate movement from Control room. Operator should be able to see that the gates moves up/down or stop when the appropriate command is given.

Bullet cameras IP based shall be placed to monitor the position of all the gates & PTZ cameras shall be installed on the main Barrage in a way to ensure the complete monitoring of the Dam. The same shall be connected with NVR (Network Video Recorder) which shall have a memory of at least 30 days. Cameras shall be connected to internet, to have its accessibility from farthest point through IP address.

The cameras shall have a provision of connecting with NVR through hardwiring using video cable (RG-6 coaxial cable)/OFC and simultaneously through internet using IP address of cameras.

Each bullet camera shall be installed in such a fashion that it shall be able to monitor at least one gates.

The following minimum features shall be available in CCTV system

i) **Bullet Camera** (Fixed Type)- shall be IP based with 3G/4G connectivity with standard SIM slot, Outdoor Weather Resistant, 2 Mega Pixel,72 LED Color Camera.6 or 8 or 12 MM (According to site suitability) 2 MP Auto Iris Lens in Elegant Metal Die Cast Housing. Outdoor weather resistant IP 66. The camera shall have SMS facility for sending alarms. The recording mechanism shall be such that when the available storage is less than 10% the system shall adopt FIFO mechanism & file shall be deleted accordingly. RTC real time clock shall Support NTP and remote setting.

ii) **Pan Tilt Zoom (PTZ)** 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP (DIGITAL) camera, 500 mtrs. Night Vision (Multiple Intelligent Array system) in IP66 Weather Resistant Outdoor Metallic Housing.

iii) Standalone **NETWORK VIDEO RECORDER** (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in H.264 Compression Format. With HDD. Remote Viewing Capability through Internet /Android /Apple/ Mobile App Xmeye /CMS software with password protection & user name.

iv) Necessary mounting arrangement like MS/ GI Poles 4/6/8-inch Dia - Medium Grade Pipe of Standard Make with suitable length along with junction box & other accessories as per the site suitability shall be provided by the bidder for installation of CCTV system along with associated Civil works.

v) All cameras shall be protected using metallic enclosure for protection against physical damage from monkey and vandalism.

4.4 VFD Starters Panels

The VFD shall be provided for each Barrage gates with following minimum features.

3 Phase VFD Starter panel shall consist of S.P.P, MCB, OLR, Timer, Main Switches of reputed makes including wiring and Electronic Digital Indicator etc.

The control module must be able to drive motors with the following control modes: linear, parabolic and parameterizable V/f characteristic, V/f characteristic with forward/reverse current control, linear and parabolic V/f characteristics with eco mode for additional power saving, vector control without sensor, torque control without sensor. The drive system must be protected through thermal motor protection, thermal converter protection, monitoring for under voltage and overvoltage, overloading, grounding, short circuiting, stalling and blocking of the motor. All digital and analogue inputs and outputs must be freely parameterizable and assigned to a specific function in the factory setting.

To parameterize the drive, an integrated USB/serial interface for PC/Laptop connection is needed, saving and loading parameter records and firmware updates must be possible. The terminals have to be identified by replaceable labelling strips for individual marking.

4.5 Data logger/RTU with 2 channel Inputs

The Data logger/RTU shall automatically collect the observations from interconnected sensors, process and store them into its memory and transmit the real time data through GSM & GPRS communication to SCADA system at Barrage control room. Data logger/RTU shall be installed at Gauging site for inflow & outflow river discharge to/from Barrage for monitoring & real time data transmission.
Also, the gates of head regulators are manually operated which shall have dataloggers installed to transmit the real time data through GSM & GPRS communication to SCADA system at Barrage control room.
The Data logger/RTU shall also continuously monitor the status of sensors, power supply and communication. In the event of failure of any instrument or disruption of any of the power sources, an alarm shall be sent back to the SCADA system at DCR through GPRS & GSM communication.
The number of input channels in the Data logger/RTU must be compatible to the sensors being integrated. Data logger/RTU shall provide necessary electrical power to the sensors and conversion of electrical output signals from the sensors into engineering value based on calibration information stored in the memory. Full compatibility with all types of sensors provided in the package is mandatory. The power supply to Data logger/RTU shall be made available from Solar Power system.
The Data logger/RTU can be installed on the same mast with the solar power system and it shall be housed in IP65 housing enclosure.
Following are the minimum technical specifications for Data logger/RTU:

Feature	Value
Site Conditions	
Ambient Temperature	From 0 to +55 Degree C
Humidity	5 to 95 % (non-condensing)
Sensor Interface	

Input type	2/8 channels compatible with outputs of sensors (as specified in schedule of requirements)
Input - Output Interfaces	
Data Transfer	USB stick option for Data transfer
Port for Configuration	One Serial Port (RS232) for communication with Laptop for programming
Port for Telemetry	1 Ports for Communication with Telemetry (GPRS/GSM) device
Computer Software	
Operating System	Windows software for system configuration / communication
Version	English language version
Licenses	All required licenses shall be included
Analog to Digital Converter	
Resolution	16 bit or better
Sample intervals	1 Sec to 24 hours (user scalable)
General Features	
Data Storage memory	Minimum 1GB memory that can store one year of data and shall be expandable
Mathematical Function	For integration of discharge equations & discharge coefficient
Firmware Operating System	Multi-tasking operating system - must log data and transmit at same time
Display	Digital Display/HMI for viewing current data and setting values
Power Supply	Shall be powered by solar Power supply to be provided by bidder
Battery Voltage	Monitoring of battery voltage level
Internal battery	Internal battery backup for clock
Charge Controller	Internal or External
User Permissions	Different user levels, system of user rights / passwords, access restricted to unauthorized personnel
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors
Real time clock	GPS synchronized
Enclosure	for wall-mounting in a shelter / enclosure with IP65 protection or better
Accessories	Serial cable + adaptor. All accessories (fixing units, etc.) as required
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)
Manuals	full documentation and maintenance instructions in English (1 copy per station).
GPRS MODEM	
Operating Temperature	From 0 to +55 Degree C
Performance	Data Reception availability of 95% or better
Form factor	The GSM /GPRS modem should either be integral part of data logger specified above, or it should be supplied as independent unit compatible with supplied data logger
Specific Features	
Communication Direction	Utilize network for two-way TCP/IP (INTERNET) connection

	and SMS
Power Saving	Ability to disable interrogation system in order to save power at remote site
Communication Protocol	Data transmission to execute HTTP Post, FTP, SMS to transmit and receiving data to the Data Center
Accessories	All associated equipment, including Antenna all cables and mounting hardware
Antenna features	
Frequency range	900 MHz: 824-960 MHz/1800MHz:1710-1880 MHz, 4G and better
Radiation	Omni-directional
Connector	SMA or suitable RF connector adaptable to GSM/GPRS modem
Cable length	As required at site

4.6 PLC/RTU for Barrage:

CE/UL approved manufacturer's Remote Terminal Unit/Programmable Logic Controller (RTU/PLC) in IP54 enclosure having modular PLC/RTU (Plug and play type) for control & monitoring with Modular Controller and should have modular communication. The Local PLC/RTU located as barrage top should be able to communicate to the master controller on an open protocol such as Profibus / Modbus over Ethernet TCP/IP using OFC cable & bidder shall provide the memory map of the same for third party etc. simultaneously the PLC/RTU shall be able to communicate with BCR via GPRS/GSM based wireless technology in order to create redundancy in telemetry to avoid loss of communication & Data.

It should be possible to view the reports of SCADA system without requiring any software, from any PC, using web-based protocols. Data logs should be stored inside the CPU and should be downloadable in CSV format using a web browser. It should be possible to increase the I/O handling capacity of the PLC/RTU, without changing the CPU. Maximum number of gates that shall be controlled by a single PLC/RTU shall be two (2). It should be possible to remotely configure the local PLC/RTU from the control room. Each CPU shall be tested to work in a temperature range of 0 to +55 degree Celsius. The CPU shall have integrated non-volatile memory capacity not less than 1 MB & extended memory up to 4MB using memory card. All must be complied with IEC-611131-03 and IEC 61158(4-20Amp). Suitable industrial grade AC to DC Power Supplies shall be mounted inside each PLC/RTU. Each PLC/RTU shall have separate power supplies for electronics and field. Surge Protection Device shall be provided inside each PLC/RTU, to safeguard against transient & lightening surges.

Industrial grade Fibre Optic convertor shall be housed in each PLC/RTU for optical communication between PLC/RTU & central controller. Each PLC/RTU shall have GPRS modem for wireless based communication with SCADA system at BCR.

Each PLC/RTU shall also be integrated with up to 2 no. digital drive starters panel and capable of operation at up to 55 degrees Celsius. The PLC/RTU equipment shall be housed in a properly sized, weather-proof panel and must be protected with lightening & surge arrestor.

The PLC/RTU shall be designed as per following specifications

A. Panel inside Climatic Conditions:

The PLC panel shall be fitted with a space heater mounted in the panel bottom with sufficient space clearance. The heater shall be protected with the MCB along with auxiliary signaling contact. The heater shall be controlled by PLC/RTU according to the application requirement.

The panel shall be fitted with two cooling Fan's with filters, and protection, for better control of internal temperature. The individual cooling fans shall be controlled /switched ON/OFF by the PLC/RTU according to the application requirement.

B. Temperature Monitoring

The PLC panel shall be fitted with the temperature sensor, space heater and shall be connected to the monitoring system. The monitoring system shall continuously monitor the panel temperature, and if it exceeds the set value, it shall automatically switch ON the cooling Fan's. The cooling FAN shall be Switched OFF after the temperature of the panel is brought back to normal level.

In case of Emergency Sequence of power back-up, the cooling FAN and Heater shall be switched OFF to save the power.

The PLC/RTU shall be capable of monitoring and controlling the temperature inside the panel and shall transmit the following information to the Barrage Control Room.

i. Panel temperature
ii. Status of cooling Fan's

C. Power Supply Scheme

Protection shall be provided in the input side of the mains power supply as follows;

i. **Input mains Fault Protection**: MPCB of suitable ratings shall be provided by bidder for mains power supply fault level protection. The mains input shall be protected using MPCB (with adjustable current limiting) and auxiliary signaling contact. Auxiliary signaling contacts shall monitor the Healthy/Trip condition of the MPCB. The signaling contact status information shall be updated in the control room.

ii. PLC/RTU can be provided with Isolation transformer for 415 to 230 Vac. Also, the relay board/contactor switches to be installed in motor starter panels for acquiring the status of electrical parameters shall be from reputable manufacturers with better standability against voltage fluctuations.

iii. **Control Voltage**: The proposed PLC/RTU system control power supply voltage shall be 24V-48VDC and the same shall be derived with the use of SMPS Power Supply Unit. The SMPS input power shall be protected with suitable MCB. The power to the input of the SMPS shall be switched ON/OFF from the PLC/RTU through Auxiliary relay contact. The panel control switch gear, PLC unit, Communication unit, HMI Screen Panel, indication lamp, hooter, instruments, Auxiliary Relays, Signal Conditioners/isolators, etc. shall be energized by control voltage of 24V -48V DC.

D. Power Supply On/Off

All the field instruments integrated with each PLC/RTU, shall be connected to the single power supply bus and energized with the control voltage supply of 24V-48 VDC. The PLC/RTU

according to the application program (periodically) shall switch OFF the control voltage supply via the DC contactor, and Switch ON the control voltage supply after a programmable time delay by actuating the DC Power contactor and the use of programmable mechanical/electrical timer switch gear unit automatically to clear the memory and other floating memory locations errors, warning, faults, etc. Ultimately it shall Reset the PLC/RTU.

The power supply ON/OFF function command shall be activated manually, locally or through timer fitted PLC/RTU the event shall be recorded in the database and suitable reporting system shall be implemented.

E. GPRS Communication Network

The proposed Intelligent GPRS communication unit shall have GPRS communication network capability.

Reliable Integration: The modem should be very tightly integrated with the PLC/RTU network.

Failure of Global System for Mobile Communications: The PLC/RTU should store data in file in buffer memory of at least 2MB if unable to transfer due to maintenance of Global Packet Radio Service of the service provider or power failure in the cell towers or cell channels switching center, etc. Data will be transferred to central location in secure manner. No data loss in case of no connectivity shall be achieved. In case of GPRS network failure the GSM communication shall be opted as a wireless mode to communicate with SCADA system at Barrage control room.

F. PLC / RTU:

The PLC should have inbuilt RTU functionality with a support for USB/RS 485/RS232/Ethernet port Modem connection.

The PLC/RTUs shall have minimum communication ports as follows:

i One RS485 Port for sensor interface.

ii 1x RS232 ports for the PLC/RTU maintenance and configuration. It shall be possible to increase the number of communication ports in the PLC/RTU by addition of cards, if required in future.

iii PLC/RTU shall be designed with cyber security features based on IEC 62443-4-1 (SDLA certification) & shall have international certification (Achilles Level II/equivalent certification) or EDSA certification based on IEC 62443-4-1 for specific model proposed by bidder. The access to the Server shall be restricted with passwords both at Windows level and at Application Level. Also, all the data should be stored in a separate file system which shall be independently accessed by the Remote Network without disturbing the PLC/RTU operation and thereby maximizing the cyber security.

iv The PLC/RTU should support for follow minimum features:

- Should have the facility for the Force Simulation
- Facility of Forcing Input /output variables when the physical devices are not functional
- Should have user access with password protection
- Should have the facility to program the PLC/RTU for all the different phases

v The PLC/RTU based SCADA system should have the facility of the Web monitoring, the same shall be audited by NIC & hosted by NIC server in order to minimize the cyber security issues.

vi The PLC/RTU should support firmware upgrades through network.

vii The PLC/RTU should have facility of storing intermediate variables

- Program protection feature, network filter setup, Operation log function, function removal feature should be available.
- User authentication, user-based operation restriction, and CPU operation restriction should be available.
- The CPU should be fast enough and capable of multi-tasking capabilities like running various tasks at different programmable cycle times.
- The CPU should have minimum 1 MB RAM to cater to current and future program additions.
- The PLC/RTU shall support all the file operating functions so that CSV file log can be stored in the basic CPU memory/buffer memory of GPRS modem for maintaining the log in case of network connection failure.
- The PLC /RTU shall be designed to a modular concept, with separate modules for each function. The modules shall be rack mounted and may be quickly exchanged for field repair. It shall not be necessary to remove field wiring in order to exchange a module. The PLC/RTU shall support a wide range of input /output signals including status inputs, pulse (accumulator) inputs, analogue inputs, analogue outputs, and control outputs. The PLC/RTU shall support any combination of the above I/O points.
- It shall be possible to add PLC/RTU's and software enhancements in the future, without taking the system out of service. The design and physical layout of the PLC equipment shall be on a modular basis, so that extra facilities, such as an increase in the number of status points or analogues, may be added with minimum of disturbance.
- The PLC/RTU shall be expandable by simply adding I/O modules to the system bus. Other than user-friendly configuration of the new modules, no additional PLC/RTU software or firmware shall be required.
- The operational status of the PLC/RTU shall be indicated on the front panel of the processor module by means of LED lamps. In addition, each I/O card shall have LED status indication.
- Modbus TCP/IP on Ethernet /Profibus communication (IEEE 802-3, or IEC 60870-5-104) shall be provided for PLC/RTU network interconnection towards SCADA station.
- SCADA System is to be capable for configuring of PLC/RTU remotely, from Barrage Control room.

G. Microprocessor /Microcontroller Module (CPU)

- Built-in minimum 1 MB RAM should be available for storing Data and log records as files. Memory Card of minimum 4 MB is supported for storing data, programs and log records as files Built-in Ethernet port should be available;
- In addition to normal scanning, CPU module should have an independent multiple constant scan function capable of a maximum scan speed i.e. fast response should also be achievable with a single CPU.
- CPU should have a compact body.
- Large-capacity programs and large device sizes shall be supported to cope with advanced, complex control applications.
- A rich set of functions should be provided to facilitate program debugging and maintenance. For example, a forced SET/RESET function independent of program processing results.
- PLC/RTU shall employ solid-state technology and use an industrial standard, suitable for operation in an aggressive environment with high levels of temperature, humidity and dust being common. It shall operate correctly up to a temperature of 55 degrees Celsius and up to 95% non-condensing humidity.
- On-board battery backed Real Time Clock (RTC) is required. The RTC will operate on the battery power even when the main power is lost.
- The PLC shall have a separate watchdog circuit independent from the main processor, which will reset the system if the firmware program fails in any way. The watchdog circuit shall be capable of being enabled or disabled by means of a jumper or by software.

H. Power Supply Modules

- DC Power Supply Unit (PSU) of voltage: 24 -48 VDC shall feed PLC/RTU power supply modules. Doubled power supply modules shall be fitted per each PLC/RTU configuration.

I. Communications Interfaces

- Communication interfaces shall correspond communications between the central PLC and distributed PLC/RTU units, via hardwired OFC cable and GPRS wireless technology at Barrage sites whereas remote location (i.e. inflow & outflow gauging site) the communication between Central PLC shall be through wireless GPRS/GSM communication.
- Adequate number of process Bus (Profibus/Modbus over Ethernet TCP/IP) Communication Ports shall be configured for communication interfacing to intelligent Instrumentation. Serial communication RS232 Port/Ethernet for local laptop connection shall be available as well.
- The RTU/PLC at Barrage gates shall be communicating to Barrage Control Room through Optical Fiber Cable (OFC). It should possible to remotely configure the RTU/PLC from barrage control room. Industrial grade optical fiber convertor shall be housed in each RTU/PLC for optical communication between RTU/PLC and central controller.

J. PLC/RTU I/O Facilities

i. General

- PLC analogue and digital inputs and outputs shall meet the requirements of test voltage of class II of IEC 255-4 appendix E.
- The PLCs should be of modular structure, equipped with separate I/O modules for each type of I/O signals, as follows.
- The PLC/RTU shall have a minimum 20% spare I/O count for each type of module.

ii. Analogue Inputs

- Analogue inputs shall be capable of accepting current signals of, (4-20) mA, with over range capabilities and support for 2/4 wire communications
- All components used in measuring circuits that affect accuracy shall be of high stability and low temperature coefficient.
- A/D conversion shall be provided on each analogue module. The module scan cycle shall be rapid so as to satisfy the overall analogue response time specified to the master workstations.
- It shall be possible by means of the PLC/RTU configuring software, to modify the signal dead-band, so that fluctuating signals are not continuously reported to the Master Station.

iii. Digital Inputs

- Digital input modules shall be optically isolated. Digital filtering to suppress contact bounce shall be provided. In addition, software filtering of two successive cycles shall enable confirmation of state.
- To reduce data transmission, time tagging shall be selectively applied. Only some inputs shall be time tagged at the PLC/RTU, but other inputs shall be time tagged on arrival at the Master Station.

iv. Digital Outputs

- The digital output modules shall support isolated outputs in, latched and BCD mode. Individual LEDs will indicate the status of each output. The outputs shall be isolated to at least 500V dc. Controls transmitted between the control station and the PLC shall comprise a select, check-back, execute sequence (or other means of providing high message security). On receipt of a select message, the PLC shall prepare to operate the output relay, and then return confirmation of correct selection of the relay to the Control Station. This signal shall be obtained as far as possible and shall be generated locally, not derived from the incoming signal. On receipt of the execute command, the output relay shall operate and confirmation of execution shall be returned to the Control Station.
- Not more than one digital output shall be possible at a time. Selection of two or more contacts simultaneously or in quick succession without one having been completed, shall result in cancellation of both requests and return an alarm to the Master Station.
- Software interlocking schemes shall be applied with reference to process requirements.

v. Analog Outputs

- The PLC shall support analogue set point outputs. These may be used to issue controls directly to plant controllers, or to drive displays.

- Analogue outputs shall generate (4-20) mA DC output signals into a minimum load of 500 Ohms at a nominal operating voltage of 24V DC.
- Simultaneous operation of individual digital outputs shall be provided, where this facility is required. Set point outputs shall provide the security to ensure that false selection of controls is minimized, similar to individual digital outputs.

K. Dummy Control

To provide test facilities, a remote dummy control shall be provided. The dummy controls and associated status indications shall be allocated with discrete addresses and operate as if they are real equipment. To set up a dummy control a PLC/RTU with dummy control set up for training of operational staff shall be provided.

L. PLC/RTU Operation Features

i. Operation with Control Station

- PLCs shall have their own unique address and not transmit information to the Control Station without the request. In order to reduce communications channel load, PLCs/RTU shall incorporate data transmission reduction methods. PLC/RTU shall reply to each interrogation on a "Report-by-exception" basis with the Control Station, also being fully updated on a regular basis. Digital input data shall only be transmitted when the status has changed since the last pool interrogation. Analog values shall be transmitted when a defined percentage change occurs from the last transmitted value. Each PLC/RTU reply shall automatically include the verification of the address in the response.
- Full details of the management of digital and analogue input/outputs counts shall be submitted for approval by the successful bidder.
- PLCs shall be also available to be polled at any time from the Control Station, either on a periodic basis or on operator command. In case of polling, all inputs may be scanned.
- Control messages from the Control Station, shall be capable of being initiated at any time to control the barrage, and shall have priority over all other messages.
- The communication system shall have feature of assured delivery of data & commands using the suitable communication protocols.

ii. Automatic Restart

- power interruption and /or communications failure, the PLC/RTU shall be arranged to restart automatically. This may be accomplished by retaining memory in non-volatile store.

M. Local HMI Facilities

- The remote PLC/RTU system shall be equipped with adequate operator panel to enable monitoring and control for the operator at the barrage level.
- The operator panel shall be preferably accomplished by means of LED/LCD backlit display of 7 inches or above at Local Control Stations & 12 inches at Central PLC. The graphical LED/LCD should be easily detachable such that its failure does not affect the PLC/RTU functionality.

- HMI functionality shall be capable of presenting customized views with key process variables presented as digital and graphical data. The HMI shall provide the ability to navigate from control screen to control screen or to navigate via navigation buttons or similar graphical device on the current screen.
- The HMI software must support real-time and historical trend graphic displays as part of a display.
- The HMI software shall provide the capability to provide popup windows for device control, trends and device status pages.
- HMI shall support parameterization and Configuration settings through its display at local PLC/RTU Station

N. PLC Programming

- PLCs shall be reconfigurable from either a locally connected portable programming device /laptop and remotely over the communication links from the control station.
- Configuration changes shall be protected by access codes.
- User-friendly designed PLC programming editor supporting all IEC 61131-3 Programming languages shall be included in the set of engineering software. For local process control, the PLC shall support Open PLC programming standard, according to IEC 61131-3, including five main programming methodologies:
    - Ladder Diagram (LD)
    - Function Block Diagrams (FBD)
    - Instruction List (IL)
    - Structured Text (ST)
    - Sequential Function Charts (SFC)
- PLC/RTU application software shall be installed in contiguous PLC/RTU memory data area, in order to ensure sufficient PLC/RTU computing speed. The PLC memory shall be sized to ensure it is not more than 50% occupied and that maximum occupancy does not significantly slow down the computing functions.

O. PLC/RTU Process Operation

- PLC/RTU shall be enabled for effective SCADA monitoring, control and data transfer with control station, as well as for local PLC /RTU level closed loop process control, control logic and other local automation applications.
- The PLC/RTU shall be controlled by application software making it capable of the following minimum functions:
    - Command outputs
    - Select before operate feature
    - Digital filter
    - Adjustable chatter frequency

- Time-tagging of events
- Alarm handling
- Automatic Restart
- Report by exceptions

The PLC/RTU shall be of Industrial grade with the IEC Certifications

4.7 RTU/PLC Panels - IP54 and above

i) PLC/RTU Panel/ Enclosures:

- Factory fabricated to requirements, lockable double door, dead-front, self-supporting.
- Cabinets shall consist of a rigid self-supporting structure constructed of not lighter than 2 mm thick, cold rolled, stretcher levelled sheet steel, braced rigidly where required with structural members. Panels and doors shall be constructed of the same weight and type of material as the housing. Housings, including doors and panels, shall show no evidence of warping, weaving, or distortion upon completion of installations.
- All cable entry in to the panel shall be form bottom using cable glands of adequate size.
- The panel shall be provided with forced fan cooling system as a standard.
- The internal panel layout must be designed considering proper approach to the PLC/RTU, instruments, relays, terminals and other accessories for maintenance.
- The Cubicles should in sheet steel construction, free floor mounting with front and back access. The doors and side covers should be of 2- mm thick sheet and all load-bearing members are 2 mm thick.
- Arrange doors with minimum 105 degrees' open position and with stops. Construct doors so that they neither weave nor warp; provide stiffening members where necessary to ensure rigidity.
- Provide ample duct space for adding and removing wiring from the top.
- Dimensions – As per site requirement & as approved by Engineer in charge.
- Lock System: Slam lock /Screw Fixed - with common key or unique key.
- The cabin shall be provided with power distribution units with sufficient number of sockets to provide power to equipment's hosted inside the cabin.
- Provide channel base for mounting.

ii) Equipment Arrangement:

- Wiring ducts to provide easy access for inspection and maintenance.
- Design and arrange ducts and terminal blocks to accommodate bottom entry to cabinet for control, alarm, status, power, and instrumentation cables, as required.

iii) Ground Bus

- Provide continuous copper bar ground bus, size not less than 6 mm by 25 mm along the full length at the rear of the panel.

iv) Nameplates

- Engraved 20-gauge metal/baked enamel or phenol plastic, black background/white letters, drilled for screw mounting with round head screws.
- Provide nameplates for all equipment, instruments, power supplies, relays, circuit breakers, fuses and other devices furnished and mounted in the cabinet. Provide nameplates for each device on panel interior door.
- Submit size, type, and wording for AUTHORITY's approval. All nameplates shall be in English.

v) Terminal blocks

- Terminal blocks for switchboard control wiring shall be DIN rail mounted screw clamp type.
- Provide white or other light-colored markers to the terminal block, for terminal designations.
- Make no more than two connections at each terminal point.
- Confine switchboard internal wiring to one side only of the terminal block. The other side shall be reserved for incoming leads.
- Twenty percent of terminal points in each panel section shall have no connections and shall be designated as spare terminals.
- Form control wire bundles without sharp bends and support adequately.

vi) Indicating Lamps

- The indicating lamp assemblies shall be a heavy-duty type with color caps. Indicating lamps shall be suitable for AC/DC power supplies, utilizing long life incandescent type lamps.

vii) Lighted Pushbuttons

- Each lighted pushbutton shall be mechanically interlocked, illuminated type. Lighted buttons shall be the recessed guarded type to preclude inadvertent operation. Gate control lighted pushbuttons shall be furnished with a flasher so the lamps will blink at a 1-second on and off rate when the maintained pushbutton is operated.

viii) Push Buttons

- Each unit shall be a maintained contact type. Pushbuttons shall be the recessed guarded type to preclude inadvertent operation.

ix) Relays

- Auxiliary relays: The auxiliary relays shall be in accordance with IS standards and shall be machine tool or industrial type. The relays shall have convertible contacts and shall be self-resetting. A minimum of two spare contacts shall be furnished on each relay.

x) Special Tools

- The bidder shall furnish any special tools that may be required to allow proper connections of wiring to devices and all terminal blocks.

xi) Surface Finish

- Cabinet has to be Nano-Ceramic/Epoxy Powder quoted with RAL 7035 after proper pretreatment as per the best industry practice, with thickness of 80 to 120 microns.

xii) Test Procedure

After the cabinets are completely assembled and wired, perform the following tests and procedures.

- Dielectric test on all circuits in accordance with standard test requirements. Instruments or other devices that cannot withstand test voltage shall be disconnected.
- Circuit continuity test to verify connections.
- Functional tests of all control switches and indicating lamps.
- Verify operation of Operator Interface Unit on cabinets.
- Temperature testing to ensure that operational temperature of all equipment's is maintained.

4.8 Flood alarming station

The flood alarming stations shall be provided by bidder at two specified locations with primary objective of developing early flood warning system based on river outflow discharge from Gaula barrage.

The objective is to develop a comprehensive system. The system is supposed to work on logic like activate appropriate level of warning if accumulated rainfall over a specified time or intensity of rainfall is greater than a set value or activate warning if water level or rate of water level rise in the river is greater than set values. The values have to be adjudged initially based on experience, and gradually rectified at field as more and more data is available. The system must be able to work through solar power supply with 36 hours back up.

A set of threshold values of rainfall intensity and total rainfall amount would be pre-set (in HIS developed by NHP) to trigger yellow (alert level), orange (alarm level) or red (critical level) alerts this real time data shall have integrated by bidder in SCADA system for which purchaser will coordinate. Likewise, initial threshold for the yellow, orange & red water level alert may be decided mutually by purchaser & bidder which shall be customized in SCADA system for development of flood warning system.

Values of the rainfall and the water level thresholds will have to be developed separately, based on its relation to actual observation of critical water levels at the respective warning stations. The lead time for forecast plays a critical role and will have to be displayed. To begin with, travel time of flood wave may be estimated considering a speed of 10 km/hour. The values will have to be updated for each reach based on actual observations.

The Flood Alarming station shall have following equipment's for implementation of Automated Flood Monitoring system.

i) Intelligent Field Controller/RTU for execution of instructions received from SCADA system.
ii) Siren for alerting the public which shall function based on control logics.
iii) Solar Power Supply system for power backup

4.8.1. Intelligent Field Controller/RTU system

The Warning stations shall be installed with controller/ RTU system for execution of instructions received from SCADA system. The Controller/RTU shall have inbuilt control logics which based on instructions/Command received from SCADA via. GPRS/GSM modem will provide the signal to Siren fitted in the same control cabinet mounted on the mast of Solar power system.

The Intelligent Field Controller/RTU system shall be provided with following minimum Specifications

TECHNICAL SPECIFICATIONS	
Module Type	Controller with inbuilt/external GPRS MODEM and Communication Ports
CPU	
CPU Type	24 Bit
Programming Languages	LD, FBD, CFC, SFC, ST as per IEC 61131-3 standard
Memory	
RAM	1 MB
Flash Memory	4 MB
Communication	Wireless GPRS/GSM based
Ports	
Ethernet Ports	1 no.
RS 485 Port	1 no.
Micro SD card Slot	1 No. (up to 1 GB SD Card Support)
GPRS/GSM Modem	
Frequencies GSM/GPRS	Quad band: 824-960 Mhz / 1800 MHz: 1710-1880 MHz, 4G or better
Antenna Interface	SMA or suitable to GPRS/GSM modem
IO Specification	
Digital Input	4 No. (minimum)
Digital Output	4 No. (minimum)
Analog Input	2 No. (minimum)
Power Supply	To be powered by Solar power supply provided by bidder
Installations	
Mounting	DIN /Rail mounted
Environmental Specifications	
Operating Temperature	0 to 55 Degree C
Relative Humidity	5 to 95%, non-condensing
Additional Features	
Simple Network Type Protocol (SNTP)	Synchronization of the system clock
Approval	CE/UL approval
Messages	Send and receive short messages (up to 10 templates respectively)
Enclosure Type	Metallic enclosure IP65 fitted with surge protection & siren with audible range up to 2 Km.

4.9 Solar Power System

The solar power system has to be provided as a power back up system for all PLC/RTU/Dataloggers, instrumentation system. It shall have following minimum features:

i. Supply, Erection and commissioning of Solar power system with all allied ancillaries for providing un-interrupted power supply to each PLC/RTU/Datalogger system as per the schedule of requirement and shall provide power backup for minimum 36 hours without

sunshine/charge. The Solar Panels shall be provided in anodized aluminium frame with tubular batteries with conformance to IEC- 61730, 61215 and 61701.

ii. The Solar power system shall be mounted on the top of barrage. The Contractor may also supply a pole – mounted arrangement including a standard pole and necessary foundation and fixing arrangements. The location of solar power system installation shall be indicated by the concerned engineer – in –charge.

iii. The batteries required for the equipment above shall be maintenance free, rechargeable sealed batteries with Overcharge and deep discharge protection Leak-proof Easy handling, Excellent recharge ability.

iv. The battery pack shall also include arrangements of charging through a standard AC power supply available nearby and also from solar panels established as above.

v. The solar power system unit shall have audio or visual alarms for overcharging and deep discharging conditions. The sealed construction shall allow trouble-free, safe operation in any position. The battery case shall be high impact, with sufficient resistance to shock, vibration, chemicals and heat.

vi. The necessary housing and configuration of the batteries shall be furnished in detail by the Contractor.

vii. The battery case shall be high impact, with sufficient resistance to shock, vibration, chemicals and heat.

viii. The disposal of batteries during 5 years' comprehensive warranty period is in the scope of bidder.

The solar panel offered shall confirm the following technical specifications:

Feature	Requirement
Battery	
Voltage	As required for instrumentation system
Type	Sealed maintenance free
Capacity	power supply system shall provide 36 hours of backup to all equipment 's being powered up by the solar panel

Solar Panel	
Size	power supply system shall provide 36 hours of backup to all equipment 's being powered up by the solar panel
Mounts	The mounts shall be detachable but shall not move or rotate with wind. It shall have a provision to adjust direction and elevation during installation for optimal solar power generation
Charger	Smart solar charger shall be provided by the bidder
General	
The supplier shall determine optimal size of solar panels and batteries such that the system will be operational for at least 36 hours in absence of charging/ without sunshine. The supplier shall also provide the calculation of power consumption of Solar power system.	

4.10 Early Streamer Emission (ESE) Lightning Protection System: -

A lightning conductor is incapable of discharging a thunder cloud without a lightning stroke. Its function is to divert to itself a lightning discharge which might otherwise strike a vulnerable part of the structure to be protected.

The following points are the minimum requirement of Early Streamer Emission (ESE) Lightning Protection System guideline as:

- Air terminal should be selected and provided only based on the protection angle or rolling sphere method.
- Connection to the air terminal and down conductors should be checked properly and the connection need to be done with proper tested clamps.
- Wherever incompatible materials to be joined (Ex. Copper with Aluminium), suitable bi-metal connectors should be used.
- Suitable expansion joints must be provided on the horizontal conductors on top to take care of thermal effects.
- Special conductor holders of insulating type need to be provided on top of the terrace floor for routing the conductor to ensure electrocution impact does not happen in case of water stagnation.
- Establishing connection for equipotential bonding with nearby metallic components need to be taken care of.
- Proper safety distance between the air terminal and any metallic object need to be maintained.
- Down conductor should run as straight as possible thereby providing a low impedance path from the air termination to the earth electrode so that the lightning current can be safely conducted to earth.
- There should be a test joint arrangement to have separation between down conductor and earth termination for safety and for measurement of earth resistance.
- At least two down conductors are mandatory immaterial of how small is the installation is.
- Good contact between reinforcing bars to be ensured only by using connection clamps tested.
- Joints should be mechanically and electrically effective, should be protected against corrosion or erosion from the elements or the environment and should present an adequate contact area.
- A common earth termination network is recommended for the lightning protective system and all other services.
- Earth electrodes for each down conductor to be provided for the installation.
- The termination of down conductor to an earth electrode should be done minimum of 1 meter away from the structure and minimum of 0.5m depth inside the ground.
- Proper monitoring and value measuring option to be provided for earth pits and should be protected with proper cover and maintained.

- Required measures to ensure shielding, bonding / equipotential bonding techniques are handled properly to avoid LEMPs.
- Proper SPDs need to be employed at every entry point of a service in to the building.
- The cable lead length to & from the SPD should be shorter less than 025m as recommended in IEC.
- Use proper signage boards mentioning lightning protection down conductor, earth pits etc., for people to easily identify.

Technical specifications:

Type	**Early Streamer Emission (ESE) Lightning Rod**
Product Standards	NF C 17-102:2011 or BS: EN/IEC-62305
Material	Stainless Steel
Enclosure	IP 66 or better
OPR radius of protection	87 meter
OPR efficiency	$E \geq 0.80$
Protection Radius at the height	5 Meter
Advance Triggering Time in micro seconds (ΔT)	60 μs
Accessories	Lightning Rod, adaptor, Mast, Mast protector, Down Conductor, Strike Counter, Test Link, Earth Terminal, Earth pits. Protection Tube
POWER	
Power Supply	100–240V AC, 50/60Hz
ENVIRONMENT CONDITIONS	
Operation Temperature	0 to 70 degree Celsius
Operational Humidity	10% to 90%

4.11 Equipment's at BCR (Barrage control room)

Equipment at Barrage Control Room shall be provided by bidder which will mainly comprise of following major item:

a) Main Server and Server as Workstation (operator Station)
b) SCADA software with life time licenced version.
c) Necessary data switch, router with modem, Static IP, and fire wall for System
d) 3KVA online UPS with 4 hours' backup time
e) External memory for data storage of 8TB for 5 years.
f) A3 size Color printer
g) 75" LED display/video wall/ DLP based system
h) Master PLC Controller

i) Network Video Recorder
j) 10 KVA DG set for power Backup

4.12 Central Control Panel (Main PLC Controller at BCR)

The central controller shall be based on modular PLC controller with firm ware based hot redundancy. Main and Redundant CPU shall be mounted in two separate racks. Event-driven synchronization method shall be provided for fast and bump less changeover to the redundant CPU in the event of a fault, without any loss of information and control. When a CPU is replaced, all the current programs and data are automatically to be synchronized by master CPU with standby CPU. The central controller PLC shall be of the same make/manufacturer as the PLC/RTU controller in Local PLC/RTU (Barrage top). The central controller & the Local PLC/RTUs shall be able to exchange data with each other freely & seamlessly, without requirement of any intervening hardware, apart from Optical convertors. The central controller shall have a 12" HMI colored screen for indicating the diagnostic & other information. It should be possible to view detailed information by using buttons on the screen, to drill-down to the appropriate page.

The remote PLC/RTU shall pass-on all the I/O information directly to the central controller and shall act as a slave.

The controller should be able to communicate over an open protocol such as Profibus / Modbus over Ethernet TCP/IP and GPRS & GSM wireless technology etc. The communication should be integrated in the CPU and should not require any additional cards or gateways excepts GPRS module/Modem. It should be possible to view, control & troubleshoot the PLC without requiring any additional software apart from SCADA software. Data logs should be stored inside the CPU and should be downloadable in CSV format using a web browser. It should be possible to increase the I/O handling capacity of the PLC, without changing the CPU, by the addition of appropriate I/O cards. The central controller should have a non-volatile memory of at least 4 MB & with 16 MB RAM with memory card and should be tested for operation from region to region change in temperature range of 0 to 55 degrees Celsius. The central controller shall have high immunity to electro-magnetic interference according to IEC 61000-6-2 and vibrations according to EN 60068-2-6.

4.13 Computer Servers

Server shall be industrial grade PC with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to SCADA System. BCR shall have Master controller server with SCADA Software. 75inch LED display/video wall Unit to be connected to server with separate USB Port/ Ethernet Port.

There will be two computer servers with monitors required (one as work station) with the Master Controller (PLC) placed at the BCR. These Computer servers are expected to operate the SCADA software as well as all software required for the project. The computer servers will be managed and operated by the successful bidder and his skilled trained experienced operators/engineers till the end of 5 years warranty period.

The minimum specifications for the servers are given in table below:

1.	Form Factor	Rack Mount Server or other compatible
2.	Processor	Intel XEON E5-2440 or higher compatible configuration

3.	DIMM Memory	Speed: 1600MT/s RDIMMS or higher compatible configuration 8GB RDIMM, 1600MT/s, Low Volt, Dual Rank or higher compatible configuration
4.	Hard Drive	RAID 5 Software or Hardware Controller compatible 5-1TB 7.2K RPM Near-Line SAS 6Gbps 2.5in Hot-plug Hard Drive or higher compatible configuration
5.	Network Adapter	2 GB or higher compatible
6.	Power Supply	Dual, Hot-plug, Redundant Power Supply/Solar Power and battery backup as compatible configuration
7.	Electrical Supply	220V AC and supply from AC distribution, DC of DG Set
8.	Connecting Devices	Soft touch Keyboard, Optical Mouse, Monitor (23" TFT) 75" LED screen (combination of more than one permitted) monitors.
9.	Software	SCADA compatible as per specification and OS Windows 8 or higher compatible.
10	Additional Memory Rack	Additional memory Rack of minimum 8TB that shall be suitable for data logging for a period of at least 5 years.
11	Accessories	Power Cord Rack Rail with cable management system Power Points as needed

Computer Rack and related parts

The bidder is required to procure full height computer racks that will hold the computer servers and UPS system.

4.14 LAPTOP

Laptop (i7 8th Gen) with all allied software and hardware accessories, for programming & configuration & monitoring of SCADA system shall be provided by bidder with licence version client SCADA software.

Laptop should be of standard brand and should have the following minimum specification:

- Intel Core i7 Processor (2.8GHz, 6MB L2 cache, 1066 MHz FSB)
- 15.6-inch LED Screen: Touch-enabled (optional)
- 8GB DDR4 RAM upgradeable to 8GB or More
- HDD 1 TB 7200rpm
- Integrated Stereo Speaker, Key Board with Touch Pad.
- Genuine Windows 10 Operating System and MS Office 2016 or higher Lifetime Licensed Software Preloaded and with Good Antivirus is preferred.
- Good quality Carry Bag will be part of delivery.
- 2 or more USB Ports, Bluetooth Connectivity with 200mts range
- USB to RS-232 converter for communication 1200 to 115,200 baud

4.15 Colour A3 size Printer

i. Functions: Print, Copy, Scan

ii. Black Print Speed (ppm): 30(A4)/20(A3)

iii. Color Print Speed (ppm): 25(A4)/18(A3)

iv. Scan Speed: 51 IPM (Single Side)/19 IPM (Double Sided)

v. Min. Resolution (Print/Scan): 600 DPI

vi. Processor speed/Memory: 1.8 GH/2.5 GB

vii. Connectivity: e print capability

viii. Control Panel: 8-inch color Touch Screen

Paper Handling: -

ix. Paper handling input, standard: 500 sheet input trays

x. Paper handling output, standard: 500-sheet face-down bin

xi. Duplex printing/scanning: 2 sided to 2 sided Automatic

4.16 Uninterruptible Power Supply Systems (3 KVA UPS System)

i. General Design

- The UPS System shall be Single Phase LVAC 50Hz output with the charger and inverter normally supplying the load.
- The charger shall be of thyristor-controlled type. The battery shall be of Nickel Cadmium/ SMF type. The inverter shall be of the Pulse Width Modulated (PWM) type, providing a single-phase output. Configuration with galvanic isolation transformer at the mains supply shall be supported.
- UPS 3 KVA minimum capacity and all its consisting elements shall cover the required Station load, together with 20% spare for future use.

ii. Operation Requirements

- UPS charger shall continuously supply the load via the UPS inverter, while simultaneously maintaining the battery charge in the float charge mode. In the event of interruption or depression in the AC mains voltage to the charger, the battery shall supply the load requirements via inverter.
- Upon restoration of the AC mains voltage, the UPS charger shall take over the power supply of the load via the inverter, while simultaneously recharging the battery.
- UPS shall be capable of energizing the load within the permissible tolerances, without the battery connected.

iii. Charger and Battery

- The charger shall operate according to the constant voltage, current limiting principle, and shall incorporate a soft- start feature to gradually accept load on initial energizing.

- UPS charger output characteristic shall provide an output voltage regulation of + 1%, for load changes 0-100 % and mains voltage supply and frequency within the tolerance ranges. Automatic compensation feature related on battery temperature shall be provided in case if lead-acid battery is installed.

iv. Inverter

- The UPS inverter output voltage shall be maintained to + 1% of the nominal value for load changes 0-100 % and mains voltage supply and frequency within the tolerance ranges. The dynamic output voltage variations shall not exceed + 10% of the rated output voltage under any circumstances of instantaneous load changes

v. Readings/Instrumentation and Alarms

- The following readings /instrumentation/LED indication shall be supplied as a minimum:

  Battery voltage

  UPS output voltage

- The following alarms/LED Indication shall be supplied as a minimum:

  Charger fails

  Inverter input voltage high /low

  Inverter fails

vi. UPS Distribution

- The distribution system shall be designed for incoming and outgoing AC supplies. Double pole miniature or moulded case circuit breakers complying to IEC 60157 shall be supplied, fitted with auxiliary contacts that operate when the circuit breaker trips. MCBs shall be rated to meet the load requirements and shall be labelled with the destination of the load.

4.17 Display Units

The 75" industrial LED display/ video wall to be provided by Bidder in BCR for monitoring of SCADA system. The Workstation shall be connected to the screen LED display panel through communication bus.

All the required information from the SCADA shall be continuously updated in the LED screen. The screen shall map and display the vital information like, Barrage level, discharge, panel status, power availability, energy meter reading, Motor data etc. Specifications as below or better for 75" LED/ video wall shall be provided.

Specifications as below or better for 75inch LED/ video wall-based system shall be provided.

Display Unit for 75" LED	
Screen Size	**75inch**
Native Resolution	3840 x 2160 (UHD)
Pixels (H x V x 3)	6,220,800
Brightness	500 +cd/m2
Contrast Ratio	4000:1
Viewing Angle	178°/178°

Running Time	24Hr
Orientation	Portrait & Landscape
INPUT	
HDMI	Yes
RS232C IN	Yes
RJ45	Yes
IR Receiver	Yes
USB (USB3.0, USB2.0)	Yes
OUTPUT	
DP Out	Yes
Audio Output	Yes
RS232C Output	Yes
SPECIAL FEATURES	
Temperature Sensor	Yes
Check Screen	Yes
Embedded Template	Yes
Set ID Setup	Manual, Auto
Password Change	Yes
Intelligent Auto	Yes
Digital Audio Input	Yes
Local Time Auto Setting	Yes
Sync Mode	Time sync, Content sync
Calibration Mode	Yes
Internal Memory	8GB (System 4GB + Available 4GB)
Brightness/Contrast /Backlight	Yes
Energy Saving	Yes, Off / Minimum / Medium /Maximum / Screen Off
Auto Configuration/Phase	Yes
Basic	Remote Controller, Power cable, DP Cable, Manual, IR Receiver, RS-232C Cable, LAN Cable, Guide Bracket, Screw
POWER	
Power Supply	100–240V~, 50/60Hz
ENVIRONMENT CONDITIONS	
Operation Temperature	0 to 40 degree Celsius
Operational Humidity	10%~80%

4.18 Internet Router and Firewall system

As per National institute of standards and technology combination of Router and firewall system is suggested as one of the Cyber security systems for Industrial Control systems. It shall ensure Intrusion detection and prevention, malware protection, Protection against network vulnerability, Router ensures basic packet filtering services.

The following minimum specifications shall be followed for implementation of the same

A. Router

i. Backplane of minimum 2 Gbps

ii. Packet throughput of minimum 3 Mbps with 64 bytes packet

iii. have minimum 2 slots with two slots dedicated for Control Processor

iv. have at least 2 slots for High speed WAN interfaces

v. support USB storage and dual images

vi. have redundant power Supply

vii. Minimum one Console and one Aux interface

B. Firewall Throughput

i. Firewall throughput – 4 Gbps

ii. VPN throughput – 100 Mbps

iii. Threat Protection – 260 Mbps

iv. IPS throughput – 450 Mbps

v. Interfaces RJ 45 GE (Minimum 8 No)

vi. I/O interfaces – 1 USB, 1 Console

vii. Authenticated users limit- Unrestricted

C. VPN Tunnels

i. SSL VPN 100

ii. IP Sec VPN 100

D. Security Features

i. Firewall - State full packet inspection, deep packet inspection, proxy firewall

ii. Application proxies - HTTP, HTTPS, SMTP, FTP, DNS, TCP, POP3

4.19 SCADA system for barrage automation

A. General

The Barrage control room will have two servers (one as a workstation), Monitor with internet connection with static IP & firewall system in combination with router. The Customized SCADA software will accept information sent by all the remote PLC/RTU's, dataloggers, GPRS/GSM communication, data import from other software& store the information in a data base, display the information in appropriate mimic displays, analyze past data and trends, will have the authentication feature by way of user name and password for operating the software; Updating of parameters of the PLC/RTU along with instrument can be done interactively from this software.
The development of software has to be customized with end user & customization of the software shall be in scope of bidder till the completion of 5 years' operation & maintenance period. The control room will have Master PLC system with IOs, SCADA system with PC, software, GPRS Modem, gateway software etc.
The control system along-with SCADA Software shall be provided in the Dam control room for automatic gate operations, automatic flood warnings & data acquisition of various monitoring stations. The information available at Dam control room should also be available on any other PC/Laptop and on mobile located at any place through web. The Data provided in Dam control room should be displayed in complete explicit way and can be extracted in different formats.

One set of laptop installed with licensed version client SCADA software, internet (4G/3G dongles) & A4 size color printer shall be provided by bidder for monitoring of SCADA system by Executive engineer.The local computing system shall be interconnected with the latest industrial grade Server with monitor and LED video wall not less than 75" size based system via master PLC Controller in the Dam Control Room, from which the command to spillway gates,& flood alarming stations shall be provided. All signals shall be sent and received to/from the SCADA system located at Dam Control Room. Operating system shall be based on Windows server 2008 or latest.

A master controller shall define the required total gate opening. The PLC/RTU shall compare the required value with the total actual opening found by adding up the individual opening values, if the deviation of one or more gates from the required value is large enough, an 'Open'- or 'Close'-instruction shall be given to the respective gate(s). However, to prevent hunting of hoist the deviation should be beyond the preselected tolerance band**.**

In a selection circuit the 'open'- instruction shall be transferred to that gate, which at the time of the comparison controls the smallest opening. Similarly, a 'close' - instruction shall be given to the gate controlling the largest opening.

For the gate selection, only the gates shall be considered, of which the manual switches are in the 'Automatic 'position, and where no alarm signal has been received from, the 'open'- or 'close'-instruction shall remain with the selected gate, unless any of the following conditions is met:

- The required and actual openings agree and the positioner cancels the instruction, or
- The gate had previously reached its limit position, or,
- The max. Permissible deviation (pre-set difference in position between controlled gate and average of all gates available) has been reached previously.
- The selected gate is not in operating condition.

In the event of major changes in required size of opening, the gates shall be moved successively one step each, i.e. after re-setting all gates again agree within the pre- set margin in size of opening. After all available gates have reached their limit positions a corresponding signal shall be given.

At any time, individual gates shall be allowed to be switched over from the automatic mode to manual mode of operation, and vice versa, however, the operation from the local panel cannot be overruled by the remote/automatic operation stage. Adjustments made manually are to be automatically compensated for with the other gates by the automatic control system.

Manually adjusted gates shall, when returned to automatic mode of operation, be adapted to their normal functioning in the automatic mode. The automatic system shall work independent of the number of available gates with the same characteristic. If all gates have been changed over to MANUAL, the master controller shall be reset so as to permit a smooth switching-over to AUTO operation.

The system is to be designed to monitor the duration of the instruction. The monitoring is to prevent, that an instruction is maintained over a period, that is longer than a pre-select e.g. in the event of a malfunction of a gate selected by the controller, if the monitoring system is actuated, the particular gate is to be cancelled from the group of gates available for selection. Electronic attenuation is to be included to provide against unsteady level signals. The system should be

compatible with flood fore-casting system to be provided by the employer for the monsoon period.

B. Functions/ Features of SCADA Software

- Normally Dynamic Gate Operation Scheduling Program will decide position of each Gate depending on the Water Discharge requirement.
- Development of Dynamic Scheduling Program is included in the scope of work.
- Operator in Control room should be able to control movement of individual gates via. SCADA software. This is needed for testing and emergency handling.
- The customized, with life time licensed version SCADA software shall be designed, developed, Supplied, installed & commissioned by bidder based on the inputs provided by Engineer-in- Charge which shall have following minimum features:

i. It shall accept information send by all the remote locations /sites

ii. Stores the information in a data base

iii. Display the information in appropriate mimic displays

iv. Will have a provision to analyse past data and trends

v. Will have the authentication feature by way of user name and password for operating the software.

vi. Updating of parameters of the PLC/RTU along with instrument can be done Interactively from this software.

vii. Development of software to be customized with end user at Site.

viii. SCADA software shall be of at least 5000 tags & screens shall be provided as per user requirement.

ix. Automatic alarm generation

x. Automatic report generation

xi. Auto e mail and SMS facility

xii. SCADA system should have the facility of the Web Server, the same shall be audited & hosted by NIC server in order to minimize the cyber security issues.

C. Trend Analysis

The HMI shall provide for a real-time and a historical trend or plot capability. The plot function shall provide for pre-scaled display of selected process variables. The operator shall be able to select either subsets or supersets of the data presented. The plot function shall automatically scale the requested data to fit the time frame requested by the operator. The plot function shall display these data as a multiline chart with each variable easily determined by color, pattern or combination. For real-time data displays, the plot function shall scroll data as necessary to include newly acquired data on the display.

The SCADA software will support trend data and displays as follows:

- Trend displays shall comprise line graphs with time on a linear, continuous horizontal or vertical axis and the trended variable on the vertical or horizontal axis.

- Trend graphs shall be capable of displaying required plots with adjustable time base with user specified time ranges.
- The capability to pan backward and forward within a selected time range to read the exact value of any displayed variable, by selecting a point on the graph or chart.
- The capability for each pan shall display individual ranges and units.
- Display of historical information as far back in time as desired shall be available on the history log.
- "Zoom" and "pan" facilities for both the trended variable range and the time axis range. The "zoom" facility shall allow an operator to compress or expand the axis range whilst the "pan" facility shall allow an operator to shift the origin of the axis. The software shall allow a user to define any zoom area by dragging a mouse across the trend.
- It shall be possible to define the section of the trend to be exported by clicking and dragging the mouse across the trend. Data shall be exported to CSV or TXT formatted files.
- Printing the trends or plots generated above by A3 Color printer.

D. SCADA Software should mandatorily provide GUIs from Main menu with:

i. Parameterisation and configuration setting of Sensor
ii. Programming of PLC/RTU.
iii. Real time data monitor on GUI and LED display.
iv. File creation and Storage controller.
v. External Data transmission controller.
vi. Burglar and alarm warning system controller.
vii. Power status monitor and logging.
viii. Motor status monitor and logging.
ix. Data exporting features
x. Integration of rating curves
xi. Manual data entry and input programmes
xii. Printing graphical and tabular data

E. SCADA Software Security Features

- The SCADA system shall be secure enough to allow access to any individual part of the system only to users with appropriate security level authentications. Application privileges shall be assigned to users or groups. Security areas may be created for graphics and tag blocks.
- The SCADA system software shall support an unlimited number of users. For each user, it shall be possible to define a password and the privilege level(s) and areas that are available to that user. Examples of privilege levels are: "operator" (can only change set points, read real-time and historical data, acknowledge alarms), "system administrator" (can change variable description, edit screens, perform backup/restore operations).

- The SCADA system software shall provide the capability to define a minimum of 8 privilege levels. The software shall check to ensure that the user logged on has the correct privilege level for all actions he wants to perform. If the user does not have the correct privilege for an action, the software shall display a message informing the operator of insufficient privilege.
- The SCADA system software shall have a mechanism to restrict access to different areas of the project for each individual user or group of users (e.g. by defining access rights to mimics.
- The SCADA system shall provide the capability to disable "hot" keys such as Ctrl Esc, Ctrl Alt Del etc. to prevent operator access to unauthorized software.
- The SCADA system shall provide the capability to prevent access to the operating system by unauthorized personnel.

F. Alarms/events management:

- The SCADA software shall support alarm and data logging, using description text and time stamp.
- The SCADA software shall not limit the number of alarm occurrences logged to a database.
- The SCADA software shall provide the ability for viewing alarms that are logged while the system is on line or off line without causing any interruption to data acquisition or alarm processing.
- The SCADA software shall provide the capability for operator event logging with the logging of operator actions. The SCADA software shall be capable of logging the following information: User Name, Action, Time, Date, Value, and Comment in free format.
- The SCADA Software shall notify the operator with graphical screen indication of the presence of an unacknowledged or new alarm. These indications will be organized in an alarm screen that can be made always visible, if customized so. The SCADA shall provide for audible alarm notification. The SCADA shall present alarms in an alarm screen in such a way as to allow easy identification of a new alarm, an unacknowledged alarm and acknowledged alarms. The SCADA shall provide the operator with the ability to review all alarms.
- The SCADA software shall be integrated such that an alarm acknowledged on one operator workstation will automatically appear as acknowledged on the other systems.
- The SCADA software shall provide alarms viewing and processing as follows:
  i. A standard alarm page with the facility for scrolling alarms up and down the page and for acknowledgment of individual alarms.
  ii. Multiple levels of alarm priority or category.
  iii. Color coding of various alarm priorities or category.
  iv. Capability of audio interaction configurable for each alarm by category.
- SCADA Software shall provide the following information for each alarm as it appears on an alarm display page:
  i. Alarm Tag Name
  ii. Alarm Description

iii. Value of the Variable

iv. Trip/set point

v. Alarm Status - Disabled, Acknowledged, Unacknowledged

vi. Alarm Category (if applicable)

vii. Alarm Priority (if applicable)

viii. Time & Date in International Formats

ix. Privilege (if applicable)

x. Operator Comments (if applicable)

- The capability to display each alarm category or alarm priority in a different color (including flashing colors) dependent on whether the alarm is Active Unacknowledged, Active Acknowledged, Acknowledged Cleared, Unacknowledged Cleared or Disabled.
- The capability to disable alarms on an individual basis, by page or by alarm category or all alarms.
- The capability to automatically display any graphic display when an alarm occurs or to dynamically change the appearance of any graphical object based on whether an alarm is On, Off, Acknowledged, Communications Error, and Disabled etc.
- The SCADA software shall monitor analog and digital variables and calculated conditions, and determine if a variable is in an alarm condition.
- For each Analog variable, the SCADA database software shall provide the ability to process an alarm for each of the following conditions: -

i. Variable LOW-LOW,

ii. Variable LOW,

iii. Variable HI,

iv. Variable HI-HI

v. Rate of Change

vi. Bad input from I/O

vii. Alarm disable

viii. Dead band

ix. Real time synchronization error > 10 sec

- For each Digital variable, an alarm for each of the following conditions shall be assignable:

i. Variable ON,

ii. Variable OFF

- The Customization of SCADA system shall be done by the bidder as per engineer – in -charge inputs at site, which is a continuous activity till the end of comprehensive warrant & operation & Maintenance period.

- The alarms shall be categorized as Critical, High, Medium & Low category based on which alarm priority shall be set in SCADA system.
- The following minimum alarms/events shall be configured in SCADA system by the bidder apart from any other alarms to be configured during customization of SCADA software.

S no.	Alarm/Event	Alarm /Event Description
1.	Power Supply Faults	Mains power Off, Trip/ Overload, battery Low, DG Set ON, solar power on etc.
1	Instruments	Hi, Hi- Hi, Lo, Lo-Lo, Rate of change, communication error, Transmitter Failure, Gate Open/Close/Stop/ Intermediate, over torque
2	Local Control System	Remote/Local mode, Auto/Manual mode, Electrical parameter alarms (Voltage, current, Power Factor etc.), communication loss/ signal loss, VFD Failure, Cooling Fan failure, Delay of more than a specified time in execution of Command, Hoist Motor failures, Over torque, software error etc.
3	Main PLC	The main controller should be intelligent enough so as to detect: 01. Input signal loss 02. Loss of power 03. Internal failure (limited) 04. CPU failure
5	Common Events	battery discharging, UPS Stopped, Motor Started, Ambient Temperature High, Pond Level decreasing, Inaccuracy in timing due to communication latency, operator log alarm, Panel open etc.

G. Web Server

SCADA software shall have a web server facility. This will be used to allow display/data input in remote sites on any PC/mobile phone using user authentication system.

It shall have following minimum features.

i. Web server shall be able to display real time process data from SCADA software, historical data from Process database server, or any third-party relational database servers into graphs, dashboards, table format.
ii. It shall be able to configure and integrate multiple data sources on a single window.
iii. It shall be able to personalize the information on the web server window depending upon various needs of the various users, with user-based information access configuration.
iv. It shall be able to view multi location information on single web server window either in graphical format or trend format.

4.20 Tele-metering and Supervisory Control

The Contractor shall provide synchronous internet connection with minimum internet speed of 8 mbps for uploading and downloading along with necessary router, static IP & switches for GPRS & GSM communication. The Contractor shall also provide the digital transmitters and indications, and terminal strips via the bus system. The SCADA System software should have the facility to track the non-functional sensors on daily basis and display on the web.

The successful bidder shall upgrade all such developed software during the O & M period on need basis and provide the latest versions of all such software including Source Codes, while handing over the facilities to Authority.

In addition, it shall be possible to import/export data to/from Hydrological Information System (HIS) to be developed under National Hydrology.

a) Tele-metering Items

- Digital type gate position indications.
- Digital type water level indication.
- Digital type discharge indication of spillway.

4.21 Diesel Generator Set 10 KVA

- Supply, Installation, Testing and Commissioning of Silent DG Set of 10 KVA for power supply to Barrage Control Room equipment's in case of power failure for more than 4 hours.
- Alternator shall be self-regulated with Standard Alternator protection (Over Voltage, Over Speed, Under Voltage, Under Speed warning & Shutdown).
- Engine shall have industrial silencer, Electronic/Mechanical Governor, Manual & Electric Start, Batteries, Engine Instrument panel, AVM and with water proof powder coated Acoustic enclosure for DG Set.

I. ENGINE

- Vertical, 2 cylinders, four stroke cycle Air / Water cooled cold starting compression / ignition, diesel engine under NTP conditions as per BS: 5514.
- The engine will have following standard accessories:
  - Heavy flywheel
  - Air cleaner dry type/Oil bath type.
  - Governor mechanical type
  - Starter 12 volts DC
  - 12-volt Battery with leads
  - Dynamo / Alternator
  - Silencer Industrial (without piping)
  - Fuel lift pump.

II. ALTERNATOR

- 415 three Phase/230 VAC, 50 cycles/ sec., 1500 RPM, self-excited, self-regulated screen protected drip proof alternator in accordance with BS: 2613.

III. ARRANGEMENT

The Engine and Alternator shall be close couple mounted on a common fabricated base plate.

IV. CONTROL PANEL

M. S. / CRCA Steel Fabricated L.T. switchboard suitable for indoor floor / wall mounting installation & for controlling the above generating set. The control panel will be equipped with.

1. Digital Energy Meter
2. Main On/Off switch / MCB
3. Set of indicating lamps.
4. Set of instrument fuses.
5. Set of current transformers.
6. Over voltage Relay
7. Suitable MPCB

The switchboard will be complete with internal wiring, front cover, rust proof, powder coated paint and arrangement for receiving incoming and outgoing cables. The control panel shall have an automatic mains failure feature for remote automatic starting from the PLC based Control panel at the Field Station. Necessary equipment like solenoid coil etc. shall be provided for the same along with an IP54 or better panel.

V. Fuel Tank

Eight hours continuous running capacity, fuel tank complete with inlet/ outlet, air vent, drain plug, inlet arrangement for direct filling. The fuel tank level shall be displayed at the local panel and at the master PLC based control panel. 10 days backup fuel should be stored at Barrage Control room for continuous running of DG set.

4.22 Miscellaneous Items, Renovation & Furnishing of Barrage Control Room

The existing Barrage Control Room at Gola barrage shall be renovated and furnished in order to establish a SCADA System for which following miscellaneous items shall be provided by bidder in control room:

i. Round table and Ergonomic Chairs for conference room (minimum 10 chairs & 1 no. round table).
ii. 3 Small sofas or couches typically one per seat and small glass table for officer's meeting/ discussion.
iii. Table and Chairs for Officer/Staff with adequate storage and drawers (minimum 6 chairs & 2 no. tables).
iv. Work Stations with pull-out key board tray and 3 drawer chestor.
v. Complete electrical wiring with all fixtures and fittings complete in all respect.
vi. 2 no. of 2.0 Ton Air-conditioning system along with installation all complete and fully functional
vii. Necessary earthing & lightening protection system for Control Room.
viii. Associated Civil works & Paint of existing Control Room

Furnishing and Fixtures:

Modular Furniture to allow adequate arrangement for complete functionality shall include:

Table/Work Stations made up of 25mm thick laminated plain particle board interior grade conforming to IS: 3087-1985 (or Latest if any) with PVC lipping/edge binding 2mm thick. The top shall be factory-made, laminated with laminate of 1mm thickness of approved shade. Plastic keyboard pullout tray made up of durable ABS material shall be on sliding telescopic channels as per direction of Engineer-in-charge.

Pre laminated three drawer pedestals Using 18mm and 25mm thick boards with two equal size drawer and one file drawer duly fixed under the work surface with drawers having channel arrangement for smooth operation, with best quality stainless steel handle and locking arrangement as per direction of Engineer-in-charge.

Medium back rest ergonomically designed revolving chairs having a hydraulic gas-lift and push-back mechanism for seat adjustment. Foam-cushioned seat and back covered with good quality Matt Fabric having ABS cover on the back. The chair base should be of nylon material for strength with nylon wheels and armrest as approved by Engineer-in-charge.

All other necessary furniture as per the requirement for making fully furnished Control Room for installation of equipment shall comprise of electrical wiring, switches, MCB, LED/Tube lights, exhaust system, power points, light, fan and 2.0 Ton Split Air conditioner with 5-star Rating and wired remote control with all necessary accessories and fittings sourced from a reputed designer cum manufacturer to complete the Job as per direction of Engineer-in-charge.

4.23 Discharge Measurement

Discharge profiling of Barrage and head regulator shall be carried out by the bidder to obtain data regarding width (m), Area (m2), Mean Speed (Mtr/s), Total Discharge (M3/s), Max Measured Depth (Mtr), Max Measured Speed (Mtr/s). For this purpose, ADCP shall be provided by the department to the successful bidder. Profiling should be done twice in a year & accordingly rating curves developed shall be integrated in SCADA system.

4.24 Installation Requirements

I. General

The installation of PLC/RTU, Water level transmitters, Gate sensors, VFD etc. shall be done at respective locations stated in bid document, a proper care shall be taken at the time of installation to minimize the disturbance in the process operations. From maintenance point of view, a proper protection and easy access to the equipment shall be ensured at the time of installation. The general installation guideline for various instruments shall be as follows.

II. Site Preparation and Installation

i. The WRD will provide details of the installation sites before the scheduled installation date to allow the Contractor to perform site inspection and construction of suitable structures before the installation of the hardware.

ii. The location of sensor/instruments installation will be decided by the respective Site Engineer-in-charge depending on the site.

iii. The Contractor shall complete the required works at the site for proper installation of the equipment before receipt of the equipment.

iv. These are the basic guidelines for installation of Automation system however it may vary as per site conditions.

III. Water Level Transmitter

i. The Level Transmitter and its accessories shall be protected from theft. The Contractor shall install the RADAR level transmitters in existing gauge wells or using cantilever arrangement as specified in bid document. The sensors shall be provided with monkey menace to avoid vandalism.

ii. Level sensors shall be mounted in such a way that they have a direct vertical shot to the water surface with no obstruction of their beams. Beam spread must be determined based on manufacturer ‘s specification and the maximum expected distance to be measured at low flows. Consideration shall be made in designing the mounting structure to allow for easy access to the instrument for maintenance.

IV. Painting

All ferrous metalwork (unless galvanized) associated with the SCADA system equipment and accessories shall be properly painted every year to avoid rusting.

V. Electrical Wiring/Cabling requirements

Shielded armored signal cables shall be used for external Cabling from the RTU/PLC to instrumentation system to ensure the reliable operation of the SCADA system with necessary conduiting/ cable trays as per site requirement.

Following are minimum cabling requirements. Contractor is free to propose improved cabling technology which shall be subjected to approval from Employer’s Representative.

The cabling system design criteria shall be as follows.

i. The term cable shall always include necessary type of connectors at both the ends for connecting between two equipment. The connectors shall be properly anchored with protective sheathing of the cable in such a way that the loads due to pulling and twisting shall be borne by the protective sheathing and the conductors shall not be subjected to any stress.

ii. The connectors shall be so fixed on the individual components of the system that the metal/ plastic connector shall always transfer the loads due to pulling and twisting directly to the protective body of the component and the internal interface cards/ connections shall not be subjected to any load.

iii. Laying of necessary data and power supply cables for connecting various components and embedding them or protecting them with necessary conduits shall be carried out as per directions of engineer-in-charge.

iv. Wherever the cables are to be laid indoors and the length of the individual cable run exceeds 1 meter, the cable shall be housed in a protective conduit made of electrical supply grade conduit of appropriate diameter and the conduit shall be fixed with the wall at a height not less than 1 meter above the floor surface. Whenever the indoor cable is required to cross the floor, it shall be housed in a HDPE /GI flexible conduits pipe of 25 mm internal diameter and the pipe shall be fixed to the floor with suitable protective covering to avoid tripping of personnel using the area or disturbance to the pipe due to such movement.

v. Wherever cables are to run through open ground including the public road and pathways, the cable shall be armored and shall be water ingress proof up to static water pressure of 5 kg/cm2. All joints made in cable shall also meet the water proofing criteria. In addition, the cable shall

be protected by housing the same in 25 mm galvanized iron pipe embedded at a depth of not less than 1.0 meter below the ground surface with a warning brick on the same. A sketch of the cable layout with respect to the identifiable marks of the area shall be prepared and hand ed over to the Engineer-in-charge for each such cable run on completion of the work of cable laying operation.

vi. The joints in the cable connecting between the sensor and data collection unit shall be avoided by measuring the appropriate length of the cable required and attaching the same in one piece. If the cable joints become necessary, prior permission of the Engineer-in-charge shall be obtained before executing the same. The joint fabricated through a splicing and jointing kit shall be stronger than the parent cable.

vii. The cable carrying data and electrical power shall be housed separately in different conduits separated by adequate distance to prevent leakage currents. The data cables shall also be laid out in such a way that the data integrity is not compromised due to mutual interference.

viii. Shielded (screened) cables shall be used for external Cabling, the power and control cables shall be generally as per IS 8130/34. For these cables, equivalent IEC/IS specifications are also acceptable.

ix. All cables shall have standard copper conductor of suitable cross section depending on load.

x. The Communication cable/power cable shall be of shielded, twisted pair type.

VI. Cabling Types

Following types of cables shall be supplied laid and terminated as per instructions provided.

- Copper armoured Signal cables
- GSM cable between PLC/RTU and modems (if applicable)
- Communication cable if used anywhere shall be twisted pair multi core 1.0 Sq. mm, Braided and aluminium foil shielded and screened as per Indian standards.
- Control cables shall be Tinned annealed electrolytic solid copper conductor, PVC insulated, extruded FRLC PVC inner sheathed, single galvanized steel armoured, and overall FRLS PVC sheathed conforming to IS 1554-I/1988.

VII. Civil Works

All the civil works required for installation, commissioning and operation of the SCADA system shall be provided by the Contractor and included in the cost. The associated civil works would include for erection and housing of instruments, laying of cables, mounting of PLC/RTU and instrumentation system and all other associated equipment's of the SCADA system.

4.25 Spare Parts and Tools

Spares management is important for a complete strategic service management process, ensuring that the right spare parts and resources are available when and where needed.

All spare parts to be supplied shall be interchangeable with the corresponding parts of all the Works supplied under these Specifications and shall be of the same material and workmanship. They shall be replaceable without cutting or destruction of adjacent components. Acceptance of any spare parts will not take place before the bidder has submitted the complete final detailed list of all spare parts and tools which shall be approved by Engineer-in-charge.

The spare parts shall be provided by Contractor before issuance of the commissioning Certificate for the installed system. These spare parts shall be checked and tested at the Site by Contractor in presence of the Engineer-in-charge or his representative and shall be stored in a storage facility of department. The storage facility(ies) will be provided by WRD. All spare parts, tools and materials shall be delivered in marked boxes of sufficient sturdy construction to withstand long term storage cum maintenance.

SCADA based automation involves spares for following critical hardware components such as:

i. Instrumentation system at Local control stations
ii. Instrumentation system at Gauging sites
iii. SCADA control room Hardware

The Following Spare Part List shall be provided by Successful bidder

a) Mandatory Spare Parts
b) Recommended Spare Parts

4.26 Electrical and Mechanical Braking Unit

Technical Specifications of Solenoid Operated, Spring Set Shoe Type Electro-Magnetic Brake

(a) Scope:

This Solenoid Operated Spring Set Shoe Type Electro-Magnetic Brake with Drum, continuously rated, effective in both directions should be able to bear, 150% of full load torque of 5.0 HP (3.7KW,960RPM) motor and should be as per para 5.3 of IS 6938: 2005 and is required for Gaula Barrage, Halwani, Uttarakhand for gate operation purpose.

(b) Specification Details:

i. Type: solenoid operated spring set shoe type
ii. Rating: Brake shall be capable of overcoming minimum 150% of the full load torque i.e. 11.67 Kg-m (3 Phase Squirrel Case type A C Electric Motor rated power 5.0 HP,3.7KW,960RPM)
iii. Operation: The brake shall set automatically, when the current is cut off from the motor and it shall be electrically released when the current is applied to the motor. The brake shall be equipped with a hand- operated release lever arrangement.
iv. IS - 6938: 005 (Para 5.3) which is reproduced as under or, its-latest. amendment, if any.

(c) Electro-magnetic Brake

i. The electro-magnetic brake shall be of spring set, shoe type It shall be solenoid operated and continuously rated. The brake shall be effective in both directions of travel and shall be capable of overcoming at least 150% of the full load torque exerted by the motor.
ii. The brake shall set automatically, when the current is cut off from the motor and it shall be electrically released when the current is applied to the motor. The brake shall be equipped with a hand- operated release lever. A weather-proof cover complete with heaters, if required, shall be provided to prevent condensation on moving parts.

iii. In addition to electro-magnetic brake, additional brakes shall also be provided, in such case where undesirable gravity fall of gate is to be arrested or where frequent intermediate stopping of gate is required during lowering cycle or where the selected

4.27 SUBMISSION OF DOCUMENTS

Bidder shall submit details of following on separate sheets for each of them, for evaluation of Bids -

(1) Warranty Related Services

(2) Software details

(3) O&M Staff details

(4) Training to the Departmental staff

(5) Installation and Commissioning Services

(6) Detail Commentary against Technical Specifications

(7) Deviation Sheet

(8) Brief SCADA system architecture & control Philosophy

The prices as to-be quoted in BOQ shall include all the prices of above services/Software/Staff.

4.28 DRAWING & DOCUMENT SUBMISSION

The complete General Arrangement Drawing along-with each component drawing and complete architecture of SCADA system, data sheet approval & QAP/ITP shall be submitted within 30 days from the issue of letter of acceptance for its approval to Engineer-in-Charge. Failure in submitting drawing in stipulated time shall account to breach of the Contract.

4.29 TECHNICAL RESPONSIVENESS:

Bidders are requested to confirm that all requirements of technical specifications have been met without any material deviation or reservation by submitting a detailed clause by clause Commentary against technical specifications specified in Annexure-1 & in case of any deviation, it shall be clearly stated in deviation sheet failing which offer of the firm may be considered as non-responsive.

4.30 Delivery and Completion Schedules

The delivery and installation schedules are described in Schedule of Requirements. The maximum time period from the date of effectiveness of Contract to Final Acceptance is twelve (12) months followed by a Warranty and operation & maintenance period of 5 years. The bidder must comply with the milestones indicated in the delivery schedule and schedule for installation and commissioning.

4.31 After Sales Service

A) Local partner

The Bidder is required to be an Indian firm or Indian arm of an international firm so as to develop an in-country technical support base during and after the project implementation phase.

The bidder /manufacturer shall have after sales support centre in region (within a radius of 500km from state capital) or shall set the same within 30 days from signing of contract.

B) Operation and Maintenance (O&M)

The Bidder shall be responsible for Operation & Maintenance of all components after installation, commissioning & site acceptance and operational test, during the contract period. All associated cost shall be part of contract price and bid price for evaluation.

This operation & maintenance support contract shall refer to the complete instrumentation network of Gola Barrage automation as per the schedule of requirement, proper functioning of SCADA and the hardware and software components. Assistance and troubleshooting will be provided for all necessary maintenance, servicing, testing, and recalibration operations.

The Bidder will intervene with his personnel within the agreed dates, in-situ, in case of damages or malfunctioning of equipment or software and will proceed to the investigation of the cause and search a prompt solution to ensure proper working of the system.

Bidder shall provide a minimum one no. of Service engineer for operation of SCADA system at Barrage Control Room from commissioning stage till completion of 5 years' warranty, operation & maintenance period The Service Engineer shall have experience of working on Instrumentation / SCADA system for period of at least 3 years and shall be well versed with Operation and Maintenance aspects of SCADA systems. Operation and Maintenance shall include free of cost repairs/ replacement of hardware and Software necessary to keep the system functional for the period of Five years from Date of Issuance of Final acceptance certificate from Engineer in Charge.

Operation and Maintenance shall include free of cost repairs/ replacement of hardware, Software and communication charges necessary to keep the system functional for the Operation Service Period from Date of Issuance of completion of Commissioning Certificate from Employer's representative.

Routine maintenance and preventive maintenance will be carried out as per a Maintenance Manual to be prepared by the Contractor and as agreed by the Engineer for the SCADA system. If the repairs of any instrument effects the calibration, then new calibration shall be done. All repairs and renewals are included in scope of maintenance to be carried out by the Contractor. The SIM and Communication cost for data transfer will be borne by the Bidder.

The Contractor shall do the calibration check & preventive visits for all instruments & Control Room equipment's at least on half yearly basis each year until the completion of Operation period and on need basis.

Contractor shall maintain records for all the repairs and submit the same at the end of every month and year in the sample formats given below:

Table: Maintenance Log of Repairs for the Month of

S No.	Equipment	Fault Report Date (From SCADA Data)	Nature of Fault	Date of rectification (From SCADA Data)	Signature of concerned EE/ SCADA report as a proof of rectification

Table: Log of Faulty Equipment on Last day of Month

S No.	Equipment	Fault Report Date (From SCADA Data)	Nature of Fault	Action Taken	Expected date of Rectification

Table: Annual Log for Faulty Equipment on Last day of year

S No.	Equipment	Fault Report Date (From SCADA Data)	Nature of Fault	Date of rectification (From SCADA Data)	Signature of concerned EE/ SCADA report as a proof of rectification

The operation chart including relevant information shall be permanently displayed near the equipment. The chart shall be prepared indicating block diagram and necessary operation and troubleshooting steps in multi-color and it shall be laminated for durability. Original parts shall be used for replacements and maintenance. Manufacturers recommendations shall be followed for maintenance.

C) Hand back requirements

Prior to completion of 5 years Operation and maintenance period the contractor shall complete the following Hand back requirements in last quarter of 5th year of Operation & Maintenance.

- The Contractor shall upgrade all such developed software during the operation period and on need basis and provide the latest versions of all such software including Source Codes, while handing over the facilities to department.
- The Contractor shall hand over spares in working condition to department at the end of O&M Period.
- Contractor shall provide the Acceptance testing of SCADA system including Local control stations & monitoring station as defined in the bid document under "Inspection & Tests" as per the satisfaction of Engineer- in- charge before completion of O&M period.
- Contract shall reinstate all the associated civil works prior to acceptance testing which shall be inspected & approved by Engineer- in- charge.
- All documents as built drawings, User manuals, Training material & software licences shall be handed over to Engineer – In- charge prior to completion of Operation & Maintenance period.
- The period of Operation & maintenance can be extended beyond the specified period of 5 years if mutually agreed by contractor and Department.

4.32 Trainings

a) Training Program

The Bidder is required to provide an extensive training programme for the system. The training set forth in the following paragraphs is a minimum requirement and the bidder should propose any additional training that he considers critical for long term success of the system operations.

The Bidder is expected to provide an outline or table indicating the contents of each of the required courses. The table shall describe the specific topics to be covered for each day of the training period.

The Bidder is responsible for the salaries of the training instructors and all training materials. The costs of travel, transportation and daily allowances for the trainees shall be borne by the Purchaser.

b) Training in General Operation

Training shall be provided by the bidder in several phases. The training shall include both classroom and field trainings and will be continued during all Five years. The bidder is required to have instrumentation/ SCADA specialists. The training shall include:

Table: Formal training courses

S. No.	Description	Numbers of training	Number of Participants per session
1	User Training Course for senior management. Design, operation and maintenance back-up, recovery and web-services for officers. (2 days)	2	20
2	User Training Course for working staff. (2 days)	2	15
3	Operation and Maintenance course onsite & class room (3 days). Course topics will include sensor calibration, PLC/RTU operation, SCADA operation & configuration, report generation & analysis, Trouble shooting of SCADA system, maintenance requirements, and procedures for equipment configuration, installation, site testing and commissioning.	2	20
4	Theory and practice of discharge measurements, and development of rating curves. (2 days)	2	20

The training course will take place at *Roorkee & Gaula Barrage or as decided by the Purchaser.* In case of formal training, the Purchaser will provide classroom and other logistics. The Bidder will facilitate the professional and the training material. On-the-job training will be provided by the Bidder in conjunction with the installation of SCADA system and during the course of operation & maintenance as required.

The classroom training, hands on experience and troubleshooting will be prepared as video for easy access and will be posted on the web. All training modules will be also provided as a media

file (Windows Media Player Compatible) on a USB Drive. Five copies on five separate media shall be required.

4.33 Schedule of Work and Progress Reports

Schedule of Work

The time and the date of completion of work as stipulated shall be deemed to be the essence of the contract. The bidder shall submit a detailed program for all the activities to perform the work as per the Contract. The schedule will be in the form of a detailed PERT network consisting of adequate number of activities covering various key phases of the works such as designs and drawings, procurement, manufacturing, shop assembly and painting. This network shall also indicate the interface facilities to be provided by the Purchaser, if any, and the dates by which such facilities are needed.

The Supplier shall so organize his resources and perform his work as to complete it not later than the date agreed to by him. The time for completion of the supplies contracted for, shall be reckoned from the date of award of supplies to the Supplier.

During the performance of the contract, if in the opinion of the Engineer-in-Charge proper progress is not maintained suitable changes/extension shall be made in the schedule to ensure proper progress.

Progress Reports

The above PERT network shall be reviewed and periodic reports shall be submitted by the bidder as directed by the Engineer-in-Charge before initiating the procurement/manufacturing, the bidder shall submit a detailed list of items/materials to be bought out from outside agencies. The list should be exhaustive and should serve as a check list for reviewing the progress from time to time. It shall be obligatory on the part of the bidder to submit a detailed monthly report by 7th of every month (for the previous month) giving the progress of the following activities:

a. Designs, data sheet, Drawings& QAP/ITP approval of complete assembly for its prior approval by Engineer in charge, within one month of issue of letter of acceptance.
b. Procurement of materials and bought out items
c. Fabrication of various assemblies and sub-assemblies indicating detailed status of fabrication of critical items involved and expected date of completion.
d. Stages of shop assembly.
e. Shop testing
f. Dispatch of materials.

4.34 Operation Manual and As-Built Drawings

I. Operation Manual

The Contractor has to submit an operation manual after the completion of commissioning of the system. This manual will be submitted as draft before commissioning completion and as final version before issuance of the Commissioning Certificate, including all the experiences made during the tests and the training given to the operators during the commissioning period. This manual will be established by the Contractor in cooperation with his suppliers and sub-

Contractors and after consultation with the Engineer for the detailed contents. It shall contain at least:

1. General description of the SCADA based automation and its functioning
2. Step-by step procedures for all operation requirements and adjustments
3. Architectural, mechanical, electrical, instrumentation, sections, details, charts
4. Nomenclature and nomenclature schedule of all the equipment (mechanical, electrical, instrumentation, power and signal cables, electrical and fixtures)
5. For each instrument of the system:
    a. Drawings
    b. Operation instructions for system
    c. Calibration charts (if required)
    d. fault identification and location guides and charts
    e. repair instructions (if repair by operators is possible)
    f. Maintenance instructions
    g. Spare parts list with addresses and procedures for ordering
6. Preventive maintenance schedules for all the equipment, showing the type and frequency of maintenance of different items.
7. Emergency management for specimen emergency situations which might occur due to external or internal factors.
8. Logs for the operators of the system.
9. Operating hours.
10. Salient indicators of the operation.
11. Maintenance operations.
12. Faults and actions taken.
13. Other events.
14. Address and telephone number (Hotline) to contact in case of operational problems.

It is emphasized that a collection of standard literature of a general nature, unaccompanied by specific drawings and descriptive matter relating to the Work as commissioned, shall not be acceptable. The operation manual shall be bound in one binder designed to prevent loss and damage of the contents. The binders shall be titled, numbered and have a table of contents of all information contained.

II. As-Built Drawings

The Contractor shall submit to the Engineer “Completion” Drawings. These Drawings shall be accurate and correct in all respects and shall be shown to and approved by the Engineer. Completion Drawings on two prints shall be supplied by the Contractor, along with a soft copy in CD. These drawings shall be developed in latest version of Auto CAD.

4.35 Data and facilities supplied by the employer under the contract

The Employer WRD will provide following data, facilities and support:

A. The Employer will provide the necessary data for implementation of SCADA system as follows:

i. Discharge statements, with locations and access to site for installation.

ii. Details of previous year demand and water scheduling documents for entry and integration in SCADA software.

iii. Organization structure with details of authorized personnel for access to the web services.

B. The Employer will provide following facilities/ infrastructure:

i. For set up of control Room for SCADA, room will be provided by WRD in their existing compounds. However, renovation of BCR in terms electrical fittings, cablings, and air conditioners, etc. shall be provided by Contractor.

ii. Electricity of three phase power will be made available by the Employer at the Dam

iii. & head regulator sites. However, local on-site electrical connection and required cabling and necessary arrangement for connection to PLC/ RTU shall be the responsibility of the Contractor.

C. Employer will provide authorization letters to Contractor for the following:

i. Purchase of lease line, SIM cards and broadband connections.

4.36 Performance requirements

The Contractor is fully responsible to keep the SCADA system functional during commission and Operation Service Period. The Contractor shall take action to repair any faulty instruments and shall not wait for a complaint from the Employer to initiate action.

Following are the key performance indicators (KPI) for the SCADA-DSS barrage Automation system which shall be strictly observed:

i. The average uptime for the SCADA based Barrage Automation shall not be less than 95% for 24x7 operations.

ii. Any fault/ malfunctioning of any instrument or software affecting the functioning and operation of the Barrage shall be rectified at earliest by service engineers of Contractor responsible for SCADA operations. The MRTR (Maximum Response Time to Repair/Replace) in no case shall be later than 48/ 120 hours (48 hours in monsoon and 120 hours for rest of the year).

iii. In the case of failure of the Contractor to rectify/ repair the defective equipment within 30 days' period from the date of fault, WRD Officials may carry out the repair/ rectification work through other agency at risk and cost of the Contractor.

iv. Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract. or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the

Performance Certificate shall be issued to the Employer. Only the Performance Certificate shall be deemed to constitute acceptance of the System.

v. The system downtime for SCADA based Automation considered here is referred as malfunctioning or any error in readings of instruments or in data receipt at SCADA system at control rooms. The computation of down time shall be as per the table given below:

The System will be considered to be "down" under any of the following conditions:

1	If **Gate Control** for more than 1 (one) of Gola barrage is down from local control stations or SCADA control room for more than three hours.
2	If **Monitoring** of any field instrument data is down from SCADA control room for more than three Hours.
3	If **Monitoring** of any other parameter like (Alarms, events, feedback status etc.) is down at SCADA control room for more than three hours.
4	If **Remote Monitoring and Control** from Barrage Control Room is down for more than three hours due to failure/ fault in any equipment/IT Hardware/Software at control room.
5	If **Monthly Reporting** is not submitted (Reports from SCADA, Analysis reports, Maintenance reports etc.) in first 7 days of next month.

Unless otherwise stated, Control/Monitoring as referred above will mean Monitoring and Control from SCADA Control Room.

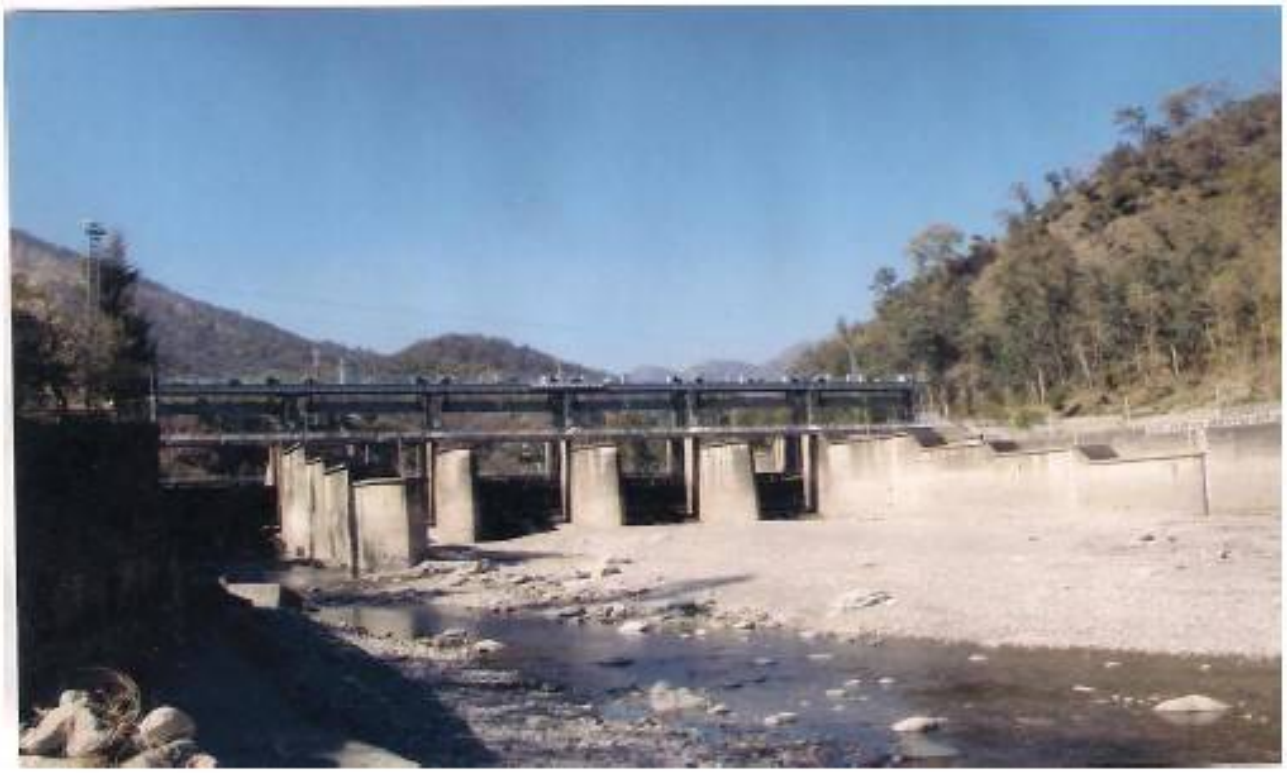
4.37 Law, regulations, codes and standards

The materials incorporated in the works shall be suitable for the duty concerned and shall be new and of first-class of commercial quality, free from imperfections and selected for long life and minimum maintenance. The Indian/International Standards like relevant IEC publications/IEEE/IS standards and Codes of Practice in their latest addition shall be adhered to for the design, manufacturing, inspection, calibration, field testing, packing, handling and transportation of materials and equipment required for this work. Shall any product be offered conforming to other standards; the equipment or product shall be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Engineer. This specification requires a reference to the following standard specifications:

IEC 61131-3	Standard for PLC Programming languages
IEC 62443-4-1	Standard for security of industrial automation and Control system
IEC 255-4	Standard for rules and requirements applicable to measuring relays and protection equipment
IEC 60157	Standard for low voltage switchgears and Circuits
IEC 61730	testing sequence intended to verify the safety of PV modules of solar panel
IEC 61215	Standard for design qualification and type approval of photovoltaic (PV) modules
IEC 61701	Test sequence for corrosion resistance of PV modules
IS 8130/34	Specifications for conductors for insulated Electric cables

4.38 Drawings

These Bidding Documents includes *["no"]* drawings.

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5. INSPECTION AND TESTING REQUIREMENTS

5.1 General

Many of the equipment as stated below shall be inspected and checked by a third-party representative of the employer at manufacturing place to carry out quality checks. The Contractor shall inform the Engineer in advance for the factory inspection for material and its fabrication. The inspection and test categories shall be applied prior to delivery of the equipment, of various categories as indicated below for each type of the equipment. The production routine test as per relevant IS shall be carried out as a part of acceptance test.

Category A: The Drawing, data sheet and Inspection test plan has to be approved by the Engineer before manufacturing and Testing. The equipment/ material has to be inspected by the Engineer or its representative at the manufactures premises before packing and dispatching. The Contractor shall provide the necessary equipment's and facilities for tests and the cost, thereof, shall be borne by the Contractor.

Category B: The drawings and datasheets of the instruments have to be submitted and to be approved by the Engineer prior to manufacture. The material has to be tested by the manufacturer and the manufacturer's test certificates are to be submitted and approved by the Engineer before dispatch of the Equipment. Not-with-standing the above, the Engineer, after examination of the test certificates, reserves the right to instruct the Contractor for retesting, if required, in the presence of Employer's representative.

Category C: The equipment/ material may be manufactured as per standard and delivered to the site.

TEST CATEGORIES FOR EQUIPMENT AND THE MATERIAL

PLC/RTU system, SCADA software, Datalogger/RTU, Ultrasonic / RADAR Level transmitters, Gate sensors, VFD etc.	Category A
All other material, signal Cable, conduits, Servers, computers, 3 KVA UPS, Solar Panel with batteries, LED display units, DG sets, Printers, IT hardware etc.	Category B
Nuts and bolts, rubber gasket, rubber rings, and fittings, etc.	Category C

i. The Contractor shall inform the Engineer about the likely dates of manufacturing, testing and dispatching. The Contractor shall notify the Engineer for Inspection and Testing, at least ten (10) days prior to packing and shipping and shall supply the manufacturer's test results and quality control certificates. For material/Equipment under category "A" and "B", the Engineer will provide an authorization for packing and shipping after inspection/verification of documents.

ii. The inspection and dispatch clearance by the Employer or the waiver thereof shall not prejudice the right of the Employer or its consignee to test the equipment/goods on receipt at destination. Upon receipt of the goods at final destination, the Employer shall have the right to inspect and /or test the equipment/Goods to confirm their conformity to contract specifications.

iii. If the equipment fails to meet the contract specifications during inspection, whether pre-dispatch or upon receipt at final destination, the supplier shall take immediate steps to remedy the

deficiency or replace the defective equipment to ensure that all supplies meet with the specifications specified in the contract.

SCADA-DSS Software

The Customized SCADA Software by the manufacturer includes:
Development of control logics, integration of discharge equations, development of various modules and various conditions are put based on the type of objective required from SCADA at factory level.

i. *At site the report formats, dashboard and creation of Screens, some minor changes in control logics as per actual site conditions are designed based on the requirement of client.*

Therefore, at the factory various tests are conducted to ensure the quality of software based on the approved ITP, in which some basic tests would most likely include: a) Simulation test, b) communication checks with PLC/RTU, c) Graphic Animation Check and others based on the features and functions of SCADA software.

5.2 Shop/ Factory Tests

All equipment shall be checked by the Contractor in order to ascertain its correct functioning and Category "A" shall be witnessed by the Employer's Representative on the basis of approved datasheets, inspection test plan and drawings (if applicable).

5.3 Packing, Hand ling and Transportation

After inspection and clearance by inspecting agency at the manufacturer's place, wherever applicable, the Contractor shall arrange and co-ordinate with all concerned agencies for proper and expeditious packing, forwarding, loading, transporting, unloading from carriers at site, inspection and storage at the agency store. Prior to dispatch all equipment shall be adequately protected by painting, packing, wrapping or by other approved means for the whole period of transit, storage and subsequent transport to the installation site against corrosion and incidental damage, including the effects of vermin, sunlight, rain, sand storms, hot and humid climate.

The instruments flanges and specials shall be protected by wooden discs attached by means of service bolts (which shall not be used at site) or by other approved means. Heavy material shall be packed in such a manner that handling during transport and unloading shall be possible with adequate equipment available at sites. bolts, nuts and other small items shall be packed in jute bags, which normally shall not weigh more than 50 kg gross per bag. The Contractor shall make good to the satisfaction of the Engineer any deterioration of the protective coatings, paint, packing etc. that may occur during transportation.

The Contractor has to ensure that the required, suitable handling equipment is available at his Workshop/stores, during interim storage and handling, and at the site for loading and unloading. All items whether individually or packed in wooden cases shall be clearly marked with indelible paint for identification against the packing list. Every crate or package shall contain a packing list in a waterproof envelope. A duplicate copy of the packing list shall be sent to the Engineer. The packing shall be in accordance with the requirements of the carrier and the lifting and handling equipment so that damage during transport, interim storage and handling can be

excluded. The items have to be marked according to their vulnerability so that the handling and transportation staff can assess the contents and the required way of handling.

5.4 SITE Inspection and Tests

During commissioning period and trial runs, the Contractor shall organize at suitable intervals all inspections and tests in the presence of the Site Engineer for this work in order to prove the orderly execution of the work in accordance with the Contract. Unless otherwise specified, all costs for testing at site and of the works and charges associated with it shall be borne by the Contractor. This includes the measuring devices, properly calibrated, and any pertinent accessories which shall be made available by the Contractor for the entire duration of the tests. The Contractor shall delegate his experts to supervise the tests at site.

Tests to be performed shall include, but not be limited to, the following:

- Checking sensitivity of all field instruments.
- Checking of correct functioning and correct calibration of all Equipment's.
- Automatic operation of the PLC/RTU shall be tested by simulation method.

5.5 LOCAL Control Systems (PLC/ RTU)

It shall consist of complete set of local controls for all equipment near their installation including their Running tests (e.g. for gates actuators on/ off), and Overload tests (e.g. over high voltage testing of PLC, Relay and motor).

All electrical equipment shall be designed for use in a tropical climate. In order to avoid operational errors and accidents, the PLC/RTU shall be equipped with an electrically operated emergency stop such that all operations of the machine are stopped on pushing of an emergency stop button.

Complete wiring of the electrical equipment and the control device with all cables shall be included, under the scope of Contractor

All such tests and checks shall be performed in the presence of the Employer's Representative. If not satisfied with the performance of the tests and checks, the Employer's Representative shall have the liberty to ask for additional tests or repetition of same. The testing at site shall be complete in every respect to prove the successful performance and operation of all the works and works supplied and erected under the Contract.

5.6 Installation Tests

The Contractor will install all the equipment's and will undertake site tests for each lot of equipment's included in the Schedule of Requirements. The exact locations for installation by Contractor shall be decided by the Employer. After final configuration and programming, the Contractor will conduct an "end-to-end" operational test for each of these stations. A formal check list shall be followed, and the results of the tests shall be recorded. The Site Engineer in charge personnel's will be trained in conducting the same site acceptance tests. A Site Acceptance Test will be passed if all sensors and RTU/PLC will perform as per the required objective of the SCADA system in the presence of Site Engineer in charge.

5.7 Operational Test (OT)

Operational Tests shall be conducted at two stages of project implementation. In each case, any operational problems related to the remote stations are to be fixed before approval can be received for the system OT. The first OT must be conducted immediately after the first lot of remote stations has been installed by the Contractor. All hardware and software components of this real time network have to be tested. The OT will be considered to be successful if all components as a whole have been operating without problems during at least 15 days' period.

The second, third, fourth and final OT will be witnessed by the Site Employer's Representative as each lot of stations are completed. Final OT will take place when all the remote stations (PLC/RTU station) system work satisfactorily for a period of two weeks. The Contractor shall demonstrate and document that the system correctly generated 95% of all expected control operations and desired daily and weekly reports for the two-week period. The Contractor will produce a report documenting the quantities of data expected / received and indicating the success / failure of the OT. The OT will be repeated until the 95% success level is achieved.

All equipment failures will be counted except those that can be specifically determined to be "acts of God". Failure of stations due to acts of God (natural disasters or other incidents) will not count against the 95%.

5.8 Final Acceptance

When the system has passed the Final OT, the Bidder can apply for Final Acceptance. When Final Acceptance is given & found satisfactory by the Site Engineer in charge the system will be officially considered to be under Warranty.

6. ANNEXURE -1

Technical Details Required to be Submitted by The Firm

Technical Specifications as per the Bid document	Technical Specifications as per Bidder
4.0 Technical Specifications of SCADA & Instrumentation System	
4.1 Water Level Measuring Systems	
The bidder shall design, supply and install best quality Level sensors considering the following points.	
a) Radar / Ultrasonic type level measuring system shall comprise of level transmitter, and any other item required to complete the level measurement loop.	
b) Radar based level transmitters shall be installed at upstream & downstream of reservoir/Barrage for pond level & downstream discharge measurement and RADAR/ultrasonic level transmitters shall be installed at downstream of canal head regulator for downstream discharge measurement.	
c) These points are to be selected so that most accurate measurement level is obtained. All accessories along-with cage to avoid theft and Monkey Menace and also proper mounting arrangement (cantilever etc.) of these instruments shall be supplied by the bidder.	
d) The level sensor shall be suitable for flange or thread mounting as required. The installation shall avoid any degradation of instrument performance due to spurious reflections, absorption and condensation. Facilities shall be provided for rejection of spurious reflection.	
e) The RADAR/ Ultrasonic type level instrument shall have the facility for dampening/ averaging the effect of waves, undulations on the water surface and discriminate the rate of change of levels to provide steady readings.	
f) All necessary instruments, interconnecting wiring, HDPE/GI pipe work, housing, cabling, panel, etc., shall be provided according to the type of equipment proposed to supply in the bid document and accepted in the Contract. Adequate safety measures shall be included in the design of these sensors to negate the effects of disturbances due to turbulence of water levels, strong air currents & electromagnetic waves etc. The Technical Details are as follows:	
4.1.1 Specifications of RADAR Level transmitters	
Feature / **Value**	
Make	
Model No.	
Site Conditions	

Ambient Temperature	From -5ºC to + 55ºC	
Humidity	5 to 95 %	
Sensor		
Sensor Type	Microwave non-contact sensor,	
Range	30 & 35 meters (As per schedule of requirement)	
Resolution	3 mm or better	
Accuracy	0.02 % FSO	
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU/Data logger	
Power Supply	2 wire type, to be powered from PLC/RTU panel (locally)	
Protection	IP67 or better	
Enclosure	Die cast aluminium or any corrosion resistant metallic enclosure	
Isolation	Circuits shall be galvanically isolated from each other.	
Display	Digital Read out at site LCD / LED Display	
Manufacturer Calibration Certificate	Required	
Beam angle	Less than 12 degrees.	
General Features		
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.	
Tools	Complete tool kit for operation and routine maintenance	
Manuals	Full Documentation and maintenance manual in English	
Accessories	Sensor Mounting support with proper HDPE/ GI Pipe conducting, cables and other accessories as required	
Mounting/Installation Arrangements	Above FRL, below a bridge girder wherever available otherwise horizontal cantilever arrangement from a mast/wall/pedestal to be provided	
RADAR Sensor should have inbuilt diagnostic feature & averaging function		
4.1.2 Specifications of RADAR/Ultrasonic Level Transmitters		
Feature	**Value**	
Make		
Model No.		
Site Conditions		
Ambient Temperature	From 0ºC to + 55ºC	
Humidity	5 to 95% (non-condensing)	
Sensor		
Sensor Type	RADAR/Ultrasonic non-contact sensor	

Range	10 meters	
Resolution	5 mm or better	
Accuracy	Better than 0.25 % of FSO	
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU	
Power Supply	to be powered from PLC/RTU panel (locally)	
Protection	IP67 or better	
Enclosure	Die cast aluminum or any corrosion resistant metallic enclosure	
Isolation	circuits shall be galvanically isolated from each other.	
Display	Digital Read out at site LCD / LED Display	
Manufacturer Calibration Certificate	Required	
Beam angle	Less than 12 degrees.	
General Features		
Sensor Material	PVDF/PP	
Enclosure	The Sensor shall be easy to dismount and replace in the event of malfunction.	
Tools	Complete tool kit for operation and routine maintenance	
Manuals	Full Documentation and maintenance manual in English	
Accessories	Sensor Mounting support with proper HDPE/ GI Pipe conduits, cables and other accessories as required	
Mounting Arrangement	horizontal cantilever arrangement from a mast/wall/pedestal to be provided	
4.2 Gate Position Measuring System		
Suitable sensors shall be provided for exact measurement & indication of position of Barrage Gates & Head regulator gates. These sensors shall be equipped with suitable shaft couplings and electronic circuits to transmit the signals to the SCADA System via local PLC/RTU for indication in Barrage Control Room & for further processing. All sensors & display units are to be mounted in the outdoor locations. Hence, suitable protection class of the enclosures shall be ensured for sensor and field mounted display. Minimum IP65 protection class shall be provided. Suitable safe & reliable arrangements of coupling with the motors of gates shall be provided. It shall be ensured that there is no slippage between the motor shaft & the transducers. In case of head regulator gates are being manually operated so necessary retrofitting required for mounting of gate sensors shall be executed by bidder. The gate sensor shall be connected to the nearest PLC/RTU's/ Datalogger located at barrage top through hard wire.		

Feature	Value	
Make		
Model No.		
Site Conditions		
Ambient Temperature	0 to 55 Degree Celsius	
Humidity	5 to 95% (non-condensing)	
Sensor		
Sensor Type	Shaft Encoder based rotary position sensor with Digital Display	
Range	0-20 meters	
Resolution	3 mm or better for gate position	
Accuracy	5 mm or better	
Output Interface	SDI-12 / RS 485 / 4-20 mA or as compatible to PLC/RTU	
Power Supply	2 wire type, to be powered by RTU/PLC	
General Features		
Material	Corrosion Resistance Metal (Stainless steel or Aluminum)	
Enclosure	Lockable (key) box provided by the supplier to be mounted on sensor, with IP65 or better protection	
Tools	Complete tool kit for operation and routine maintenance	
Manuals	Full Documentation and maintenance manual in English	
Mounting	Wiring from sensor to RTU/PLC must be through HDPE/ GI Pipe Conduits and flexible metallic conduits wherever applicable	
Display	Read out LCD / LED field mounted Display	
Process connections	through suitable coupling	
Manufacturer's Calibration Certificate	Required	
4.3 Surveillance System		
Primary Purpose of Surveillance system is to view gate movement from Control room. Operator should be able to see that the gates moves up/down or stop when the appropriate command is given.		
Bullet cameras IP based shall be placed to monitor the position of all the gates & PTZ cameras shall be installed on the main Barrage in a way to ensure the complete monitoring of the Dam. The same shall be connected with NVR (Network Video Recorder) which shall have a memory of at least 30 days. Cameras shall be connected to internet, to have its accessibility from farthest point through IP address.		

The cameras shall have a provision of connecting with NVR through hardwiring using video cable (RG-6 coaxial cable)/OFC and simultaneously through internet using IP address of cameras.	
Each bullet camera shall be installed in such a fashion that it shall be able to monitor at least one gates.	
The following minimum features shall be available in CCTV system	
i) **Bullet Camera** (Fixed Type)- shall be IP based with 3G/4G connectivity with standard SIM slot, Outdoor Weather Resistant, 2 Mega Pixel,72 LED Color Camera.6 or 8 or 12 MM (According to site suitability) 2 MP Auto Iris Lens in Elegant Metal Die Cast Housing. Outdoor weather resistant IP 66. The camera shall have SMS facility for sending alarms. The recording mechanism shall be such that when the available storage is less than 10% the system shall adopt FIFO mechanism & file shall be deleted accordingly. RTC real time clock shall Support NTP and remote setting.	
ii) **Pan Tilt Zoom (PTZ)** 36 X Optical and 12 X Digital Zoom; 2 Mega Pixel IP (DIGITAL) camera, 500 mtrs. Night Vision (Multiple Intelligent Array system) in IP66 Weather Resistant Outdoor Metallic Housing.	
iii) Standalone **NETWORK VIDEO RECORDER** (NVR) 32 Channel 1080 P Full HD, Real time Recording and Reviewing in H.264 Compression Format. With HDD. Remote Viewing Capability through Internet /Android /Apple/ Mobile App Xmeye /CMS software with password protection & user name.	
iv) Necessary mounting arrangement like MS/ GI Poles 4/6/8-inch Dia - Medium Grade Pipe of Standard Make with suitable length along with junction box & other accessories as per the site suitability shall be provided by the bidder for installation of CCTV system along with associated Civil works.	
v) All cameras shall be protected using metallic enclosure for protection against physical damage from monkey and vandalism.	
4.4 VFD Starters Panels	
Make	
Model No.	
The VFD shall be provided for each Barrage gates with following minimum features. 3 Phase VFD Starter panel shall consist of S.P.P, MCB, OLR, Timer, Main Switches of reputed makes including wiring and Electronic Digital Indicator etc. The control module must be able to drive motors with the following control modes: linear, parabolic and parameterizable V/f characteristic, V/f characteristic with forward/reverse current control, linear and parabolic V/f characteristics with eco mode for additional power saving, vector control without sensor, torque control without sensor. The drive system must be	

protected through thermal motor protection, thermal converter protection, monitoring for under voltage and overvoltage, overloading, grounding, short circuiting, stalling and blocking of the motor. All digital and analogue inputs and outputs must be freely parameterizable and assigned to a specific function in the factory setting. To parameterize the drive, an integrated USB/serial interface for PC/Laptop connection is needed, saving and loading parameter records and firmware updates must be possible. The terminals have to be identified by replaceable labelling strips for individual marking.		
4.5 Data logger/RTU with 2 channel Inputs		
The Data logger/RTU shall automatically collect the observations from interconnected sensors, process and store them into its memory and transmit the real time data through GSM & GPRS communication to SCADA system at Barrage control room. Data logger/RTU shall be installed at Gauging site for inflow & outflow river discharge to/from Barrage for monitoring & real time data transmission.		
Also, the gates of head regulators are manually operated which shall have dataloggers installed to transmit the real time data through GSM & GPRS communication to SCADA system at Barrage control room.		
The Data logger/RTU shall also continuously monitor the status of sensors, power supply and communication. In the event of failure of any instrument or disruption of any of the power sources, an alarm shall be sent back to the SCADA system at DCR through GPRS & GSM communication.		
The number of input channels in the Data logger/RTU must be compatible to the sensors being integrated. Data logger/RTU shall provide necessary electrical power to the sensors and conversion of electrical output signals from the sensors into engineering value based on calibration information stored in the memory. Full compatibility with all types of sensors provided in the package is mandatory. The power supply to Data logger/RTU shall be made available from Solar Power system.		
The Data logger/RTU can be installed on the same mast with the solar power system and it shall be housed in IP65 housing enclosure. Following are the minimum technical specifications for Data logger/RTU:		
Feature	**Value**	
Make		
Model No.		
Site Conditions		
Ambient Temperature	From 0 to +55 Degree C	
Humidity	5 to 95 % (non-condensing)	
Sensor Interface		
Input type	2/8 channels compatible with outputs of sensors (as specified in schedule of requirements)	
Input - Output Interfaces		

Data Transfer	USB stick option for Data transfer	
Port for Configuration	One Serial Port (RS232) for communication with Laptop for programming	
Port for Telemetry	1 Ports for Communication with Telemetry (GPRS/GSM) device	
Computer Software		
Operating System	Windows software for system configuration / communication	
Version	English language version	
Licenses	All required licenses shall be included	
Analog to Digital Converter		
Resolution	16 bit or better	
Sample intervals	1 Sec to 24 hours (user scalable)	
General Features		
Data Storage memory	Minimum 1GB memory that can store one year of data and shall be expandable	
Mathematical Function	For integration of discharge equations & discharge coefficient	
Firmware Operating System	Multi-tasking operating system - must log data and transmit at same time	
Display	Digital Display/HMI for viewing current data and setting values	
Power Supply	Shall be powered by solar Power supply to be provided by bidder	
Battery Voltage	Monitoring of battery voltage level	
Internal battery	Internal battery backup for clock	
Charge Controller	Internal or External	
User Permissions	Different user levels, system of user rights / passwords, access restricted to unauthorized personnel	
Keypad	For displaying or transferring data to memory stick, configuration of data logger and sensors	
Real time clock	GPS synchronized	
Enclosure	for wall-mounting in a shelter / enclosure with IP65 protection or better	
Accessories	Serial cable + adaptor. All accessories (fixing units, etc.) as required	
Tools	complete tool kit for installation and routine maintenance giving full detail (number of pieces and type)	
Manuals	full documentation and maintenance instructions in English (1 copy per station).	
GPRS MODEM		
Operating Temperature	From 0 to +55 Degree C	

Performance	Data Reception availability of 95% or better	
Form factor	The GSM /GPRS modem should either be integral part of data logger specified above, or it should be supplied as independent unit compatible with supplied data logger	
Specific Features		
Communication Direction	Utilize network for two-way TCP/IP (INTERNET) connection and SMS	
Power Saving	Ability to disable interrogation system in order to save power at remote site	
Communication Protocol	Data transmission to execute HTTP Post, FTP, SMS to transmit and receiving data to the Data Center	
Accessories	All associated equipment, including Antenna all cables and mounting hardware	
Antenna features		
Frequency range	900 MHz: 824-960 MHz/1800MHz:1710-1880 MHz, 4G and better	
Radiation	Omni-directional	
Connector	SMA or suitable RF connector adaptable to GSM/GPRS modem	
Cable length	As required at site	
4.6 PLC/RTU for Barrage		
Make		
Model No.		
CE/UL approved manufacturer's Remote Terminal Unit/Programmable Logic Controller (RTU/PLC) in IP54 enclosure having modular PLC/RTU (Plug and play type) for control & monitoring with Modular Controller and should have modular communication. The Local PLC/RTU located as barrage top should be able to communicate to the master controller on an open protocol such as Profibus / Modbus over Ethernet TCP/IP using OFC cable & bidder shall provide the memory map of the same for third party etc. simultaneously the PLC/RTU shall be able to communicate with BCR via GPRS/GSM based wireless technology in order to create redundancy in telemetry to avoid loss of communication & Data.		
It should be possible to view the reports of SCADA system without requiring any software, from any PC, using web-based protocols. Data logs should be stored inside the CPU and should be downloadable in CSV format using a web browser. It should be possible to increase the I/O handling capacity of the PLC/RTU, without changing the CPU. Maximum number of gates that shall be controlled by a single PLC/RTU shall be two (2). It should be possible to remotely configure the local PLC/RTU from the control room. Each CPU shall be tested to work in a temperature range of 0 to +55 degree Celsius. The CPU shall have integrated non-volatile memory capacity not less than 1 MB & extended memory up to 4MB using memory card. All must be complied with IEC-611131-03 and IEC 61158(4-20Amp). Suitable		

industrial grade AC to DC Power Supplies shall be mounted inside each PLC/RTU. Each PLC/RTU shall have separate power supplies for electronics and field. Surge Protection Device shall be provided inside each PLC/RTU, to safeguard against transient & lightening surges.	
Industrial grade Fibre Optic convertor shall be housed in each PLC/RTU for optical communication between PLC/RTU & central controller. Each PLC/RTU shall have GPRS modem for wireless based communication with SCADA system at BCR.	
Each PLC/RTU shall also be integrated with up to 2 no. digital drive starters panel and capable of operation at up to 55 degrees Celsius. The PLC/RTU equipment shall be housed in a properly sized, weather-proof panel and must be protected with lightening & surge arrestor.	
The PLC/RTU shall be designed as per following specifications	
A. Panel inside Climatic Conditions: The PLC panel shall be fitted with a space heater mounted in the panel bottom with sufficient space clearance. The heater shall be protected with the MCB along with auxiliary signaling contact. The heater shall be controlled by PLC/RTU according to the application requirement. The panel shall be fitted with two cooling Fan's with filters, and protection, for better control of internal temperature. The individual cooling fans shall be controlled /switched ON/OFF by the PLC/RTU according to the application requirement.	
B. Temperature Monitoring The PLC panel shall be fitted with the temperature sensor, space heater and shall be connected to the monitoring system. The monitoring system shall continuously monitor the panel temperature, and if it exceeds the set value, it shall automatically switch ON the cooling Fan's. The cooling FAN shall be Switched OFF after the temperature of the panel is brought back to normal level.	
In case of Emergency Sequence of power back-up, the cooling FAN shall be switched OFF to save the power.	
The PLC/RTU shall be capable of monitoring and controlling the temperature inside the panel and shall transmit the following information to the Dam Control Room.	
i. Panel temperature	
ii. Status of cooling Fan's	
C. Power Supply Scheme Protection shall be provided in the input side of the mains power supply as follows;	

i. **Input mains Fault Protection**: MPCB of suitable ratings shall be provided by bidder for mains power supply fault level protection. The mains input shall be protected using MPCB (with adjustable current limiting) and auxiliary signaling contact. Auxiliary signaling contacts shall monitor the Healthy/Trip condition of the MPCB. The signaling contact status information shall be updated in the control room.	
ii. PLC/RTU can be provided with Isolation transformer for 415 to 230 Vac. Also, the relay board/contactor switches to be installed in motor starter panels for acquiring the status of electrical parameters shall be from reputable manufacturers with better standability against voltage fluctuations.	
iii. **Control Voltage**: The proposed PLC/RTU system control power supply voltage shall be 24V-48VDC and the same shall be derived with the use of SMPS Power Supply Unit. The SMPS input power shall be protected with suitable MCB. The power to the input of the SMPS shall be switched ON/OFF from the PLC/RTU through Auxiliary relay contact. The panel control switch gear, PLC unit, Communication unit, HMI Screen Panel, indication lamp, hooter, instruments, Auxiliary Relays, Signal Conditioners/isolators, etc. shall be energized by control voltage of 24V - 48V DC.	
D. Power Supply On/Off All the field instruments integrated with each PLC/RTU, shall be connected to the single power supply bus and energized with the control voltage supply of 24V-48 VDC. The PLC/RTU according to the application program (periodically) shall switch OFF the control voltage supply via the DC contactor, and Switch ON the control voltage supply after a programmable time delay by actuating the DC Power contactor and the use of programmable mechanical/electrical timer switch gear unit automatically to clear the memory and other floating memory locations errors, warning, faults, etc. Ultimately it shall Reset the PLC/RTU. The power supply ON/OFF function command shall be activated manually, locally or through timer fitted PLC/RTU the event shall be recorded in the database and suitable reporting system shall be implemented.	
E. GPRS Communication Network The proposed Intelligent GPRS communication unit shall have GPRS communication network capability. **Reliable Integration**: The modem should be very tightly integrated with the PLC/RTU network. **Failure of Global System for Mobile Communications:** The PLC/RTU should store data in file in buffer memory of at least 2MB if unable to transfer due to maintenance of Global Packet Radio Service of the service provider or power failure in the cell towers or cell channels switching center, etc. Data will	

be transferred to central location in secure manner. No data loss in case of no connectivity shall be achieved. In case of GPRS network failure the GSM communication shall be opted as a wireless mode to communicate with SCADA system at Barrage control room.	
F. PLC / RTU: The PLC should have inbuilt RTU functionality with a support for USB/RS 485/RS232/Ethernet port Modem connection. The PLC/RTUs shall have minimum communication ports as follows:	
i One RS485 Port for sensor interface.	
ii 1x RS232 ports for the PLC/RTU maintenance and configuration. It shall be possible to increase the number of communication ports in the PLC/RTU by addition of cards, if required in future.	
iii PLC/RTU shall be designed with cyber security features based on IEC 62443-4-1 (SDLA certification) & shall have international certification (Achilles Level II/equivalent certification) or EDSA certification based on IEC 62443-4-1 for specific model proposed by bidder. The access to the Server shall be restricted with passwords both at Windows level and at Application Level. Also, all the data should be stored in a separate file system which shall be independently accessed by the Remote Network without disturbing the PLC/RTU operation and thereby maximizing the cyber security.	
iv The PLC/RTU should support for follow minimum features: • Should have the facility for the Force Simulation • Facility of Forcing Input /output variables when the physical devices are not functional • Should have user access with password protection • Should have the facility to program the PLC/RTU for all the different phases	
v The PLC/RTU based SCADA system should have the facility of the Web monitoring, the same shall be audited by NIC & hosted by NIC server in order to minimize the cyber security issues.	
vi The PLC/RTU should support firmware upgrades through network.	
vii The PLC/RTU should have facility of storing intermediate variables	
• Program protection feature, network filter setup, Operation log function, function removal feature should be available.	
• User authentication, user-based operation restriction, and CPU operation restriction should be available.	

• The CPU should be fast enough and capable of multi-tasking capabilities like running various tasks at different programmable cycle times.	
• The CPU should have minimum 1 MB RAM to cater to current and future program additions.	
• The PLC/RTU shall support all the file operating functions so that CSV file log can be stored in the basic CPU memory/buffer memory of GPRS modem for maintaining the log in case of network connection failure.	
• The PLC /RTU shall be designed to a modular concept, with separate modules for each function. The modules shall be rack mounted and may be quickly exchanged for field repair. It shall not be necessary to remove field wiring in order to exchange a module. The PLC/RTU shall support a wide range of input /output signals including status inputs, pulse (accumulator) inputs, analogue inputs, analogue outputs, and control outputs. The PLC/RTU shall support any combination of the above I/O points.	
• It shall be possible to add PLC/RTU's and software enhancements in the future, without taking the system out of service. The design and physical layout of the PLC equipment shall be on a modular basis, so that extra facilities, such as an increase in the number of status points or analogues, may be added with minimum of disturbance.	
• The PLC/RTU shall be expandable by simply adding I/O modules to the system bus. Other than user-friendly configuration of the new modules, no additional PLC/RTU software or firmware shall be required.	
• The operational status of the PLC/RTU shall be indicated on the front panel of the processor module by means of LED lamps. In addition, each I/O card shall have LED status indication.	
• Modbus TCP/IP on Ethernet /Profibus communication (IEEE 802-3, or IEC 60870-5-104) shall be provided for PLC/RTU network interconnection towards SCADA station.	
• SCADA System is to be capable for configuring of PLC/RTU remotely, from Barrage Control room.	
G. Microprocessor /Microcontroller Module (CPU)	
• Built-in minimum 1 MB RAM should be available for storing Data and log records as files. Memory Card of minimum 4 MB is supported for storing data, programs and log records as files Built-in Ethernet port should be available;	
• In addition to normal scanning, CPU module should have an independent multiple constant scan function capable of a maximum scan speed i.e. fast response should also be achievable with a single CPU.	
• CPU should have a compact body.	

• Large-capacity programs and large device sizes shall be supported to cope with advanced, complex control applications.	
• A rich set of functions should be provided to facilitate program debugging and maintenance. For example, a forced SET/RESET function independent of program processing results.	
• PLC/RTU shall employ solid-state technology and use an industrial standard, suitable for operation in an aggressive environment with high levels of temperature, humidity and dust being common. It shall operate correctly up to a temperature of 55 degrees Celsius and up to 95% non-condensing humidity.	
• On-board battery backed Real Time Clock (RTC) is required. The RTC will operate on the battery power even when the main power is lost.	
• The PLC shall have a separate watchdog circuit independent from the main processor, which will reset the system if the firmware program fails in any way. The watchdog circuit shall be capable of being enabled or disabled by means of a jumper or by software.	
H. Power Supply Modules	
• DC Power Supply Unit (PSU) of voltage: 24 -48 VDC shall feed PLC/RTU power supply modules. Doubled power supply modules shall be fitted per each PLC/RTU configuration.	
I. Communications Interfaces	
• Communication interfaces shall correspond communications between the central PLC and distributed PLC/RTU units, via hardwired OFC cable and GPRS wireless technology at Barrage sites whereas remote location (i.e. inflow & outflow gauging site) the communication between Central PLC shall be through wireless GPRS/GSM communication.	
• Adequate number of process Bus (Profibus/Modbus over Ethernet TCP/IP) Communication Ports shall be configured for communication interfacing to intelligent Instrumentation. Serial communication RS232 Port/Ethernet for local laptop connection shall be available as well.	
• The RTU/PLC at Barrage gates shall be communicating to Barrage Control Room through Optical Fiber Cable (OFC). It should possible to remotely configure the RTU/PLC from barrage control room. Industrial grade optical fiber convertor shall be housed in each RTU/PLC for optical communication between RTU/PLC and central controller.	

J. PLC/RTU I/O Facilities	
i. General • PLC analogue and digital inputs and outputs shall meet the requirements of test voltage of class II of IEC 255-4 appendix E. • The PLCs should be of modular structure, equipped with separate I/O modules for each type of I/O signals, as follows. • The PLC/RTU shall have a minimum 20% spare I/O count for each type of module.	
ii. Analogue Inputs • Analogue inputs shall be capable of accepting current signals of, (4-20) mA, with over range capabilities and support for 2/4 wire communications • All components used in measuring circuits that affect accuracy shall be of high stability and low temperature coefficient. • A/D conversion shall be provided on each analogue module. The module scan cycle shall be rapid so as to satisfy the overall analogue response time specified to the master workstations. • It shall be possible by means of the PLC/RTU configuring software, to modify the signal dead-band, so that fluctuating signals are not continuously reported to the Master Station	
iii. Digital Inputs • Digital input modules shall be optically isolated. Digital filtering to suppress contact bounce shall be provided. In addition, software filtering of two successive cycles shall enable confirmation of state. • To reduce data transmission, time tagging shall be selectively applied. Only some inputs shall be time tagged at the PLC/RTU, but other inputs shall be time tagged on arrival at the Master Station.	
iv. Digital Outputs • The digital output modules shall support isolated outputs in, latched and BCD mode. Individual LEDs will indicate the status of each output. The outputs shall be isolated to at least 500V dc. Controls transmitted between the control station and the PLC shall comprise a select, check-back, execute sequence (or other means of providing high message security). On receipt of a select message, the PLC shall prepare to operate the output relay, and then return confirmation of correct selection of the relay to the Control Station. This signal shall be obtained as far as possible and shall be generated locally, not derived from the incoming signal. On receipt of the execute command, the output relay shall operate and confirmation of execution shall be returned to the Control Station. • Not more than one digital output shall be possible at a time. Selection of two or more contacts simultaneously or in quick succession without one	

having been completed, shall result in cancellation of both requests and return an alarm to the Master Station. • Software interlocking schemes shall be applied with reference to process requirements.	
v. Analog Outputs • The PLC shall support analogue set point outputs. These may be used to issue controls directly to plant controllers, or to drive displays. • Analogue outputs shall generate (4-20) mA DC output signals into a minimum load of 500 Ohms at a nominal operating voltage of 24V DC. • Simultaneous operation of individual digital outputs shall be provided, where this facility is required. Set point outputs shall provide the security to ensure that false selection of controls is minimized, similar to individual digital outputs.	
K. Dummy Control	
To provide test facilities, a remote dummy control shall be provided. The dummy controls and associated status indications shall be allocated with discrete addresses and operate as if they are real equipment. To set up a dummy control a PLC/RTU with dummy control set up for training of operational staff shall be provided.	
L. PLC/RTU Operation Features	
i. Operation with Control Station	
• PLCs shall have their own unique address and not transmit information to the Control Station without the request. In order to reduce communications channel load, PLCs/RTU shall incorporate data transmission reduction methods. PLC/RTU shall reply to each interrogation on a "Report-by-exception" basis with the Control Station, also being fully updated on a regular basis. Digital input data shall only be transmitted when the status has changed since the last pool interrogation. Analog values shall be transmitted when a defined percentage change occurs from the last transmitted value. Each PLC/RTU reply shall automatically include the verification of the address in the response.	
• Full details of the management of digital and analogue input/outputs counts shall be submitted for approval by the successful bidder.	
• PLCs shall be also available to be polled at any time from the Control Station, either on a periodic basis or on operator command. In case of polling, all inputs may be scanned.	
• Control messages from the Control Station, shall be capable of being initiated at any time to control the barrage, and shall have priority over all other messages.	
• The communication system shall have feature of assured delivery of data & commands using the suitable communication protocols.	

ii. Automatic Restart	
• power interruption and /or communications failure, the PLC/RTU shall be arranged to restart automatically. This may be accomplished by retaining memory in non-volatile store.	
M. Local HMI Facilities	
• The remote PLC/RTU system shall be equipped with adequate operator panel to enable monitoring and control for the operator at the barrage level.	
• The operator panel shall be preferably accomplished by means of LED/LCD backlit display of 7 inches or above at Local Control Stations & 12 inches at Central PLC. The graphical LED/LCD should be easily detachable such that its failure does not affect the PLC/RTU functionality.	
• HMI functionality shall be capable of presenting customized views with key process variables presented as digital and graphical data. The HMI shall provide the ability to navigate from control screen to control screen or to navigate via navigation buttons or similar graphical device on the current screen.	
• The HMI software must support real-time and historical trend graphic displays as part of a display.	
• The HMI software shall provide the capability to provide popup windows for device control, trends and device status pages.	
• HMI shall support parameterization and Configuration settings through its display at local PLC/RTU Station	
N. PLC Programming	
• PLCs shall be reconfigurable from either a locally connected portable programming device /laptop and remotely over the communication links from the control station.	
• Configuration changes shall be protected by access codes.	
• User-friendly designed PLC programming editor supporting all IEC 61131-3 Programming languages shall be included in the set of engineering software. For local process control, the PLC shall support Open PLC programming standard, according to IEC 61131-3, including five main programming methodologies:	
• Ladder Diagram (LD)	
• Function Block Diagrams (FBD)	
• Instruction List (IL)	
• Structured Text (ST)	
• Sequential Function Charts (SFC)	
• PLC/RTU application software shall be installed in contiguous PLC/RTU memory data area, in order to ensure sufficient PLC/RTU computing speed. The PLC memory shall be sized to ensure it is not more than 50% occupied and that maximum occupancy does not significantly slow down the	

computing functions.	
O. PLC/RTU Process Operation	
• PLC/RTU shall be enabled for effective SCADA monitoring, control and data transfer with control station, as well as for local PLC /RTU level closed loop process control, control logic and other local automation applications.	
• The PLC/RTU shall be controlled by application software making it capable of the following minimum functions:	
• Command outputs	
• Select before operate feature	
• Digital filter	
• Adjustable chatter frequency	
• Time-tagging of events	
• Alarm handling	
• Automatic Restart	
• Report by exceptions	
The PLC/RTU shall be of Industrial grade with the IEC Certifications	
4.7 RTU/PLC Panels - IP54 and above	
i) PLC/RTU Panel/ Enclosures:	
• Factory fabricated to requirements, lockable double door, dead-front, self-supporting.	
• Cabinets shall consist of a rigid self-supporting structure constructed of not lighter than 2 mm thick, cold rolled, stretcher levelled sheet steel, braced rigidly where required with structural members. Panels and doors shall be constructed of the same weight and type of material as the housing. Housings, including doors and panels, shall show no evidence of warping, weaving, or distortion upon completion of installations.	
• All cable entry in to the panel shall be form bottom using cable glands of adequate size.	
• The panel shall be provided with forced fan cooling system as a standard.	
• The internal panel layout must be designed considering proper approach to the PLC/RTU, instruments, relays, terminals and other accessories for maintenance.	
• The Cubicles should in sheet steel construction, free floor mounting with front and back access. The doors and side covers should be of 2- mm thick sheet and all load-bearing members are 2 mm thick.	
• Arrange doors with minimum 105 degrees' open position and with stops. Construct doors so that they neither weave nor warp; provide stiffening members where necessary to ensure rigidity.	
• Provide ample duct space for adding and removing wiring from the top.	
• Dimensions – As per site requirement & as approved by Engineer in charge.	
• Lock System: Slam lock /Screw Fixed - with common key or unique key.	
• The cabin shall be provided with power distribution units with sufficient number of sockets to provide power to equipment's hosted inside the cabin.	

• Provide channel base for mounting.	
ii) Equipment Arrangement:	
• Wiring ducts to provide easy access for inspection and maintenance.	
• Design and arrange ducts and terminal blocks to accommodate bottom entry to cabinet for control, alarm, status, power, and instrumentation cables, as required.	
iii)Ground Bus	
• Provide continuous copper bar ground bus, size not less than 6 mm by 25 mm along the full length at the rear of the panel.	
iv) Nameplates	
• Engraved 20-gauge metal/baked enamel or phenol plastic, black background/white letters, drilled for screw mounting with round head screws.	
• Provide nameplates for all equipment, instruments, power supplies, relays, circuit breakers, fuses and other devices furnished and mounted in the cabinet. Provide nameplates for each device on panel interior door.	
• Submit size, type, and wording for AUTHORITY's approval. All nameplates shall be in English.	
v) **Terminal blocks**	
• Terminal blocks for switchboard control wiring shall be DIN rail mounted screw clamp type.	
• Provide white or other light-colored markers to the terminal block, for terminal designations.	
• Make no more than two connections at each terminal point.	
• Confine switchboard internal wiring to one side only of the terminal block. The other side shall be reserved for incoming leads.	
• Twenty percent of terminal points in each panel section shall have no connections and shall be designated as spare terminals.	
• Form control wire bundles without sharp bends and support adequately.	
vi)Indicating Lamps	
• The indicating lamp assemblies shall be a heavy-duty type with color caps. Indicating lamps shall be suitable for AC/DC power supplies, utilizing long life incandescent type lamps.	
vii) Lighted Pushbuttons	
• Each lighted pushbutton shall be mechanically interlocked, illuminated type. Lighted buttons shall be the recessed guarded type to preclude inadvertent operation. Gate control lighted pushbuttons shall be furnished with a flasher so the lamps will blink at a 1-second on and off rate when the maintained pushbutton is operated.	
viii) Push Buttons • Each unit shall be a maintained contact type. Pushbuttons shall be the recessed guarded type to preclude inadvertent operation.	

ix) Relays • Auxiliary relays: The auxiliary relays shall be in accordance with IS standards and shall be machine tool or industrial type. The relays shall have convertible contacts and shall be self-resetting. A minimum of two spare contacts shall be furnished on each relay.	
x) Special Tools • The bidder shall furnish any special tools that may be required to allow proper connections of wiring to devices and all terminal blocks.	
xi) Surface Finish • Cabinet has to be Nano-Ceramic/Epoxy Powder quoted with RAL 7035 after proper pre-treatment as per the best industry practice, with thickness of 80 to 120 microns.	
xii) Test Procedure • After the cabinets are completely assembled and wired, perform the following tests and procedures. • Dielectric test on all circuits in accordance with standard test requirements. Instruments or other devices that cannot withstand test voltage shall be disconnected. • Circuit continuity test to verify connections. • Functional tests of all control switches and indicating lamps. • Verify operation of Operator Interface Unit on cabinets. • Temperature testing to ensure that operational temperature of all equipment's is maintained.	
4.8 Flood alarming station	
The flood alarming stations shall be provided by bidder at two specified locations with primary objective of developing early flood warning system based on river outflow discharge from Gaula barrage.	
The objective is to develop a comprehensive system. The system is supposed to work on logic like activate appropriate level of warning if accumulated rainfall over a specified time or intensity of rainfall is greater than a set value or activate warning if water level or rate of water level rise in the river is greater than set values. The values have to be adjudged initially based on experience, and gradually rectified at field as more and more data is available. The system must be able to work through solar power supply with 36 hours back up.	
A set of threshold values of rainfall intensity and total rainfall amount would be pre-set (in HIS developed by NHP) to trigger yellow (alert level), orange (alarm level) or red (critical level) alerts this real time data shall have integrated by bidder in SCADA system for which purchaser will coordinate. Likewise, initial threshold for the yellow, orange & red water level alert may be decided mutually by purchaser & bidder which shall be customized in SCADA system for development of flood warning system.	
Values of the rainfall and the water level thresholds will have to be developed separately, based on its relation to actual observation of critical water levels at the respective warning stations. The lead time for forecast plays a critical role and will have to be displayed. To begin with, travel time of flood wave may be	

estimated considering a speed of 10 km/hour. The values will have to be updated for each reach based on actual observations.		
The Flood Alarming station shall have following equipment's for implementation of Automated Flood Monitoring system. iv) Intelligent Field Controller/RTU for execution of instructions received from SCADA system. v) Siren for alerting the public which shall function based on control logics. vi) Solar Power Supply system for power backup		
4.8.1. Intelligent Field Controller/RTU system The Warning stations shall be installed with controller/ RTU system for execution of instructions received from SCADA system. The Controller/RTU shall have inbuilt control logics which based on instructions/Command received from SCADA via. GPRS/GSM modem will provide the signal to Siren fitted in the same control cabinet mounted on the mast of Solar power system. The Intelligent Field Controller/RTU system shall be provided with following minimum Specifications		
Technical Specifications		
Feature	**Value**	
Make		
Model No.		
Module Type	Controller with inbuilt/external GPRS MODEM and Communication Ports	
CPU		
CPU Type	24 Bit	
Programming Languages	LD, FBD, CFC, SFC, ST as per IEC 61131-3 standard	
Memory		
RAM	1 MB	
Flash Memory	4 MB	
Communication	Wireless GPRS/GSM based	
Ports		
Ethernet Ports	1 no.	
RS 485 Port	1 no.	
Micro SD card Slot	1 No. (up to 1 GB SD Card Support)	
GPRS/GSM Modem		
Frequencies GSM/GPRS	Quad band: 824-960 Mhz / 1800 MHz: 1710-1880 MHz, 4G or better	
Antenna Interface	SMA or suitable to GPRS/GSM modem	
IO Specification		
Digital Input	4 No. (minimum)	
Digital Output	4 No. (minimum)	
Analog Input	2 No. (minimum)	
Power Supply	To be powered by Solar power supply provided by bidder	
Installations		
Mounting	DIN /Rail mounted	
Environmental		

Specifications		
Operating Temperature	0 to 55 Degree C	
Relative Humidity	5 to 95%, non-condensing	
Additional Features		
Simple Network Type Protocol (SNTP)	Synchronization of the system clock	
Approval	CE/UL approval	
Messages	Send and receive short messages (up to 10 templates respectively)	
Enclosure Type	Metallic enclosure IP65 fitted with surge protection & siren with audible range up to 2 Km.	
4.9 Solar Power System		
The solar power system has to be provided as a power back up system for all PLC/RTU/Dataloggers, instrumentation system. It shall have following minimum features:		
i. Supply, Erection and commissioning of Solar power system with all allied ancillaries for providing un-interrupted power supply to each PLC/RTU/datalogger system as per the schedule of requirement and shall provide power backup for minimum 36 hours without sunshine/charge. The Solar Panels shall be provided in anodized aluminum frame with tubular batteries with conformance to IEC-61730, 61215 and 61701.		
ii. The Solar power system shall be mounted on the top of barrage. The Contractor may also supply a pole – mounted arrangement including a standard pole and necessary foundation and fixing arrangements. The location of solar power system installation shall be indicated by the concerned engineer – in –charge.		
iii. The batteries required for the equipment above shall be maintenance free, rechargeable sealed batteries with Overcharge and deep discharge protection Leak-proof Easy handling, Excellent recharge ability.		
iv. The battery pack shall also include arrangements of charging through a standard AC power supply available nearby and also from solar panels established as above.		
v. The solar power system unit shall have audio or visual alarms for overcharging and deep discharging conditions. The sealed construction shall allow trouble-free, safe operation in any position. The battery case shall be high impact, with sufficient resistance to shock, vibration, chemicals and heat.		
vi. The necessary housing and configuration of the batteries shall be furnished in detail by the Contractor.		

vii. The battery case shall be high impact, with sufficient resistance to shock, vibration, chemicals and heat.		
viii. The disposal of batteries during 5 years' comprehensive warranty period is in the scope of bidder.		
The solar panel offered shall confirm the following technical specifications:		
Feature	**Requirement**	
Battery		
Voltage	As required for instrumentation system	
Type	Sealed maintenance free	
Capacity	power supply system shall provide 36 hour of backup to all equipment 's being powered up by the solar panel	
Solar Panel		
Size	power supply system shall provide 36 hours of backup to all equipment 's being powered up by the solar panel	
Mounts	The mounts shall be detachable but shall not move or rotate with wind. It shall have a provision to adjust direction and elevation during installation for optimal solar power generation	
Charger	Smart solar charger shall be provided by the bidder	
General		
The supplier shall determine optimal size of solar panels and batteries such that the system will be operational for at least 36 hours in absence of charging/ without sunshine. The supplier shall also provide the calculation of power consumption of Solar power system.		
4.10 Early Streamer Emission (ESE) Lightning Protection System: -		
A lightning conductor is incapable of discharging a thunder cloud without a lightning stroke. Its function is to divert to itself a lightning discharge which might otherwise strike a vulnerable part of the structure to be protected.		
The following points are the minimum requirement of Early Streamer Emission (ESE) Lightning Protection System guideline as:		
➢ Air terminal should be selected and provided only based on the protection angle or rolling sphere method.		
➢ Connection to the air terminal and down conductors should be checked properly and the connection need to be done with proper tested clamps.		
➢ Wherever incompatible materials to be joined (Ex. Copper with Aluminium), suitable bi-metal connectors should be used.		
➢ Suitable expansion joints must be provided on the horizontal conductors on top to take care of thermal effects.		

➢ Special conductor holders of insulating type need to be provided on top of the terrace floor for routing the conductor to ensure electrocution impact does not happen in case of water stagnation.		
➢ Establishing connection for equipotential bonding with nearby metallic components need to be taken care of.		
➢ Proper safety distance between the air terminal and any metallic object need to be maintained.		
➢ Down conductor should run as straight as possible thereby providing a low impedance path from the air termination to the earth electrode so that the lightning current can be safely conducted to earth.		
➢ There should be a test joint arrangement to have separation between down conductor and earth termination for safety and for measurement of earth resistance.		
➢ At least two down conductors are mandatory immaterial of how small is the installation is.		
➢ Good contact between reinforcing bars to be ensured only by using connection clamps tested.		
➢ Joints should be mechanically and electrically effective, should be protected against corrosion or erosion from the elements or the environment and should present an adequate contact area.		
➢ A common earth termination network is recommended for the lightning protective system and all other services.		
➢ Earth electrodes for each down conductor to be provided for the installation.		
➢ The termination of down conductor to an earth electrode should be done minimum of 1 meter away from the structure and minimum of 0.5m depth inside the ground.		
➢ Proper monitoring and value measuring option to be provided for earth pits and should be protected with proper cover and maintained.		
➢ Required measures to ensure shielding, bonding / equipotential bonding techniques are handled properly to avoid LEMPs.		
➢ Proper SPDs need to be employed at every entry point of a service in to the building.		
➢ The cable lead length to & from the SPD should be shorter less than 025m as recommended in IEC.		
➢ Use proper signage boards mentioning lightning protection down conductor, earth pits etc., for people to easily identify.		
Technical specifications:		
Type	**Early Streamer Emission (ESE) Lightning Rod**	
Product Standards	NF C 17-102:2011 or BS :EN/IEC-62305	
Material	Stainless Steel	
Enclosure	IP 66 or better	
OPR radius of protection	87 meter	

OPR efficiency	$E \geq 0.80$	
Protection Radius at the height	5 Meter	
Advance Triggering Time in micro seconds (ΔT)	60 μs	
Accessories	Lightning Rod, adaptor, Mast, Mast protector, Down Conductor, Strike Counter, Test Link, Earth Terminal, Earth pits. Protection Tube	
POWER		
Power Supply	100–240V AC, 50/60Hz	
ENVIRONMENT CONDITIONS		
Operation Temperature	0 to 70 degree Celsius	
Operational Humidity	10% to 90%	
4.11 Equipment's at Barrage Control Room		
Equipment at Barrage Control Room shall be provided by bidder which will mainly comprise of following major item:		
k) Main Server and Server as Workstation (operator Station)		
l) SCADA software with life time licenced version.		
m) Necessary data switch, router with modem, Static IP, and fire wall for System		
n) 3KVA online UPS with 4 hours' backup time		
o) External memory for data storage of 8TB for 5 years.		
p) A3 size Color printer		
q) 75" LED display/video wall/ DLP based system		
r) Master PLC Controller		
s) Network Video Recorder		
t) 10 KVA DG set for power Backup		
4.12 Central Control Panel (Main PLC Controller at BCR)		
Make		
Model No.		
The central controller shall be based on modular PLC controller with firm ware based hot redundancy. Main and Redundant CPU shall be mounted in two separate racks. Event-driven synchronization method shall be provided for fast and bump less changeover to the redundant CPU in the event of a fault, without any loss of information and control. When a CPU is replaced, all the current programs and data are automatically to be synchronized by master CPU with standby CPU. The central controller PLC shall be of the same make/manufacturer as the PLC/RTU controller in Local PLC/RTU (Barrage top). The central controller & the Local PLC/RTUs shall be able to exchange data with each other freely & seamlessly, without requirement of any intervening hardware, apart from Optical convertors. The central controller shall have a 12" HMI colored screen for indicating the diagnostic & other information. It should be possible to view detailed information by using buttons on the screen, to drill-down to the appropriate page.		
The remote PLC/RTU shall pass-on all the I/O information directly to the central controller and shall act as a slave.		
The controller should be able to communicate over an open protocol such as		

Profibus / Modbus over Ethernet TCP/IP and GPRS & GSM wireless technology etc. The communication should be integrated in the CPU and should not require any additional cards or gateways excepts GPRS module/Modem. It should be possible to view, control & troubleshoot the PLC without requiring any additional software apart from SCADA software. Data logs should be stored inside the CPU and should be downloadable in CSV format using a web browser. It should be possible to increase the I/O handling capacity of the PLC, without changing the CPU, by the addition of appropriate I/O cards. The central controller should have a non-volatile memory of at least 4 MB & with 16 MB RAM with memory card and should be tested for operation from region to region change in temperature range of 0 to 55 degrees Celsius. The central controller shall have high immunity to electro-magnetic interference according to IEC 61000-6-2 and vibrations according to EN 60068-2-6.		
4.13 Computer Servers		
Server shall be industrial grade PC with USB, RS232/RS485, Ethernet Ports, OS Windows 8 or higher compatible to SCADA System. BCR shall have Master controller server with SCADA Software. 75 inch LED display/video wall Unit to be connected to server with separate USB Port/ Ethernet Port.		
There will be two computer servers with monitors required (one as work station) with the Master Controller (PLC) placed at the BCR. These Computer servers are expected to operate the SCADA software as well as all software required for the project. The computer servers will be managed and operated by the successful bidder and his skilled trained experienced operators/engineers till the end of 5 years warranty period.		
Feature	**Value**	
Form Factor	Rack Mount Server or other compatible	
Processor	Intel XEON E5-2440 or higher compatible configuration	
DIMM Memory	Speed: 1600MT/s RDIMMS or higher compatible configuration 8GB RDIMM, 1600MT/s, Low Volt, Dual Rank or higher compatible configuration	
Hard Drive	RAID 5 Software or Hardware Controller compatible 5-1TB 7.2K RPM Near-Line SAS 6Gbps 2.5in Hot-plug Hard Drive or higher compatible configuration	
Network Adapter	2 GB or higher compatible	
Power Supply	Dual, Hot-plug, Redundant Power Supply/Solar Power and battery backup as compatible configuration	
Electrical Supply	220V AC and supply from AC distribution, DC of DG Set	
Connecting Devices	Soft touch Keyboard, Optical Mouse, Monitor (23" TFT) 75" LED screen (combination of more	

	than one permitted) monitors.	
Software	SCADA compatible as per specification and OS Windows 8 or higher compatible.	
Additional Memory Rack	Additional memory Rack of minimum 8TB that shall be suitable for data logging for a period of at least 5 years.	
Accessories	Power Cord Rack Rail with cable management system Power Points as needed	
Computer Rack and related parts The bidder is required to procure full height computer racks or equivalent that will hold the computer servers and UPS system.		
4.14 LAPTOP		
Laptop (i7 8th Gen) with all allied software and hardware accessories, for programming & configuration & monitoring of SCADA system shall be provided by bidder with licence version client SCADA software.		
Laptop should be of standard brand and should have the following minimum specification:		
• Intel Core i7 Processor (2.8GHz, 6MB L2 cache, 1066 MHz FSB)		
• 15.6-inch LED Screen: Touch-enabled (optional)		
• 8GB DDR4 RAM upgradeable to 8GB or More		
• HDD 1 TB 7200rpm		
• Integrated Stereo Speaker, Key Board with Touch Pad.		
• Genuine Windows 10 Operating System and MS Office 2016 or higher Lifetime Licensed Software Preloaded and with Good Antivirus is preferred.		
• Good quality Carry Bag will be part of delivery.		
• 2 or more USB Ports, Bluetooth Connectivity with 200mts range		
• USB to RS-232 converter for communication 1200 to 115,200 baud		
4.15 Color A3 size Printer		
i. Functions: Print, Copy, Scan ii. Black Print Speed (ppm): 30(A4)/20(A3) iii. Color Print Speed (ppm): 25(A4)/18(A3) iv. Scan Speed: 51 IPM (Single Side)/19 IPM (Double Sided) v. Min. Resolution (Print/Scan): 600 DPI vi. Processor speed/Memory: 1.8 GH/2.5 GB vii. Connectivity: e print capability viii. Control Panel: 8-inch color Touch Screen **Paper Handling: -** ix. Paper handling input, standard: 500 sheet input trays x. Paper handling output, standard: 500-sheet face-down bin xi. Duplex printing/scanning: 2 sided to 2 sided Automatic		

4.16 Uninterruptible Power Supply Systems (3 KVA UPS System)	
i. General Design	
• The UPS System shall be Single Phase LVAC 50Hz output with the charger and inverter normally supplying the load.	
• The charger shall be of thyristor-controlled type. The battery shall be of Nickel Cadmium/ SMF type. The inverter shall be of the Pulse Width Modulated (PWM) type, providing a single-phase output. Configuration with galvanic isolation transformer at the mains supply shall be supported.	
• UPS 3 KVA minimum capacity and all its consisting elements shall cover the required Station load, together with 20% spare for future use.	
ii. Operation Requirements	
• UPS charger shall continuously supply the load via the UPS inverter, while simultaneously maintaining the battery charge in the float charge mode. In the event of interruption or depression in the AC mains voltage to the charger, the battery shall supply the load requirements via inverter.	
• Upon restoration of the AC mains voltage, the UPS charger shall take over the power supply of the load via the inverter, while simultaneously recharging the battery.	
• UPS shall be capable of energizing the load within the permissible tolerances, without the battery connected.	
iii. Charger and Battery	
• The charger shall operate according to the constant voltage, current limiting principle, and shall incorporate a soft- start feature to gradually accept load on initial energizing.	
• UPS charger output characteristic shall provide an output voltage regulation of + 1%, for load changes 0-100 % and mains voltage supply and frequency within the tolerance ranges. Automatic compensation feature related on battery temperature shall be provided in case if lead-acid battery is installed.	
iv. Inverter	
• The UPS inverter output voltage shall be maintained to + 1% of the nominal value for load changes 0-100 % and mains voltage supply and frequency within the tolerance ranges. The dynamic output voltage variations shall not exceed + 10% of the rated output voltage under any circumstances of instantaneous load changes	
v. Readings/Instrumentation and Alarms	
• The following readings /instrumentation/LED indication shall be supplied as a minimum: ◦ Battery voltage	

• UPS output voltage • The following alarms/LED Indication shall be supplied as a minimum: • Charger fails • Inverter input voltage high /low • Inverter fails		
vi. UPS Distribution		
• The distribution system shall be designed for incoming and outgoing AC supplies. Double pole miniature or moulded case circuit breakers complying to IEC 60157 shall be supplied, fitted with auxiliary contacts that operate when the circuit breaker trips. MCBs shall be rated to meet the load requirements and shall be labelled with the destination of the load.		
4.17 Display Units		
The 75" industrial LED display/ video wall to be provided by Bidder in BCR for monitoring of SCADA system. The Workstation shall be connected to the screen LED display panel through communication bus.		
All the required information from the SCADA shall be continuously updated in the LED screen. The screen shall map and display the vital information like, Barrage level, discharge, panel status, power availability, energy meter reading, Motor data etc. Specifications as below or better for 75" LED/ video wall shall be provided.		
Specifications as below or better for 75" LED/ video wall based system shall be provided.		
Display Unit for 75" LED		
Screen Size	**75 inch**	
Native Resolution	3840 x 2160 (UHD)	
Pixels (H x V x 3)	6,220,800	
Brightness	500 +cd/m2	
Contrast Ratio	4000:1	
Viewing Angle	178°/178°	
Running Time	24Hr	
Orientation	Portrait & Landscape	
INPUT		
HDMI	Yes	
RS232C IN	Yes	
RJ45	Yes	
IR Receiver	Yes	
USB (USB3.0, USB2.0)	Yes	
OUTPUT		
DP Out	Yes	
Audio Output	Yes	
RS232C Output	Yes	
SPECIAL FEATURES		
Temperature Sensor	Yes	
Check Screen	Yes	
Embedded Template	Yes	
Set ID Setup	Manual, Auto	
Password Change	Yes	
Intelligent Auto	Yes	

Digital Audio Input	Yes	
Local Time Auto Setting	Yes	
Sync Mode	Time sync, Content sync	
Calibration Mode	Yes	
Internal Memory	8GB (System 4GB + Available 4GB)	
Brightness/Contrast /Backlight	Yes	
Energy Saving	Yes, Off / Minimum / Medium /Maximum / Screen Off	
Auto Configuration/Phase	Yes	
Basic	Remote Controller, Power cable, DP Cable, Manual, IR Receiver, RS-232C Cable, LAN Cable, Guide Bracket, Screw	
POWER		
Power Supply	100–240V~, 50/60Hz	
ENVIRONMENT CONDITIONS		
Operation Temperature	0 to 40 degree Celsius	
Operational Humidity	10%~80%	

4.18 Internet Router and Firewall system

As per National institute of standards and technology combination of Router and firewall system is suggested as one of the Cyber security systems for Industrial Control systems. It shall ensure Intrusion detection and prevention, malware protection, Protection against network vulnerability, Router ensures basic packet filtering services.

The following minimum specifications shall be followed for implementation of the same

A. Router

i. Backplane of minimum 2 Gbps

ii. Packet throughput of minimum 3 Mbps with 64 bytes packet

iii. have minimum 2 slots with two slots dedicated for Control Processor

iv. have at least 2 slots for High speed WAN interfaces

v. support USB storage and dual images

vi. have redundant power Supply

vii. Minimum one Console and one Aux interface

B. Firewall Throughput

i. Firewall throughput – 4 Gbps

ii. VPN throughput – 100 Mbps

iii. Threat Protection – 260 Mbps

iv. IPS throughput – 450 Mbps

v. Interfaces RJ 45 GE (Minimum 8 No)

vi. I/O interfaces – 1 USB, 1 Console vii. Authenticated users limit- Unrestricted	
C. VPN Tunnels i. SSL VPN 100 ii. IP Sec VPN 100	
D. Security Features i. Firewall - State full packet inspection, deep packet inspection, proxy firewall ii. Application proxies - HTTP, HTTPS, SMTP, FTP, DNS, TCP, POP3 iii. Threat protection - DoS attacks, fragmented packets, blended threats and more	
4.19 SCADA System for Barrage Automation	
Make & Model No.	
A. General	
The Barrage control room will have two servers (one as a workstation), Monitor with internet connection with static IP & firewall system in combination with router. The Customized SCADA software will accept information sent by all the remote PLC/RTU's, dataloggers, GPRS/GSM communication, data import from other software& store the information in a data base, display the information in appropriate mimic displays, analyze past data and trends, will have the authentication feature by way of user name and password for operating the software; Updating of parameters of the PLC/RTU along with instrument can be done interactively from this software.	
The development of software has to be customized with end user & customization of the software shall be in scope of bidder till the completion of 5 years' operation & maintenance period. The control room will have Master PLC system with IOs, SCADA system with PC, software, GPRS Modem, gateway software etc.	
The control system along-with SCADA Software shall be provided in the Dam control room for automatic gate operations, automatic flood warnings & data acquisition of various monitoring stations. The information available at Dam control room should also be available on any other PC/Laptop and on mobile located at any place through web. The Data provided in Dam control room should be displayed in complete explicit way and can be extracted in different formats.	
One set of laptop installed with licensed version client SCADA software, internet (4G/3G dongles) & A4 size color printer shall be provided by bidder for monitoring of SCADA system by Executive engineer.	
The local control and computing system for the gates shall be able to calculate the actual spillway discharge depending on reservoir water level and gate opening.	
The local computing system shall be interconnected with the latest industrial grade Server with monitor and LED display/ video wall not less than 75" size via master PLC Controller in the BCR, from which the command for the necessary discharge, to spillway gates shall be provided. All signals shall be sent and received to/from the BCR. Operating system shall be based on	

Windows server 2008 or latest.	
A master controller shall define the required total gate opening. The PLC/RTU shall compare the required value with the total actual opening found by adding up the individual opening values, if the deviation of one or more gates from the required value is large enough, an 'Open'- or 'Close'- instruction shall be given to the respective gate(s). However, to prevent hunting of hoist the deviation should be beyond the preselected tolerance band**.**	
In a selection circuit the 'open'- instruction shall be transferred to that gate, which at the time of the comparison controls the smallest opening. Similarly, a 'close' - instruction shall be given to the gate controlling the largest opening.	
For the gate selection, only the gates shall be considered, of which the manual switches are in the 'Automatic 'position, and where no alarm signal has been received from, the 'open'- or 'close'- instruction shall remain with the selected gate, unless any of the following conditions is met:	
• The required and actual openings agree and the positioner cancels the instruction, or	
• The gate had previously reached its limit position, or,	
• The max. Permissible deviation (pre-set difference in position between controlled gate and average of all gates available) has been reached previously.	
• The selected gate is not in operating condition.	
In the event of major changes in required size of opening, the gates shall be moved successively one step each, i.e. after re-setting all gates again agree within the pre- set margin in size of opening. After all available gates have reached their limit positions a corresponding signal shall be given.	
At any time, individual gates shall be allowed to be switched over from the automatic mode to manual mode of operation, and vice versa, however, the operation from the local panel cannot be overruled by the remote/automatic operation stage. Adjustments made manually are to be automatically compensated for with the other gates by the automatic control system.	
Manually adjusted gates shall, when returned to automatic mode of operation, be adapted to their normal functioning in the automatic mode. The automatic system shall work independent of the number of available gates with the same characteristic. If all gates have been changed over to MANUAL, the master controller shall be reset so as to permit a smooth switching-over to AUTO operation.	
The system is to be designed to monitor the duration of the instruction. The monitoring is to prevent, that an instruction is maintained over a period, that is longer than a pre-select e.g. in the event of a malfunction of a gate selected by the controller, if the monitoring system is actuated, the particular gate is to be cancelled from the group of gates available for selection. Electronic attenuation is to be included to provide against unsteady level signals.	
The system should be compatible with flood fore-casting system to be provided by the employer for the monsoon period.	

B. Functions/ Features of SCADA Software	
• Normally Dynamic Gate Operation Scheduling Program will decide position of each Gate depending on the Water Discharge requirement.	
• Development of Dynamic Scheduling Program is included in the scope of work.	
• Operator in Control room should be able to control movement of individual gates via. SCADA software. This is needed for testing and emergency handling.	
• The customized, with life time licensed version SCADA software shall be designed, developed, Supplied, installed & commissioned by bidder based on the inputs provided by Engineer-in- Charge which shall have following minimum features:	
xiii. It shall accept information send by all the remote locations /sites	
xiv. Stores the information in a data base	
xv. Display the information in appropriate mimic displays	
xvi. Will have a provision to analyse past data and trends	
xvii. Will have the authentication feature by way of user name and password for operating the software.	
xviii. Updating of parameters of the PLC/RTU along with instrument can be done Interactively from this software.	
xix. Development of software to be customized with end user at Site.	
xx. SCADA software shall be of at least 5000 tags & screens shall be provided as per user requirement.	
xxi. Automatic alarm generation	
xxii. Automatic report generation	
xxiii. Auto e mail and SMS facility	
xxiv. SCADA system should have the facility of the Web Server, the same shall be audited & hosted by NIC server in order to minimize the cyber security issues.	
C. Trend Analysis	
The HMI shall provide for a real-time and a historical trend or plot capability. The plot function shall provide for pre-scaled display of selected process variables. The operator shall be able to select either subsets or supersets of the data presented. The plot function shall automatically scale the requested data to fit the time frame requested by the operator. The plot function shall display these data as a multiline chart with each variable easily determined by color, pattern or combination. For real-time data displays, the plot function shall scroll data as necessary to include newly acquired data on the display.	
The SCADA software will support trend data and displays as follows:	
• Trend displays shall comprise line graphs with time on a linear, continuous horizontal or vertical axis and the trended variable on the vertical or horizontal axis.	
• Trend graphs shall be capable of displaying required plots with adjustable time base with user specified time ranges.	
• The capability to pan backward and forward within a selected time range to read the exact value of any displayed variable, by selecting a point on the	

graph or chart.	
• The capability for each pan shall display individual ranges and units.	
• Display of historical information as far back in time as desired shall be available on the history log.	
• "Zoom" and "pan" facilities for both the trended variable range and the time axis range. The "zoom" facility shall allow an operator to compress or expand the axis range whilst the "pan" facility shall allow an operator to shift the origin of the axis. The software shall allow a user to define any zoom area by dragging a mouse across the trend.	
• It shall be possible to define the section of the trend to be exported by clicking and dragging the mouse across the trend. Data shall be exported to CSV or TXT formatted files.	
• Printing the trends or plots generated above by A3 Color printer.	
D. SCADA Software should mandatorily provide GUIs from Main menu with:	
xiii. Parameterisation and configuration setting of Sensor	
xiv. Programming of PLC/RTU.	
xv. Real time data monitor on GUI and LED display.	
xvi. File creation and Storage controller.	
xvii. External Data transmission controller.	
xviii. Burglar and alarm warning system controller.	
xix. Power status monitor and logging.	
xx. Motor status monitor and logging.	
xxi. Data exporting features	
xxii. Integration of rating curves	
xxiii. Manual data entry and input programmes	
xxiv. Printing graphical and tabular data	
xxv. Parameterisation and configuration setting of Sensor	
E. SCADA Software Security Features	
• The SCADA system shall be secure enough to allow access to any individual part of the system only to users with appropriate security level authentications. Application privileges shall be assigned to users or groups. Security areas may be created for graphics and tag blocks.	
• The SCADA system software shall support an unlimited number of users. For each user, it shall be possible to define a password and the privilege level(s) and areas that are available to that user. Examples of privilege levels are: "operator" (can only change set points, read real-time and historical data, acknowledge alarms), "system administrator" (can change variable description, edit screens, perform backup/restore operations).	
• The SCADA system software shall provide the capability to define a minimum of 8 privilege levels. The software shall check to ensure that the user logged on has the correct privilege level for all actions he wants to perform. If the user does not have the correct privilege for an action, the software shall display a message informing the operator of insufficient privilege.	
• The SCADA system software shall have a mechanism to restrict access to	

different areas of the project for each individual user or group of users (e.g. by defining access rights to mimics.	
• The SCADA system shall provide the capability to disable "hot" keys such as Ctrl Esc, Ctrl Alt Del etc. to prevent operator access to unauthorized software.	
• The SCADA system shall provide the capability to prevent access to the operating system by unauthorized personnel.	
F. Alarms/events management:	
• The SCADA software shall support alarm and data logging, using description text and time stamp.	
• The SCADA software shall not limit the number of alarm occurrences logged to a database.	
• The SCADA software shall provide the ability for viewing alarms that are logged while the system is on line or off line without causing any interruption to data acquisition or alarm processing.	
• The SCADA software shall provide the capability for operator event logging with the logging of operator actions. The SCADA software shall be capable of logging the following information: User Name, Action, Time, Date, Value, and Comment in free format.	
• The SCADA Software shall notify the operator with graphical screen indication of the presence of an unacknowledged or new alarm. These indications will be organized in an alarm screen that can be made always visible, if customized so. The SCADA shall provide for audible alarm notification. The SCADA shall present alarms in an alarm screen in such a way as to allow easy identification of a new alarm, an unacknowledged alarm and acknowledged alarms. The SCADA shall provide the operator with the ability to review all alarms.	
• The SCADA software shall be integrated such that an alarm acknowledged on one operator workstation will automatically appear as acknowledged on the other systems.	
• The SCADA software shall provide alarms viewing and processing as follows:	
v. A standard alarm page with the facility for scrolling alarms up and down the page and for acknowledgment of individual alarms.	
vi. Multiple levels of alarm priority or category.	
vii. Color coding of various alarm priorities or category.	
viii. Capability of audio interaction configurable for each alarm by category.	
• SCADA Software shall provide the following information for each alarm as it appears on an alarm display page:	
xi. Alarm Tag Name	
xii. Alarm Description	
xiii. Value of the Variable	
xiv. Trip/set point	
xv. Alarm Status - Disabled, Acknowledged, Unacknowledged	
xvi. Alarm Category (if applicable)	
xvii. Alarm Priority (if applicable)	
xviii. Time & Date in International Formats	
xix. Privilege (if applicable)	
xx. Operator Comments (if applicable)	
• The capability to display each alarm category or alarm priority in a different	

color (including flashing colors) dependent on whether the alarm is Active Unacknowledged, Active Acknowledged, Acknowledged Cleared, Unacknowledged Cleared or Disabled.		
• The capability to disable alarms on an individual basis, by page or by alarm category or all alarms.		
• The capability to automatically display any graphic display when an alarm occurs or to dynamically change the appearance of any graphical object based on whether an alarm is On, Off, Acknowledged, Communications Error, and Disabled etc.		
• The SCADA software shall monitor analog and digital variables and calculated conditions, and determine if a variable is in an alarm condition.		
• For each Analog variable, the SCADA database software shall provide the ability to process an alarm for each of the following conditions: -		
i. Variable LOW-LOW,		
ii. Variable LOW,		
iii. Variable HI,		
iv. Variable HI-HI		
v. Rate of Change		
vi. Bad input from I/O		
vii. Alarm disable		
viii. Dead band		
ix. Real time synchronization error > 10 sec		
• For each Digital variable, an alarm for each of the following conditions shall be assignable: i. Variable ON, ii. Variable OFF		
• The Customization of SCADA system shall be done by the bidder as per engineer – in -charge inputs at site, which is a continuous activity till the end of comprehensive warrant & operation & Maintenance period.		
• The alarms shall be categorized as Critical, High, Medium & Low category based on which alarm priority shall be set in SCADA system.		
• The following minimum alarms/events shall be configured in SCADA system by the bidder apart from any other alarms to be configured during customization of SCADA software.		
Alarm/Event	**Alarm /Event Description**	
Power Supply Faults	Mains power Off, Trip/ Overload, battery Low, DG Set ON, solar power on etc.	
Instruments	Hi, Hi- Hi, Lo, Lo-Lo, Rate of change, communication error, Transmitter Failure, Gate Open/Close/Stop/ Intermediate, over torque	
Local Control System	Remote/Local mode, Auto/Manual mode, Electrical parameter alarms (Voltage, current, Power Factor etc.), communication loss/ signal loss, VFD Failure, Cooling Fan failure, Delay of more than a specified time in execution of Command, Hoist Motor failures, Over torque, software error etc.	

Main PLC	The main controller should be intelligent enough so as to detect: 01. Input signal loss 02. Loss of power 03. Internal failure (limited) 04. CPU failure	
Common Events	battery discharging, UPS Stopped, Motor Started, Ambient Temperature High, Pond Level decreasing, Inaccuracy in timing due to communication latency, operator log alarm, Panel open etc.	
G. Web Server		
SCADA software shall have a web server facility. This will be used to allow display/data input in remote sites on any PC/mobile phone using user authentication system. It shall have following minimum features. v. Web server shall be able to display real time process data from SCADA software, historical data from Process database server, or any third-party relational database servers into graphs, dashboards, table format. vi. It shall be able to configure and integrate multiple data sources on a single window. vii. It shall be able to personalize the information on the web server window depending upon various needs of the various users, with user-based information access configuration. viii. It shall be able to view multi location information on single web server window either in graphical format or trend format.		
4.20 Tele-metering and Supervisory Control		
The Contractor shall provide synchronous internet connection with minimum internet speed of 8 mbps for uploading and downloading along with necessary router, static IP & switches for GPRS & GSM communication. The Contractor shall also provide the digital transmitters and indications, and terminal strips via the bus system. The SCADA System software should have the facility to track the non-functional sensors on daily basis and display on the web.		
The successful bidder shall upgrade all such developed software during the O & M period on need basis and provide the latest versions of all such software including Source Codes, while handing over the facilities to Authority.		
In addition, it shall be possible to import/export data to/from Hydrological		

Information System (HIS) to be developed under National Hydrology.	
a) Tele-metering Items - Digital type gate position indications. - Digital type water level indication. - Digital type discharge indication of spillway.	
4.21 DIESEL GENERATOR SET 10KVA	
• Supply, Installation, Testing and Commissioning of Silent DG Set of 10 KVA for power supply to Barrage Control Room equipment's in case of power failure for more than 4 hours.	
• Alternator shall be self-regulated with Standard Alternator protection (Over Voltage, Over Speed, Under Voltage, Under Speed warning & Shutdown).	
• Engine shall have industrial silencer, Electronic/Mechanical Governor, Manual & Electric Start, Batteries, Engine Instrument panel, AVM and with water proof powder coated Acoustic enclosure for DG Set.	
I. ENGINE	
• Vertical, 2 cylinders, four stroke cycle Air / Water cooled cold starting compression / ignition, diesel engine under NTP conditions as per BS: 5514.	
• The engine will have following standard accessories:	
- Heavy flywheel	
- Air cleaner dry type/Oil bath type.	
- Governor mechanical type	
- Starter 12 volts DC	
- 12-volt Battery with leads	
- Dynamo / Alternator	
- Silencer Industrial (without piping)	
- Fuel lift pump.	
II. ALTERNATOR	
• 415 three Phase/230 VAC, 50 cycles/ sec., 1500 RPM, self-excited, self-regulated screen protected drip proof alternator in accordance with BS: 2613.	
III. ARRANGEMENT The Engine and Alternator shall be close couple mounted on a common fabricated base plate.	
IV. CONTROL PANEL • M.S / CRCA Steel Fabricated L.T. switchboard suitable for indoor floor / wall mounting installation & for controlling the above generating set. The control panel will be equipped with	

1. Digital Energy Meter	
2. Main On/Off switch / MCB	
3. Set of indicating lamps.	
4. Set of instrument fuses.	
5. Set of current transformers.	
6. Over voltage Relay	
7. Suitable MPCB	
The switchboard will be complete with internal wiring, front cover, rust proof, powder coated paint and arrangement for receiving incoming and outgoing cables. The control panel shall have an automatic mains failure feature for remote automatic starting from the PLC based Control panel at the Field Station. Necessary equipment like solenoid coil etc. shall be provided for the same along with an IP54 or better panel.	
V. FUEL TANK	
Eight hours continuous running capacity, fuel tank complete with inlet/ outlet, air vent, drain plug, inlet arrangement for direct filling. The fuel tank level shall be displayed at the local panel and at the master PLC based control panel. 10 days backup fuel should be stored at Barrage Control room for continuous running of DG set.	

8. PROFORMA OF CERTIFICATE FOR ISSUE BY THE PURCHASER AFTER SUCCESSFUL INSTALLATION AND START-UP OF THE SUPPLIED GOODS

[This is to be attached for supply, erection, supervision of erection and startup contracts only]

No. Date:

M/s.

Sub: Certificate of startup of the supplied Goods

1. This is to certify that the plants / Equipment as detailed below has/have been received in good condition along with all the standard and special accessories (subject to remarks in Para No. 2) and a set of spares in accordance with the Contract/Specifications. The same has been installed and commissioned.

   (a) Contract No. _____dated_____

   (b) Description of the Equipment _____

   (c) Sl.No. _____

   (d) Quantity _____

(e) Rail/RoGolays Receipt No. _____dated_____

(f) Name of the consignee _____

(g) Date of startup and proving test _____

2. Details of accessories/spares not yet supplied and recoveries to be made on that account.

S. No.	Description	Amount to be recovered

3. The proving test has been done to our entire satisfaction and operators have been trained to operate the plant.

4. The supplier has fulfilled his contractual obligations satisfactorily. *

or

The supplier has failed to fulfill his contractual obligations with regard to the following:

(a)

(b)

(c)

(d)

5. The amount of recovery on account of non-supply of accessories and spares is given under Para No. 2.

6. The amount of recovery on account of failure of the supplier to meet his contractual obligations is as indicated in endorsement of the letter.

Signature _____

Name _____

Designation with Stamp _____

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* Explanatory notes for filling up the certificates:

(a) He has adhered to the time schedule specified in the contract in dispatching the documents/drawings pursuant to Technical Specifications.

(b) He has supervised the startup of the plan in time i.e., within the period specified in the contract from the date of intimation by the Purchaser in respect of the installation of the plant.

(c) Training of personnel has been done by the supplier as specified in the contract

(d) In the event of documents/drawings having not been supplied or installation and startup of the plant have been delayed on account of the supplier, the extent of delay should always be mentioned.

Note: This form is for the information only. It is not to be filled and submitted / uploaded along with the bid.

PART 3 – CONTRACT

SECTION VII – GENERAL CONDITIONS OF CONTRACT

Section VII. General Conditions of Contract

Table of Clauses

Section VIII. General Conditions of Contract

1. Definitions The following words and expressions shall have the meanings hereby assigned to them:

(a) "Bank" means the World Bank and refers to the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(b) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.

(c) "Contract Documents" means the documents listed in the Contract Agreement, including any amendments thereto.

(d) "Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom, as may be made pursuant to the Contract.

(e) "Day" means calendar day.

(f) "Completion" means the fulfillment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

(g) "GCC" means the General Conditions of Contract.

(h) "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

(i) "Purchaser's Country" is India.

(j) "Purchaser" means the entity purchasing the Goods and Related Services, as specified in the **SCC.**

(k) "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, start-up, training and initial maintenance and other such obligations of the Supplier under the Contract.

(l) "SCC" means the Special Conditions of Contract.

(m) "Subcontractor" means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.

(n) "Supplier" means the natural person, private or government entity, or a combination of the above, whose bid to perform the Contract

has been accepted by the Purchaser and is named as such in the Contract Agreement.

(o) "The Project Site," where applicable, means the place named in the **SCC.**

2. Contract Documents

2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

3. Corrupt & Fraudulent Practices

3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.

3.2 The Purchaser requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

4. Interpretation

4.1 If the context so requires it, singular means plural and vice versa.

4.2 Incoterms.

(a) Unless inconsistent with any provision of the Contract**,** the meaning of any trade term and the rights and obligations of parties there under shall be as prescribed by Incoterms.

(b) The terms EXW and other similar terms, when used, shall be governed by the rules prescribed in the current edition of Incoterms specified in the **SCC** and published by the International Chamber of Commerce in Paris, France.

4.3 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the date of Contract.

4.4 Amendment

No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party thereto.

4.5 Nonwaiver

(a) Subject to GCC Sub-Clause 4.5(b) below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any

waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

(b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

4.6 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

5. Language

5.1 The Contract as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be English. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in English language**,** in which case, for purposes of interpretation of the Contract, this translation shall govern.

5.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Supplier.

6. Deleted

7. Eligibility

7.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.

7.2 All Goods and Related Services to be supplied under the Contract and financed by the Bank shall have their origin in Eligible Countries. For the purpose of this Clause, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.

8. Notices

8.1 Any notice given by one party to the other pursuant to the Contract shall be in writing to the address specified in the **SCC.** The term "in writing" means communicated in written form with proof of receipt.

8.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

9. Governing Law

9.1 The Contract shall be governed by and interpreted in accordance with the laws of the Union of India.

10. Settlement of Disputes

10.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

10.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract. Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**

10.3 Notwithstanding any reference to arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and

(b) the Purchaser shall pay the Supplier any monies due the Supplier.

11. Inspections and Audit by the Bank

11.1 The Supplier shall keep, and shall make all reasonable efforts to cause its Subcontractors to keep, accurate and systematic accounts and records in respect of the Goods in such form and details as will clearly identify relevant time changes and costs

11.2 The Supplier shall permit, and shall cause its Subcontractors to permit, the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and all accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Supplier's and its Subcontractors and consultants' attention is drawn to Clause 3 [Fraud and Corruption], which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under this Sub-Clause 11.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures)

12. Scope of Supply

12.1 The Goods and Related Services to be supplied shall be as specified in the **Special Conditions of Contract**.

13. Delivery and Documents

13.1 Subject to GCC Sub-Clause 33.1, the Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Schedule of Requirements. The details of shipping and other documents to be furnished by the Supplier are specified in the **SCC.**

14. Supplier's Responsibilities

14.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with GCC Clause 12, and the Delivery and Completion Schedule, as per GCC Clause 13.

15. Contract Price

15.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments authorized in the **SCC.**

16. Terms of Payment

16.1 The Contract Price, including any Advance Payments, if applicable, shall be paid as specified in the **SCC.**

16.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by invoices describing, as appropriate, the Goods delivered and Related Services performed, and by the documents submitted pursuant to GCC Clause 13 and upon fulfillment of all other obligations stipulated in the Contract.

16.3 Payments shall be made promptly by the Purchaser, but in no case later than sixty (60) days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.

16.4 The payments shall be made in Indian Rupees to the Supplier under this Contract.

16.5 In the event that the Purchaser fails to pay the Supplier any payment by its due date or within the period set forth in the **SCC,** the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the **SCC,** for the period of delay until payment has been made in full, whether before or after judgment or arbitrage award.

17. Taxes and Duties

17.1 The Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.

18. Performance Security

18.1 If required as specified in the SCC, the Supplier shall, within twenty-one (21) days of the notification of contract award, provide a performance security for the performance of the Contract in the amount specified in the **SCC.**

18.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

18.3 As specified in the SCC, the Performance Security shall be denominated in the Indian Rupees, and shall be in the format stipulated by the Purchaser in the **SCC,** or in another format acceptable to the Purchaser.

18.4 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than twenty-eight (28) days following the date of Completion of the Supplier's performance

obligations under the Contract, including any warranty obligations, unless specified otherwise in the **SCC.**

19. Copyright

19.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

20. Confidential Information

20.1 The Purchaser and the Supplier shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data, or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following completion or termination of the Contract. Notwithstanding the above, the Supplier may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Supplier shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Supplier under GCC Clause 20.

20.2 The Purchaser shall not use such documents, data, and other information received from the Supplier for any purposes unrelated to the contract. Similarly, the Supplier shall not use such documents, data, and other information received from the Purchaser for any purpose other than the performance of the Contract.

20.3 The obligation of a party under GCC Sub-Clauses 20.1 and 20.2 above, however, shall not apply to information that:

(a) the Purchaser or Supplier need to share with the Bank or other institutions participating in the financing of the Contract;

(b) now or hereafter enters the public domain through no fault of that party;

(c) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party; or

(d) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

20.4 The above provisions of GCC Clause 20 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Supply or any part thereof.

20.5 The provisions of GCC Clause 20 shall survive completion or termination, for whatever reason, of the Contract.

21. Subcontracting

21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under the Contract if not already specified in the bid. Such notification, in the original bid or later shall not relieve the Supplier from any of its obligations, duties, responsibilities, or liability under the Contract.

21.2 Subcontracts shall comply with the provisions of GCC Clauses 3 and 7.

22. Specifications and Standards

22.1 Technical Specifications and Drawings

(a) The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section VII, Schedule of Requirements and, when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.

(b) The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.

(c) Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Schedule of Requirements. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated in accordance with GCC Clause 33.

23. Packing and Documents

23.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

23.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in the **SCC,** and in any other instructions ordered by the Purchaser.

24. Insurance

24.1 Unless otherwise specified in the **SCC,** the Goods supplied under the Contract shall be fully insured—against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery, in accordance with the applicable Incoterms or in the manner specified in the **SCC.**

25. Transportation

25.1 Unless otherwise specified in the **SCC,** responsibility for

& Incidental Services

arranging transportation of the Goods shall be in accordance with the specified Incoterms.

25.2 The Supplier may be required to provide any or all of the following services, including additional services, if any, **specified in Schedule of Requirements and SCC:**

(a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;

(b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;

(c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;

(d) performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and

(e) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods

25.3 Prices charged by the Supplier for incidental services, if not included in the Contract Price for the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

26. Inspections and Tests

26.1 The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in the **SCC.**

26.2 The inspections and tests may be conducted on the premises of the Supplier or its Subcontractor, at point of delivery, and/or at the Goods' final destination, or in another place in the Purchaser's Country as specified in the **SCC.** Subject to GCC Sub-Clause 26.3, if conducted on the premises of the Supplier or its Subcontractor, all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.

26.3 The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in GCC Sub-Clause 26.2, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

26.4 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

26.5 The Purchaser may require the Supplier to carry out any test

and/or inspection not required by the Contract but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.

26.6 The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.

26.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to GCC Sub-Clause 26.4.

26.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to GCC Sub-Clause 26.6, shall release the Supplier from any warranties or other obligations under the Contract.

27. Liquidated Damages

27.1 Except as provided under GCC Clause 32, if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery or perform the Related Services within the period specified in the Contract, the Purchaser may without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the **SCC** of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those **SCC.** Once the maximum is reached, the Purchaser may terminate the Contract pursuant to GCC Clause 35.

28. Warranty

28.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

28.2 Subject to GCC Sub-Clause 22.1(b), the Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination.

28.3 Unless otherwise specified in the **SCC,** the warranty shall remain valid for twelve (12) months after the Goods, or any portion

thereof as the case may be, have been delivered to and accepted at the final destination indicated in the **SCC,** or for eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.

28.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.

28.5 Upon receipt of such notice, the Supplier shall, within the period specified in the **SCC,** expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

28.6 If having been notified, the Supplier fails to remedy the defect within the period specified in the **SCC,** the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

29. Patent Indemnity

29.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 29.2, indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:

(a) the installation of the Goods by the Supplier or the use of the Goods in the country where the Site is located; and

(b) the sale in any country of the products produced by the Goods.

Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant, or materials not supplied by the Supplier, pursuant to the Contract.

29.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 29.1, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

29.3 If the Supplier fails to notify the Purchaser within twenty-eight

(28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf.

29.4 The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

29.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Purchaser.

30. Limitation of Liability

30.1 Except in cases of criminal negligence or willful misconduct,

(a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser, and

(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the supplier to indemnify the purchaser with respect to patent infringement.

31. Change in Laws and Regulations

31.1 Unless otherwise specified in the Contract, if after the date of 28 days prior to date of Bid submission, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in India, where the Site is located (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with GCC Clause 15.

32. Force Majeure

32.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to

the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

32.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

32.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

33. Change Orders and Contract Amendments

33.1 The Purchaser may at any time order the Supplier through notice in accordance GCC Clause 8, to make changes within the general scope of the Contract in any one or more of the following:

(a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;

(b) the method of shipment or packing;
(c) the place of delivery; and
(d) the Related Services to be provided by the Supplier.

33.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within twenty-eight (28) days from the date of the Supplier's receipt of the Purchaser's change order.

33.3 Prices to be charged by the Supplier for any Related Services that might be needed but which were not included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

33.4 Subject to the above, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

34. Extensions of Time

34.1 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services pursuant

to GCC Clause 13, the Supplier shall promptly notify the Purchaser in writing of the delay, its likely duration, and its cause. As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

34.2 Except in case of Force Majeure, as provided under GCC Clause 32, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 26, unless an extension of time is agreed upon, pursuant to GCC Sub-Clause 34.1.

35. Termination

35.1 Termination for Default

(a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate the Contract in whole or in part:

(i) if the Supplier fails to deliver any or all of the Goods within the period specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 34;

(ii) if the Supplier fails to perform any other obligation under the Contract; or

(iii) if the Supplier, in the judgment of the Purchaser has engaged in fraud and corruption, as defined in GCC Clause 3, in competing for or in executing the Contract.

(b) In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 35.1(a), the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.

35.2 Termination for Insolvency.

(a) The Purchaser may at any time terminate the Contract by giving notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In such event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy that has accrued or will accrue thereafter to the Purchaser.

35.3 Termination for Convenience.

(a) The Purchaser, by notice sent to the Supplier, may terminate

the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

(b) The Goods that are complete and ready for shipment within twenty-eight (28) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:

(i) to have any portion completed and delivered at the Contract terms and prices; and/or

(ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Related Services and for materials and parts previously procured by the Supplier.

36. Assignment

36.1 Neither the Purchaser nor the Supplier shall assign, in whole or in part, their obligations under this Contract, except with prior written consent of the other party.

APPENDIX TO GENERAL CONDITIONS
Bank's Policy- Corrupt and Fraudulent Practices

(text in this Appendix shall not be modified)

Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:

"Fraud and Corruption:

1.16 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.12 In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;[13];

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;[14]

(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;[15]

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;[16]

(v) "obstructive practice" is:

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12 In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

13 For the purpose of this sub-paragraph, "*another party*" refers to a public official acting in relation to the procurement process or contract execution. In this context, "*public official*" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

14 For the purpose of this sub-paragraph, "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

15 For the purpose of this sub-paragraph, "parties" refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other's bid prices or other conditions.

16 For the purpose of this sub-paragraph, "party" refers to a participant in the procurement process or contract execution.

(aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.

(b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

(c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

(d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,17 including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated18;

(e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

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17 A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

18 A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

SECTION VIII. SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

GCC 1.1 (j)	The Purchaser is: ***The Superintending Engineer, Research Circle, Irrigation Research Institute, Roorkee.***
GCC 1.1 (o)	The Project Site(s)/Final Destination(s) is/are: as mentioned in schedule of Requirements
GCC 4.2 (a)	The meaning of the trade terms shall be as prescribed by Incoterms.
GCC 4.2 (b)	The version edition of Incoterms shall be 2010
GCC 8.1	For **Notices**, the Purchaser's address shall be: Office of the Superintending Engineer, Research Circle, Irrigation Research Institute, Roorkee- 247667 E-Mail: uttarkhandwrd@gmail.com **Website : iriroorkee.res.in.** The Supplier address shall be: Attention: Address: **PHONE**
GCC 10.2	**Settlement of Disputes** The dispute settlement mechanism to be applied shall be as follows: (a) In case of Dispute or difference arising between the Purchaser and a domestic supplier relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996 as amended up-to-date. The arbitral tribunal shall consist of 3 arbitrators one each to be appointed by the Purchaser and the Supplier. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the Parties and shall act as Presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the Indian Council of Arbitration. (b) In the case of a dispute with a Foreign Supplier, the dispute shall be settled in accordance with provisions of UNCITRAL (United nations Commission on International Trade Law) Arbitration Rules. The Arbitral Tribunal shall

	consist of three Arbitrators one each to be appointed by the Purchaser and the Supplier. The third Arbitrator shall be chosen by the two Arbitrators so appointed by the parties, and shall act as presiding arbitrator. In case of failure of the two arbitrators appointed by the parties to reach upon a consensus within a period of 30 days from the appointment of the arbitrator appointed subsequently, the Presiding Arbitrator shall be appointed by the Indian Council of Arbitration. (c) If one of the parties fails to appoint its arbitrator in pursuance of sub-clause (a) and (b) above, within 30 days after receipt of the notice of the appointment of its arbitrator by the other party, then the Indian Council of Arbitration, both in cases of the Foreign supplier as well as Indian supplier, shall appoint the arbitrator. A certified copy of the order of the Indian Council of Arbitration, making such an appointment shall be furnished to each of the parties. (d) Arbitration proceedings shall be held at Dehradun India, and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English. (e) The decision of the majority of arbitrators shall be final and binding upon both parties. The cost and expenses of Arbitration proceedings will be paid as determined by the arbitral tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc. of its proceedings as also the fees and expenses paid to the arbitrator appointed by such party or on its behalf shall be borne by each party itself. (f) Where the value of the contract is Rs.10 million and below, the disputes or differences arising shall be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely the President of the Institution of Engineers (India), Bangalore. (g) Except otherwise agreed to by the Parties, Arbitrators should give a decision in writing within 120 days of receipt of notification of dispute.
GCC 12.1 and 25.2	The scope of supply for the Goods and Related Services to be supplied shall be as specified in the *Schedule of Requirement.*
GCC 13.1	Details of Shipping and other Documents to be furnished by the Supplier are given below: Upon delivery of the goods to the transporter/consignee, the supplier shall notify the purchaser and mail the following documents to the Purchaser : (i) Four Copies of the Supplier invoice showing contract number, goods description, quantity, unit price, total amount; (ii) Delivery note, Railway receipt, or Road consignment note or equivalent transport document or acknowledgement of receipt of goods from the Consignee; (iii) Four Copies of packing list identifying contents of each package;

	(iv) Insurance certificate; (v) Manufacturer's/Supplier's warranty certificate; (vi) Inspection certificate issued by the nominated inspection agency, and the Supplier's factory inspection report; and (vii) Certificate or origin. The above documents shall be received by the Purchaser before arrival of the Goods (except where it is handed over to the Consignee with all documents) and if not received, the supplier will be responsible for any consequent expenses.
GCC 14.1	**ADD to GCC 14.1;** The supplier is responsible for and obliged to conduct all contracted activities in accordance with the contract using state- of- the- art methods and economic principles and exercising all means available to achieve the performance specified in the Contract. The Supplier is obliged to work closely with the Purchaser's staff, act within its own authority and abide by directives issued by the Purchaser and implementation activities. The Supplier will abide by the job safety measures prevalent in India and will free the Purchaser from all demands or responsibilities arising from accidents or loss of life the cause of which is the supplier's negligence. The Supplier will pay all indemnities arising from such incidents and will not holding the activities of its personnel or sub- contracted personnel and will hold itself responsible for any misbehavior/ misconduct. The Supplier will treat as confidential all data and information about the purchaser, obtained in the execution of his responsibilities, in strict confidence and will not reveal such information to any other party without the prior written approval of the Purchaser.
GCC 15.1	The prices charged for the Goods supplied and the related Services performed *shall not* be adjustable.
GCC 16.1	Payment for Goods and Services shall be made in Indian Rupees as follows: (i) ***Advance Payment*:** Nil. (ii) ***On Delivery*:** The 30 (Thirty) percent of the "Contract Price" excluding GST under Clause 15.1 of GCC shall be paid to the Supplier within *60 (sixty) days* after the delivery at site. (iii) ***On Installation & Commissioning:*** The 15 (Fifteen) percent of the "Contract Price" excluding GST under Clause 15.1 of GCC shall be paid to the Supplier within *60 (sixty) days* after the date of the Installation Certificate issued by the Purchaser's representative for the respective delivery. (iv) ***On Final Acceptance***: The 15 (Fifteen) percent of the "Contract Price" excluding GST under Clause 15.1 of GCC shall be paid to the Supplier within *60 (sixty) days* after the date of the Final Acceptance Certificate issued by the Engineer in charge for the respective delivery. (v) On the satisfactory completion of **First year** of warranty and Operation &

	Maintenance: the 20 (Twenty) *percent* of the "Contract Price" excluding GST under Clause 15.1 of GCC shall be paid to the Supplier within *60 (sixty) days* after the date of the completion of first year of Warranty and Operation & Maintenance period after Final Acceptance Certificate. Satisfactory completion is deemed if performance criteria as defined in section VI clause 4 are fulfilled. (vi) On the satisfactory completion of **Second year** of warranty and Operation & Maintenance: the 20 (Twenty) *percent* of the "Contract Price" excluding GST under Clause 15.1 of GCC shall be paid to the Supplier within *60 (sixty) days* after the date of the completion of second year of Warranty and Operation & Maintenance period after Final Acceptance Certificate. Satisfactory completion is deemed if performance criteria as defined in section VI, 3. Technical Specification under clause 4 are fulfilled. (vii) The Income Tax and surcharges, if applicable, will be deducted from the payments due to the Supplier.
	(viii) The Suppliers request for payment with invoice in triplicate and the Acceptance certificate for each equipment should be sent to the Purchaser i.e. **The Superintending Engineer, Research Circle, Irrigation Research Institute, Roorkee- 247667** (ix) For all the payments to be made, against Bank guarantees, the bank guarantee shall be issued by a Scheduled Indian Bank or a foreign bank located in India in the format enclosed at Section X. The guarantees issued by other banks should be confirmed by a Scheduled Indian Bank or a foreign bank operating in India. (x) Payment of Local Taxes such as GST will be against valid Invoice as per GST ACT & Rules and submission of GST Registration Certificate along with declaration that GST Registration is valid and all liabilities towards GST have been discharged by the vendor. GST amount will be paid after 30 days of submission of valid Invoice and all required documents and declaration by vendor.
GCC 16.5	The payment-delay period after which the Purchaser shall pay interest to the supplier shall be 30 days. The interest rate that shall be applied is 4 %.
GCC 17	In the case of tax/ duty waiver, the purchaser will issue only the certificates in terms of the Government of India's notification as per information given by supplier in form stipulated in Section IV. Supplier is solely responsible for obtaining such benefits and in case of failure to receive such benefits, the purchaser will not compensate the supplier separately.
GCC 18.1	Performance Security to the Purchaser shall be for an amount of 10% of the contract value, valid upto 365 days after the date of completion of performance

	obligations including warranty obligations. In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/ replaced material shall be extended to a further period of 12 months and the Performance Bank guarantee for proportionate value shall be extended 365 days over and above the extended warranty period.
GCC 18.3	The Performance Security shall be in the form of an unconditional "Bank Guarantee" or "FDR" drawn/pledged in favour of the Purchaser.
GCC 18.4	Discharge of the performance Security shall take place not later than 60 days following the date of completion of the Supplier's performance obligations, including the warranty obligation, under the contract.
GCC 18.5	Add as Clause 18.5 to the GCC the following: In the event of any contractual amendment, the Supplier shall, within 21 days of receipt of such amendment, furnish the amendment to the Performance Security, rendering the same valid for the duration of the Contract, as amended for 365 days after the completion of performance obligations including warranty obligations.
GCC 23.2	Packing Instructions: The Supplier will be required to make separate packages for each Consignee. Each package will be marked on three sides with proper paint/indelible ink with the following: (i) Project; (ii) Contract No.; (iii) Country of Origin of Goods; (iv) Supplier's Name; (v) Packing List Reference Number. Suppliers should use recycled materials as much as possible for packing
GCC 24.1	The insurance shall be paid in an amount equal to 110 percent of the EXW value of the Goods from "Warehouse to warehouse (final destination)" on "All Risks" basis including War Risks and Strikes.
GCC 25.1	The Supplier is required under the Contract to transport the Goods duly insured to the specified final destination, and until the commissioning & final acceptance of each equipment, and all related costs shall be included in the Contract Price.
GCC 26.1	The inspections and tests shall be as detailed in Para 5 of Section VI-Schedule of Requirement: The supplier shall get each item indicated in the Schedule of requirement inspected in manufacturer's works and submit a test certificate and also manufacturer's guarantee /warranty certificate that the items are conforms to the laid down specification. The Purchaser or its representative may inspect and /or test any or all the items to confirm their conformity to the contract specification, prior to dispatch from the manufacturer's premises. Such inspection and clearance will not prejudice the right of the consignee to inspect and test the items on receipt at destination to verify conformity to technical specification. If the items fails to meet the laid down specifications the supplier shall take

	immediate steps to remedy the deficiency or replace the defective parts of the each to the satisfaction of the purchaser/ consignee.
GCC 26.2	The Inspections and tests shall be conducted at: **Gaula Barrage, Haldwani.**
GCC 27.1	The liquidated damage shall be: 0.5% of contract price of delayed Goods or Services per week or part thereof. The maximum amount of liquidated damages shall be: 10% of the contract price.
GCC 28.3	The period of validity of the Warranty shall be Sixty (60) months after successful installation, testing, commissioning and acceptance. This includes seamless operation of SCADA system for Dam. The warranty shall remain valid for Sixty (60) months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination or for Thirty (30) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.
GCC 28.5	The period for repair or replacement shall be: 48 Hours/120 hrs. time required for bidder's maintenance engineers to restore the instrument or SCADA system shall not exceed 48 hours during monsoon and 120 hrs. during non-monsoon period. The performance of the system would be continuously monitored by the service engineers of the contractor deployed at the Barrage Control Room who shall be responsible for detection of any fault in the SCADA & surveillance System. On detection of fault, the Contractor shall repair or replace the defective Goods or parts thereof, without cost to the Department within stipulated time of 48 hrs /120 hrs. It is the responsibility of the Supplier to rectify/replace the equipment without any notice from purchaser and it is the duty of its personnel i.e. dedicated service engineers cum data entry operator to notice that site become non-operational or become faulty. A system shall be treated as faulty if it fails to respond or transmits erroneous data during six consecutive pre-programmed observation cycles/3 hours. The decision of Engineer-in-Charge about errors in data shall be final and binding. If a remote site/ instrument continues to remain "fail" for more than 3 hours in excess of the maintenance time schedule of 48/120 hours. The contractor is liable to pay penalty @ Rs. 5000/- per Day/ during non-monsoon period and @Rs 10000/ per day during monsoon period (15^{th} June to 15^{th} October). The Day for the purpose of penalty shall be taken as failure period of 24 hours or part thereof for a particular remote site. The amount of penalty will be recovered from performance bank guarantee or payment due to bidder during warranty period. **Refer 4.36 "Performance Requirements" for details of computation of Down time.**
GCC 28.6	The period shall be 14 days.
GCC 31.1	This clause will apply only to variations in GST and other taxes payable in India on the final product which is being supplied and not for variations in tax on the individual components / raw materials which go into the product.

GCC33.5	During the validity of the contract, the Supplier shall supply and replace/ re-install/re-commission Goods in case of damage/theft or vandalism not attributable to the Supplier, as per applicable line item/items listed in Table- Price Schedule for Supply of Goods as per Schedule of Requirement and Table- Price and Completion Schedule-Related Services of this contract and payment shall be accordingly made at the quoted rates in this contract by the Supplier for the line item. The procedure adopted shall be in accordance with GCC 33- Change Orders and Contract Amendments.
GCC 37	**Add the following additional sub clauses.** **37.1 Supplier integrity:** The supplier is responsible for and obliged to conduct all contracted activities in accordance with the contract using state- of- the- art methods and economic principles and exercising all means available to achieve the performance specified in the Contract.
	37.2 Supplier's obligations: The Supplier is obliged to work closely with the Purchaser's staff, act within its own authority and abide by directives issued by the Purchaser and implementation activities. The Supplier will abide by the job safety measures prevalent in India and will free the Purchaser from all demands or responsibilities arising from accidents or loss of life the cause of which is the supplier's negligence. The Supplier will pay all indemnities arising from such incidents and will not hold the purchaser responsible or obligated. The Supplier is responsible for managing the activities of its personnel or sub-contracted personnel and will hold itself responsible for any misdemeanors. The Supplier will treat as confidential all data and information about the purchaser, obtained in the execution of his responsibilities, in strict confidence and will not reveal such information to any other party without the prior written approval of the Purchaser.
	37.3 Site preparation and installation The supplier is responsible for associated civil work required for installation and commissioning of the supplies in the Schedule of Requirement under the heading of Relative services
	37.4 Hardware installation: The Supplier is responsible for all unpacking, assemblies, wiring, installations, cabling between hardware units and connecting to power supplies. The Supplier will test all hardware operations and accomplish all adjustments necessary for successful and continuous operation of the hardware at all installation sites.

Attachment: Price Adjustment Formula

Not Applicable

SECTION X – CONTRACT FORMS

1. LETTER OF ACCEPTANCE

[letterhead paper of the Purchaser]

[date]

To: *[name and address of the Supplier]*

Subject: ***Notification of Award Contract No.*** . . . . . .

This is to notify you that your Bid dated . . .. ***[insert date] . .*** .. for execution of the . . . . ***[insert name of the contract and identification number, as given in the SCC]*** . . . . for the Accepted Contract Amount of . . . . ***[insert amount in numbers and words in Rupees]***, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 21 days in accordance with the Conditions of Contract, using for that purpose the of the Performance Security Form included in Section X, Contract Forms, of the Bidding Document.

Authorized Signature: _____
Name and Title of Signatory: _____
Name of Agency: _____

Attachment: Contract Agreement

2. CONTRACT AGREEMENT

[The successful Bidder shall fill in this form in accordance with the instructions indicated]

THIS CONTRACT AGREEMENT is made

the *[insert:* ***number*** *]* day of *[insert:* ***month*** *]*, *[insert:* ***year*** *]*.

BETWEEN

(1) *[insert complete name of Purchaser]*, a *[insert description of type of legal entity, for example, an agency of the Ministry of …. of the Government of { insert name of Country of Purchaser }, or corporation incorporated under the laws of { insert name of Country of Purchaser }]* and having its principal place of business at *[insert address of Purchaser]* (hereinafter called "the Purchaser"), and

(2) *[insert name of Supplier]*, a corporation incorporated under the laws of *[insert: country of Supplier]* and having its principal place of business at *[insert: address of Supplier]* (hereinafter called "the Supplier").

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz., *[insert brief description of Goods and Services]* and has accepted a Bid by the Supplier for the supply of those Goods and Services in the sum of *[insert Contract Price in words and figures, expressed in Rs]* (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract Agreement. This Agreement shall prevail over all other contract documents: In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed below.

(a) The letter of Acceptance

(b) this Contract Agreement

(c) Letter of Bid – Technical Part

(d) The Supplier's letter of Bid – Financial Part and original completed Schedules including Price Schedules

(e) Special Conditions of Contract

(f) General Conditions of Contract

(g) Technical Requirements (including Schedule of Requirements and Technical Specifications)

(h) *[Add here any other document(s)listed in GCC/SCC as part of contract]*

3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and

Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of *[insert the name of the Contract governing law country]* on the day, month and year indicated above.

For and on behalf of the Purchaser

Signed: *[insert signature]*
in the capacity of *[insert title or other appropriate designation]*
in the presence of *[insert identification of official witness]*

For and on behalf of the Supplier

Signed: *[insert signature of authorized representative(s) of the Supplier]*
in the capacity of *[insert title or other appropriate designation]*
in the presence of *[insert identification of official witness]*

3. Performance Security - Bank Guarantee

[Guarantor letterhead or SWIFT identifier code]

Performance Guarantee No…….*[insert guarantee reference number]*
Date…….*[insert date of issue of the guarantee]*

To: _____ *[name of Purchaser]*

_____ *[address of Purchaser]*

WHEREAS _____ *[name and address of Supplier[19]]* (hereinafter called "the Applicant") has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ *[name of Contract and brief description of Goods and related Services]* (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Applicant shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Applicant such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Applicant, up to a total of _____ *[amount of guarantee[20]]* _____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Applicant before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Goods and related Services to be supplied thereunder or of any of the Contract documents which may be made between you and the Applicant shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until …… (i.e.) 60 days following the Completion date of the Contract including any warranty obligations[21], and any demand for payment under it must be received by us at this office on or before that date.

Signature and seal of the guarantor _____

Name of Bank _____

Address _____

Date _____

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

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[19] *In the case of a JV, insert the name of the Joint Venture*

[20] *An amount shall be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract and denominated in Indian Rupees.*

[21] Completion date as described in GC Clause 18.4

4. Advance Payment Security

Deleted