GOVERNMENT OF WEST BENGAL
IRRIGATION AND WATERWAYS DIRECTORATE

METROPOLITAN ELECTRICAL DIVISION

TENDER DOCUMENT

e-NIT No. WBIW/EE/MED/e-NIT-01/2025-26

Contents:-

PART-A

Enclosure-I

(Latest modified e-NIT '*Standard Format*' for works of 'Tender Value' (Amount Put to Tender) above Rs.5.00 lakh upto Rs. 45.0 lakh)

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Irrigation & Waterways Directorate
Office of the Executive Engineer
Metropolitan Electrical Division
Jalasampad Bhawan (4th floor)
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NOTICE INVITING e-TENDER

e-NIT No - WBIW/EE/MED/e-NIT-01/2025-26

Memo No: 526/7E-16/2025-26 **Dated: 04.04.2025**

Encrypted electronic bids are hereby invited by the **Executive Engineer, Metropolitan Electrical Division, Irrigation & Waterways Directorate**, on behalf of the Governor of the State of West Bengal through a single stage two part e-Procurement System; (Part I: Techno-commercial bid and Part II: Financial bid) for the 'LIST OF WORKS' given in the next page from eligible bonafide contractors/agencies/bidders having specified Pre-Qualification (eligibility) credential for execution of works of similar nature and desired financial capabilities. The technical bid in Part-I would require the bidder to qualify for the next phase of financial bid: Part-II, in which L1 bid price would determine the final selection and acceptance of a bidder for award of the Procurement of Goods & Works contract.

Intending contractors/bidders desirous of participating in this e-Tender are required to login to the Government of West Bengal e-Procurement website having URL https://wbtenders.gov.in and locate the instant tender by typing WBIW/EE in the search engine provided therein, or by logging-in using their assigned User ID and password. They may also visit the official website of the Irrigation & Waterways Department, Government of West Bengal www.wbiwd.gov.in to locate the same e-Tender by scrolling the "e-Procurement" link.

Contractors/bidders willing to take part in the e-Tender are required to obtain a valid Digital Signature- Certificate (DSC) from any of the authorized 'Certifying Authorities' (CA) under Controller of Certifying Authorities (CCA), Department of Electronics & Information Technology (DEIT), Govt. of India. (viz. NIC, n-Code Solution, Safescrypt, e-Mudhra Consumer Services Ltd, TCS, MTNL, IDRBT) or as notified by the CA /Finance Department, GoWB from time to time. DSC is given as a USB e-Token. After obtaining the Class 2 or Class 3 Digital Signature Certificate (DSC) from any of the above CA, they are required to register the fact of possessing the DSC through the registration system available in the above mentioned websites. A list of such licensed CAs' are also available in the CCA website cca.gov.in. The prospective contractors / bidders may contact the Departmental e-Tendering Help desk located at the 7th Floor of Jalasampad Bhavan at Bidhannagar, Sector-II, Kolkata, through e-mails irrigationhelpdesk@gmail.com and no-egov@wbiwd.gov.in/ ee-dvcstdycell@wbiwd.gov.in or Telephone No. 033-23346098 and the State Level e-Procurement Help Desk located at the Ground Floor of Jalasampad Bhavan through e-mail wbehelpdesk@gmail.com or Ph:(033)-2334 5161 on any working day between 10.30AM-5.30PM for any query on e-Tendering procedure, obtaining DSC and free of cost training on e-Procurement procedure.

Intending contractors/bidders are required to download the e-Tender documents directly from either of the websites stated above. This is the only mode for submission of a tender. The interested bidders eligible for the tender are required to submit their bids through the e-Procurement System using their valid DSC e-Token with assigned PIN using login ID and password. Details of e-filing procedure for participating in e-tenders under State Government have also been explained in the 'Bidders' Manual', available in the Departmental website www.wbiwd.gov.in.

Last date & time of submission of bid electronically, is on 23.04.2025 till 10:00 Hours IST.

The applicant bidders/contractors are advised to carefully read all the 'Terms & Conditions' contained in this e-Notice Inviting Tender (e-NIT). He/she should particularly go through the minimum desired Pre-qualification (PQ) works credential & financial eligibility criteria and satisfy himself/herself of all the mandatory eligibility requirements. Bidders desirous of participating in the e-Tender should submit bids only if they fulfill the minimum PQ eligibility criteria and are in possession of all the required PQ Credential documents "in original" as these may be summoned by the Tendering authority for verification purposes.

All information published in the website consisting of e-NIT and other related documents uploaded by the selected bidder, WB Works Contract Form No. 2911(i)/2911(ii), Bill of Quantities (BOQ), EMD exemption order, if any, corrigenda and drawings etc. if any, shall form a part of the Agreement / contract document.

LIST OF WORKS

e-NIT No - WBIW/EE/MED/e-NIT-01/2025-26

Sl. No.	Name of Work//Project/Procurement*	Estimated Amount put to Tender (Tender Value) (Rs.)	Earnest Money (EMD) (Rs.)	Time allowed for completion (In English Calendar days)	Source of fund	Minimum eligibility criteria to match the Prequalification (PQ) credential in terms of execution of similar completed previous works contract	Physical Milestones for completion of each work within stipulated time (Refer to Clause 17 of the General Terms & Conditions of e-NIT)
1	2	3	4	5	6	7	8
1	Replacement of 05 (five) no. draw shutters and 02 (two) no. flap shutters and allied works of 11 vented **Fuleswar** sluice within Block Uluberia-I, PS- Uluberia, Dist- Howrah.	79,28,947.99	1,58,579.00	84 Days	Core State Development Scheme	Summary of minimum eligibility requirement to technically qualify for the next stage of financial bid in this tender: A. **Technical PQ Credential**: i. The bidder must have satisfactorily completed at least 1 (one) '**similar nature' work** under Government Sector within last five FYs on the date of publication of this NIT of Gross monitory value of **Rs. 23.79 Lakh** (Gross monitory value is calculated based on final billed value is the Credential Certificate (CC) multiplied by inflationary factor completed within the preceding five FYs of similar in nature, of Gross notional Value not be less than 30% of the amount put to tender of the work for which the bidder chooses to participate in this NIT. (Brief description of PQ work credential desired with corresponding PQ eligibility amount in **Rupees 23.79 Lakh**). **'Similar nature' work means:** Fabrication, manufacturing and erection of hydraulic gate & hoisting arrangement.	As per Work Programme prepared and uploaded by the Tender Inviting Authority in the form of Bar Chart
2	Replacement of 4 (four) no. draw shutters and 6 (six) no. flap shutters and allied works of 20 vented **Sejberia** sluice within Uluberia Municipality, P.S.- Uluberia, Dist- Howrah.	46,48,478.33	92,970.00	84 Days	Core State Development Scheme	Summary of minimum eligibility requirement to technically qualify for the next stage of financial bid in this tender: A. **Technical PQ Credential**: i. The bidder must have satisfactorily completed at least 1 (one) '**similar nature' work** under Government Sector within last five FYs on the date of publication of this NIT of Gross monitory value of **Rs. 13.95 Lakh** (Gross monitory value is calculated based on final billed value is the Credential Certificate (CC) multiplied by inflationary factor completed within the preceding five FYs of similar in nature, of Gross notional Value not be less than 30% of the amount put to tender of the work for which the bidder chooses to participate in this NIT. (Brief description of PQ work credential desired with corresponding PQ eligibility amount in **Rupees 13.95 Lakh**). **'Similar nature' work means:** Fabrication, manufacturing and erection of hydraulic gate & hoisting arrangement.	As per Work Programme prepared and uploaded by the Tender Inviting Authority in the form of Bar Chart

(*)Consortium & Joint Venture are not permitted to bid in this e-tender.

LIST OF WORKS

e-NIT No - WBIW/EE/MED/e-NIT-01/2025-26

Sl. No.	Name of Work//Project/Procurement*	Estimated Amount put to Tender (Tender Value) (Rs.)	Earnest Money (EMD) (Rs.)	Time allowed for completion (In English Calendar days)	Source of fund	Minimum eligibility criteria to match the Prequalification (PQ) credential in terms of execution of similar completed previous works contract	Physical Milestones for completion of each work within stipulated time (Refer to Clause 17 of the General Terms & Conditions of e-NIT)
1	2	3	4	5	6	7	8
3	Electrical installation work for illumination of **Dabu** Irrigation Sub-Division compound including re-wiring within Block-Canning-I, P.S-Canning, Dist-24Pgs (South).	73,95,255.44	1,47,905.00	84 Days	Core State Development Scheme	Summary of minimum eligibility requirement to technically qualify for the next stage of financial bid in this tender: A. **Technical PQ Credential**: i. The bidder must have satisfactorily completed at least 1 (one) '**similar nature' work** under Government Sector within last five FYs on the date of publication of this NIT of Gross monitory value of **Rs. 22.19 Lakh** (Gross monitory value is calculated based on final billed value is the Credential Certificate (CC) multiplied by inflationary factor completed within the preceding five FYs of similar in nature, of Gross notional Value not be less than 30% of the amount put to tender of the work for which the bidder chooses to participate in this NIT. (Brief description of PQ work credential desired with corresponding PQ eligibility amount in **Rupees 22.19 Lakh**). **'Similar nature' work means:** SITC of electrical items like feeder pillar, panel, steel tubular pole, high mast, under ground cable, wiring etc. **Requisite parts of License:** 1, 2, 4, 6A, 7A & 11 as per I.E.	As per Work Programme prepared and uploaded by the Tender Inviting Authority in the form of Bar Chart

(*)Consortium & Joint Venture are not permitted to bid in this e-tender.

(General Terms & Conditions for Contract: 'Tender value' above Rs 5.0 Lakh up to Rs 45.00 Lakh)

1. Eligibility for participation in e-tenders under National Comparative Bidding (NCB)

All Bonafide Indian contractors/Agencies/Organizations, Registered Companies/ Firms including Registered Partnership Firms, Proprietorship Firms, Registered Consortiums & valid 'Joint Ventures' and contractors/bidders of equivalent grade or class having Pre-Qualification (PQ) Credential from the Government of West Bengal, Union Government Departments/ Other State Government Departments/ Engineering Wings of GoI /IRCON/RVNL/NHPC, Autonomous Project Authority and other similar organizations of GoI and State Governments/PSU and Corporations of Government of India and other States having successfully completed at least one similar nature project and not otherwise debarred are eligible to participate subject to fulfilling the other PQ eligibility criteria laid down in the subsequent paragraph. Consortiums and Joint Ventures are not allowed to participate in tenders of value up to Rs. 45.00 lakh

2. Participation in more than one serial of work out of list of works published in one e-NIT.

Any contractor/bidder may bid for any number of Serials of work in a particular e-NIT, if more than one work have been published in that e-NIT, subject to fulfillment of all of the following conditions:

a. There should be full compatibility (matching between the technical PQ credential submitted by the bidder in the form of Credential Certificate (CC) along with other relevant documents as stated under Clause 3.2B III) relating to any work successfully completed by the bidder and technical PQ criteria specified in the e-NIT for any particular serial of works for which the bidder intends to bid. In other words, technical PQ credential certificate along with relevant documents submitted for any work should at the minimum; satisfy the technical PQ eligibility criteria specified for that work. Normally there should be separate CC along with relevant documents for each of the serial of works, the bidder intends to bid and the serial number relevant to the CC should be clearly written on the body of the CC and also on the other documents stated under **Clause 3.2B III**. However, the bidder will also reserve the right to submit one CC along with relevant documents for bidding in more than one serial of work, provided cumulative technical PQ credential of all such serials should be fulfilled by one single CC. In such case also, serial numbers of the relevant works for which the CC is submitted should be clearly written on the body of the CC by the bidder. Omission of serial numbers on the body of the CC and also on the other documents stated under **Clause 3.2B III**, in case of bidding for more than one serial will lead to rejection of all the bids.

b. Average of gross annual turnover of the individual bidder/Organization/consortium or Joint Venture for any three financial years within preceding five financial years, as stated under Clause 7V, should not less than the summation of turnover requirements of the relevant individual serial of works for which the bidder intends to bid.

3. Submission of bid

3.1 General procedure for submission of e-bid

Bids are to be submitted electronically in the on-line mode through the e-Procurement portal www.wbtenders.gov.in. All documents uploaded by the Tender Inviting Authority forms an integral part of the works contract/Agreement. Contractors/bidders are required to upload the entire tender documents along with all other relevant PQ credential documents as asked for in the e-NIT, electronically, through the above portal within the stipulated date and time as notified in the e-NIT. Tenders are to be submitted in two parts/folders at the same time for each work, one being '*Technical Proposal*' and the other '*Financial Proposal*'**.** The contractor/bidder should carefully go through all the documents of the e-tender and upload the scanned copies of his/her/their original documents in 'Portable Document Format' (PDF) files in the designated links in the web portal as their *'Technical Bid'*. He/she needs to fill up the financial offer/bid price/ rates in percentage above or below or 'At-Par' in the downloaded BOQ of the work in the designated cell in '**Excel sheet only'**, and upload the same in the designated link of the portal as their *'Financial Bid'*. Documents uploaded are virus scanned and required to be digitally signed using their 'Digital Signature Certificates' (DSC). Contractors/bidders should especially take note of all the *Addenda* or *Corrigenda* notices related to the e-Tender and upload all of these documents forming a part of their e-bid as tender document. Documents digitally signed and uploaded in the e-Tender portal by the contractors/bidders containing requisite information & financial bid/rate comprising '*Technical bid'* and '*Financial bid'* are submitted concurrently, which cannot be changed after end date and time fixed for submission of the e-Tender. Extension of last date for e-bid submission or insertion of any of Addendum/Corrigendum, if unavoidable is to be notified as per Finance Department guidelines in the e-Procurement Portal, Departmental website, Newspapers and in Notice boards. Whenever any corrigendum is issued irrespective of the content (date corrigendum or otherwise), due date of submission of bid will be extended by 7 (seven) calendar days to be published before expiry of the last date for original validity period of bid submission. Extension of last date and time for bid submission by issuance of a Corrigendum shall not be treated as 2nd Call or Re-tender.

3.2 Technical Proposal

The Technical Proposal should contain scanned PDF files of all documents in the following standardised formats in two part covers or folders.

Cover No	Cover	Document Type	Descriptions
1	Pre-Qual/Technical	.pdf	NIT_Corrigendum
		.pdf	Agreement_2911
		.pdf	Forms
		.pdf/jpg/WinRAR	Drawings
		.pdf/jpg	BAR_CHART
2	Finance	.xls	BOQ

3.2 A Descriptions of Technical (Pre-Qual) Covers

i. **'NIT**_Corrigendum **folder':** e-Notice Inviting Tender is *to be downloaded in entirely, digitally signed and uploaded during e-bid submission in **"NIT_Corrigendum"** folder.* **'Corrigenda/Addenda'** if published in connection with the NIT is to be digitally signed and uploaded in the **'NIT_Corrigendum'** folder merged with e-NIT documents during e-bid submission.

ii. **'Agreement_2911' folder:** Contract /Agreement in WB Form No. 2911(i) published in the e-Tender is *to be downloaded digitally signed and uploaded during e-bid submission in Agreement_2911 folder**.***

iii. **'Forms'** *folder***:** Applications for e-Tender: vide self declaration format in specimen *Form-1* ,
Self declaration of bidder not having common interest as a different bidder organisation in any other work tendered under different serials of this particular e-NIT *vide specimen Form-2*, and self declaration on antecedents and performance of the bidder in specimen Form-4.
*All above are to be filled up completely, digitally signed and uploaded during bid submission in **"Forms"** folder.*

iv**.** **Drawings folder:** The GAD/Plan/Map published in the e-Tender by the Tender Inviting Authority is to be downloaded by the bidder digitally signed and again *uploaded during e-bid submission in **"Drawings"** folder*

v. **BAR_CHART folder: BAR CHART/Work Programmes in other Networking Methods** prepared by TIA in *pdf* file defining the Physical Milestones of the construction period for implementation of the project is to be downloaded by the bidder digitally signed and again *uploaded during e-bid submission in **"BAR_CHART"** folder*

3.2A.NOTE:

i. Contractors/bidders are required to keep track in the e-Procurement website www.wbtenders.gov.in for all the Addenda or Corrigenda notices and documents published in connection with a particular e-Tender within the bidding period and upload the same, digitally signed by him/her along with their e- bid. Tenders submitted without Addendum/Corrigendum are liable to be treated as incomplete and thereby liable for disqualification or rejection.

iii. Form 1, Form 2, Form 3 (for companies etc.) and Form 4 are taken from bidders by TIA as bidders self declarations' or undertakings. These formats are specimens or samples only, which are to be firstly downloaded by the bidders from the NIT in e-Procurement portal, filled up completely and again uploaded with their electronic bids.

3.2 B. ***My Document [OID* Cover] containing:***

It is desired that PDF files of all other original documents in support of their eligibility and PQ credential shall have to be submitted under the OID cover folders as detailed below:

My Document Format for uploading in the OID folder:-

Sl. No.	Category	Sub-category	Sub-category description	Remarks if any
I	**Certificates**	*1. certificates.pdf* *2. GST_registration_ certificates.pdf*	1 Latest Professional Tax Payment Certificate (PTPC) or, PT deposit challan for current financial year or Government Order for exemption in other States where ever applicable. 2 Valid PAN Card in the name of bidder/organisation 3 Income Tax Return of current Assessment year or, IT Return of immediate preceding Assessment year whichever is ;attest available 4 Valid GSTIN under GST Act & Rules	Refer to Clause 3.2C(I) for details

Sl. No.	Category	Sub-category	Sub-category description	Remarks if any
II	**Company Details**	*companydetails.pdf* 1 *companydetails.pdf* 2	1 For Proprietorship Firms, Partnership Firms, Registered Companies, Registered Co-operative Societies Valid Trade License/ acknowledgement or Receipt of application for Trade License/ Revalidation OTHER REQUIREMENTS:- 2 For Partnership Firms: Legally valid Partnership Deed, Form-VIII/ Memorandum of Registration of Registrar of Firms 3 For Companies: Incorporation Certificate, Memorandum of Articles of ROC, List of current owners/ Directors/Board Members 4 For State Registered Co-operative Societies: Society Registration certificate from ARCS of the State, Society by-Laws, latest available Auditor's Report of Directorate of Co-operative Audit within proceeding five years as per Societies Act & Rules	Refer to Clause 3.2C(II) for details
III	**Credential of works**	1. Credential pdf 1 2. Credential pdf 2	1 BOQ/SOR & Work Order/ Award of Contract or LOA/LOI duly authenticated by issuing authority. 2 Pre-Qualification (PQ) Work credential of one 100% completed work as desired in the NIT as the Credential Certificate (CC) duly authenticated by competent authority.	Refer to Clause 3.2C(III) for details
IV	**Financial credential**	Payment certificate.pdf	All 100% Payment Certificates of competent authorities during preceding Five FY. IT Return of bidder in thee FY, or Audited Profit & Loss Accounts statement of any three financial years within the zone of preceding five financial years whichever is available.	Refer to Clause 3.2C(IV) for details

* OID denotes Other Important Documents.

Note:

i. It is desirable though not mandatory that all documents stated above in PDF files shall be uploaded by bidders only in specified designated folders. No off-line document will be accepted and considered during tender evaluation stage from bidders before publishing of final selection of L1 by publication of FBE sheet verification by TEC may be undertaken directly from PQ Credential issuing authority.

ii. Validity of documents submitted by bidder shall be stand determined on the date of publication of tender notice (e-Notice Inviting Tender)

3.2 C(I) Certificate/s: The documents mentioned below under Serial a, b & c are to be uploaded as 'PDF' files in Certificate.pdf1 *(name of the file should be **"certificates.pdf"**)*
The document mentioned under Sl. d below is to be uploaded in GST Registration Certificate.pdf2 file

a. Latest available Professional Tax Payment Certificate (PTPC) or the PT payment challan/ receipt for current financial year/Waiver Order of competent authority in other States if applicable.

b. Valid PAN Card of the bidder/s are required;

c. Income Tax Return of current Assessment Year or, IT Return of immediate preceding Assessment year under IT Act & Rules, whichever latest available with the bidder.

d. Valid 15 digit Goods and Service Tax payer Identification Number (GSTIN) as per GST Act, 2017 & Rules of the bidder to be uploaded *in 'GST registration certificate pdf'.*

3.2C(II) All documents mentioned in tabular format under **Clause 3.2B** and also explained below should be uploaded during electronic bid submission in *PDF* files with the *name of file should be **"companydetails.pdf"***

i. For Partnership Firms: Documents of Registration of Partnership Firms in the certified copy of 'Form No. VIII,' issued under Indian Partnership Act, 1932 (Act-IX of 1932) by the Registrar of Firms. In case a Partnership Firm is yet to receive Form No. VIII, a "Memorandum" issued by the Registrar of Firms may also be accepted.

ii. For Companies: Incorporation Certificate, valid Trade License or acknowledgement of issuing authority of receipt of application for Trade License / renewal, 'Memorandum of Articles' registered under the Registrar of Companies (ROC) under the Indian Companies Act, List of owners/ Directors/Board Members are to be uploaded with the e-bid.

iii. For State Registered Co-operative Societies:

a. Society Registration certificate from ARCS (Assistant Registrar of Co-operative Societies, GoWB) and By-Laws for Cooperative Societies under West Bengal Co-operative Societies Act, 2006 and Rules, 2011 and all amendments.
b. Latest Auditor's Report of Directorate of Co-operative Audit under Department of Co-operative, Government of West Bengal within preceding five financial years as per Societies Act & Rules.

3.2C (III) Eligibility criteria based on Credential of work/Prequalification Work Credential ***"credential.pdf"***

i. Bill of Quantities (BOQ) along with Work Order/Award of Contract; duly authenticated by the competent authority to be submitted under Technical cover *(name of file should be "credential.pdf 1).*

ii. Pre-Qualification (PQ) credential of one 100% completed work of Gross Notional Value as desired in the NIT as the Credential Certificate (CC) duly authenticated by competent authority. *(Name of file should be "credential.pdf 2).*

3.2C (IV) PQ Financial credential: In *'**payment certificate.pdf'*** folder under OID *c*over

a. Disqualification during PQ evaluation of financial capability of bidder shall not be decided during technical bid evaluation by TEC up to work of Rs 45 lakh, as no minimum financial capacity is fixed, except if reveals from documents beyond any doubt of the financial liquidity & bankruptcy of the bidder, determining absolute incapacity to execute the work.

b. i. 'Payment certificate' of works authenticated by appropriate authority for preceding three Financial Years,

or, ii. Valid Income Tax Returns for preceding three FY, or,

iii. Audited Profit & Loss Accounts statements of three FY, any one of i, ii, or iii as a complete set for three FY within zone of immediate preceding five FY is to be uploaded in **'*payment certificate.pdf'*** folder under OID cover, else the bidder may be disqualified. Name, address, contact no. and registration no. of auditor Firm is desirable for Profit & Loss accounts statement, if submitted.

***Note**: a. If the bidder Company/Firm was set up less than three years ago, audited balance sheets and P/L Accounts for the number of years since inception are to be submitted under Technical cover and the average value would be evaluated only for the period since inception and not three years. Credential Certificate (CC) given as PQ Work Credential may also contain payment certificate and in those cases separate payment certificate is not required.*

b. *No file in Technical / Pre-Qual cover or OID cover folder is allowed by the system to be kept blank/empty. Where ever the forms and documents are uploaded by the Tender Inviting Authority, the same is to be downloaded, duly filled up, converted to pdf file, and again uploaded after digital signing, forming a part of tender document. These formats are specimens or samples only and deviation from specimen format is not a sufficient ground for rejection of the bid. Relevant blank Forms are to be firstly downloaded by the bidders from the NIT in e-Procurement portal, filled up completely and again uploaded with their electronic bid. No offline document is acceptable from bidders by TEC during evaluation stage.*

3.3 Financial proposal / bid under Financial cover:-

The financial bid should contain the following documents in one cover or folder.

i. Bill of Quantities (BOQ): The contractor/bidder is required to quote the financial offer/bid price or rate as percentage above or below the estimated amount put to tender or 'at-par' with tender value, in the space marked for quoting rate in the BOQ of the tendered work.

ii. Only the downloaded sheet of the above document in Excel format is required to be uploaded by the contractor/bidder.

iii. BOQ without a valid numeric rate at the designated space provided in the BOQ will be disqualified and rejected outright. Contractors/bidders willing to quote "at-par" rate shall need to write "0" in the 'space' provided for rates in the BOQ of the tendered work.

4. Tender Fee and Earnest Money Deposit (EMD)

i. Tender Fees:

Entire set of e-Tender documents are made available free of cost through the State Government e-Procurement portal having URL https://wbtenders.gov.in and also available in the e-Procurement link of Departmental website www.wbiwd.gov.in. Cost for tender documents will not be charged even during execution of a formal tender contract/agreement. However, the contractors/bidders may wherever necessary shall be suitably charged for additional/multiple copies of drawings, specifications, Schedule of Rates booklet etc. and such fee may be suitably determined by the Tender Inviting Authority as per existing Rules.

ii. (a) Earnest Money Deposit (EMD):

Bidders are required make payment of Earnest Money (EMD) through the e-Payment banking system, on-line and should read in advance the instructions carefully, particularly those contained in the challan generated in the e-transaction of the portal, if opted for EMD payment through RTGS/NEFT. Only if the bidder is exempted from payment of EMD by the State Finance Department, the Govt order for such exemption is to be uploaded while opting for EMD exemption category. Any misjudgement and resultant non submission of EMD will lead to summarily rejection of the bid/\tender. **The quantum of Earnest Money Deposit has been revised as 2 % of the amount put to tender or Rs. 10 Lakh, whichever is lower for amount put to tender upto value of Rs. 25 crore**.

(b) Additional Performance Bank Guarantee:

"Additional Performance Security" has been made mandatory which shall be obtained only from the successful L1 bidder, if the accepted bid price is below 20% of tender BOQ or below by more than 20% of the tender BOQ. This Additional Performance Security shall be equal to 10% of the tendered amount i.e. 10% of the L1 bid price.
The said Bank Guarantee (BG) shall have to be valid up till the end of the contract/Agreement period including extended time period till 100% physical completion of work in all respects and shall be renewed within validity period accordingly if required. The said Bank Guarantee shall remain in custody of the DDO & Executive Engineer in-charge of the work, which shall be returned to the bidder/contractor after successful physical completion of the work as per contract. If the bidder fails to complete the work successfully, this Additional Performance Security shall be forfeited at any time during the pendency of the contract period after serving proper notice to the contractor/bidder agency. Necessary provisions regarding deduction of security deposit from progressive bills of the contractor in respect of the tendered work shall be governed as per relevant clauses of the tender contract/Agreement which will in no way be affected / altered due to this Additional Performance Security.
As per Dept. Memo no.- 306-IB/IW-14011(34)/1/2018-JS(IW),dated: 06.08.2018, the entire Security Deposit or the Performance Security may be released after physical and financial completion of the project but before expiry of the security period or defect liability period against receipt of equivalent amount of bank guarantee of approved bank of RBI which should remain valid till the expiry of the defect liability period.

4A. **Login by bidder**:

a. A bidder desirous of taking part in e-tender floated by the State Government shall login to the e-Procurement portal of the Government of West Bengal www.wbtenders.gov.in using his/her login ID and password by using their valid DSC.

b. He/she will select the tender to bid and initiate payment of pre-defined EMD fixed for that tender by selecting from either of the following payments modes:

i. Net-Banking (any of the banks listed in the ICICI Bank Payment Gateway) in case of payment through ICICI Bank Payment Gateway;

ii. RTGS/NEFT in case of off-line payment through bidder's bank accounts in any Bank approved by RBI in India.

4B. EMD payment procedure:

a. Payment by Net Banking out of any listed bank through ICICI Bank Payment Gateway:

i. On selection of Net Banking as the payment mode, the bidder will be directed to ICICI Bank Payment Gateway (along with a string containing a Unique ID) where he/she will select the Bank through which he/she wants to electronically transact the EMD.

ii. Bidder will make the payment after entering his Unique ID and password of the bank to process the e-transaction.

iii. Bidder will receive a confirmation message on registered mobile phone regarding success/failure of the transaction.

iv. If the transaction is successful, the amount paid by the bidder will get credited in the respective Pooling account of the State Government maintained with the Focal Point Branch of ICICI Bank at R.N Mukherjee Road, Kolkata for collection of EMD against unique codes for identification of the tendering authority.

v. If the transaction is failure, the bidder will again try for payment by going back to the first step.

b. Payment through RTGS/NEFT:

i. On selection of RTGS/NEFT as the payment mode, the e-procurement portal will show a pre-filled challan having the details to process RTGS/NEFT transaction.

ii. The bidder will print the challan and use the pre-filled information to make RTGS/NEFT payment using his/her own designated Bank account.

iii. Once payment is made, the bank would provide an "**UTR remittance number**" for successful transaction with which the bidder will come back to the e-Procurement portal after expiry of 2 to 3 bank working days to enable the NEFT/RTGS process to complete, in order to verify the payment made and continue with his/her bidding process.

iv. If verification is successful, the fund get credited to the respective Pooling account of the State Government maintained with the Focal Point Branch of ICICI Bank at R.N Mukherjee Road, Kolkata for collection of EMD.

v. Hereafter, the bidder will go to e-Procurement portal for final submission of his/her e-bid within pre-assigned last date of submission of e-tender.

vi. If the payment verification is unsuccessful, the amount will be returned automatically by the system to the bidder's bank account.

Note: EMD made through RTGS/NEFT would require additional 2 to 3 bank working days after date of transaction in the bank before the procedure is completed for enabling the bidder to continue with the bidding process in the on-line final bid submission. Thus, the bidder is to take precaution in case of RTGS/NEFT transfers, so that the entire process of submission of e-tender is completed within last date of on-line submission of his/her tender. However, Net-banking transaction through ICICI bank payment Gateway would be on real time basis.

4C. Refund/Settlement Process for EMD:

i. After decrypting/admitting of all e-bids, the preliminary technical bid evaluation (TBO) summery sheet would be published in the Portal after two working days, and thereafter at least after four working days, the Final technical evaluation (TBE) summery sheet would be published in the Portal with simultaneous electronic processing in the e-Procurement portal by the tender inviting authority done so that status of the all bids as qualified or disqualified; based on the Final Bid Evaluation Sheet (FBE) is made available to all bidders along with the details of the unsuccessful bidders to ICICI Bank by the e-Procurement portal through web services.

ii. On receipt of the information from the e-Procurement portal, the Bank will refund through an automated process the EMD of the bidders disqualified at the technical evaluation to the respective bidders' bank accounts from which they made the EMD on-line transaction. Such refund will take place within T+2 Bank working days where T will mean the date on which information on rejection of bid is uploaded to the e-Procurement portal by the Tender Inviting Authority.

iii. Once the financial bid evaluation is electronically processed in the e-Procurement portal, EMD of the technically qualified bidders other than that of the L1 will be refunded, through an automated e-process, to the respective bidders' bank accounts from which they made the payment transaction. Such refund will take place within T+2 Bank working days where T will mean the date on which information on rejection of financial bid is uploaded to the e-Procurement portal by the tender inviting authority.

iv. As soon as the L1 bidder is awarded the contract (AOC), the same is processed electronically in the e-Procurement portal for transfer to Government Receipt under Public Accounts of the State through GRIPS where under the security deposit will also be collected in connection with the work.

v. All refunds will be made mandatorily to the Bank account from which the payment of EMD was initiated.

vi. If the e-tender is cancelled, then the EMD would be reverted to the original bidder's bank account automatically after such cancellation order is processed online by the Tender Inviting Authority.

vii. TIA reserves the right to forfeit the EMD electronically in case of breach/violation of tender rules as defined under clause 8 & 9.

5. Credential Certificate (CC) as Prequalification Work Credential:

i. Credential Certificates (CC) for one/single 100% completed work within last five financial years on the date of publication of NIT will only be accepted as valid PQ credential of work. Incomplete ongoing work shall not be considered for valid PQ Credential. Payment Certificate without containing mandatory details shall not be treated as valid.

ii. It is desirable that CC should preferably contain the name with designation, postal address of office, contact Telephone No./FAX / e-mail ID of the authority issuing the CC for the work along with name of work, amount put to tender, date of completion of the work, gross final billed value of the 100% completed work, certificate of issuing authority indicating successful and satisfactory completion. Illegible certificates, absence of contact details making it time consuming for verification purposes of CC issued by authorities outside the State are liable to be rejected by the Bid Evaluation Committee (TEC).

iii. Credential Certificates (CC) of successfully completed works in any Department/autonomous authority of the Government of West Bengal will be considered. CC of 100% completed works executed under any other State / Central Government Ministry / Department / Nationalised Financial Institution Organisation / Govt. Undertaking / Govt. Enterprises or Government Institutions or Local Government Bodies(Municipalities, Zilla Parishad & Panchayat Samities within West Bengal, will also be considered as valid PQ Credential. Such CC are to be issued by an officer/authority not below the rank of Executive Engineer / Divisional Engineer /District Engineer/Project Manager of the State/Union Government Departments/ Organisations; authorised signatories of CC for Panchayat Samities and Municipalities shall be the BDO & Executive Officers or equivalent administrative officers respectively. It is desirable to have telephone and FAX or e-mail addresses of the signatory of the CC for all offices outside West Bengal for verification purposes.

6. Pre Qualification (PQ) eligibility criteria

Prequalification (PQ) eligibility of a contractor/ bidder based on one single 100% completed works contract and financial capacity achieved within the zone of last five financial years will be determined as per Rules stated below:

6 I (a). Firstly, the gross value of the work submitted as PQ Credential as per CC of similar in nature completed during the current financial year before date of publishing of e-NIT or within the preceding five FY will be multiplied by the following factors to take care of the inflationary effects to arrive at the gross notional amount.

Year	Description	Multiplying factor to arrive at gross notional amount
Current	The financial year of floating of NIT	1.00
1st	1 year preceding the current financial year	1.08
2nd	2 years preceding the current financial year	1.16
3rd	3 years preceding the current financial year	1.26
4th	4 years preceding the current financial year	1.36
5th	5 years preceding the current financial year	1.47

Note: For cases where two contractors/bidders are participating in a e-Tender for a particular work are such that one happens to have worked as a sub-contractor of the other, and both the contractors/bidders PQ submit work credential of having completed the same job either wholly or partly, then in such case the PQ credential of the principal contractor will be considered while that of the sub-contractor will not be taken into consideration for determining the eligibility criteria of the contractor/bidder during technical evaluation of the tender. If the PQ Credentials submitted by hitherto contractors/bidders are for different works, then both the PQ Credentials will be considered for determining the eligibility criteria of the individual contractors/bidders.

6* II. *Financial proposal of any contractor/bidder will come under consideration only when the Technical PQ criteria mentioned below are satisfied and fulfilled in the Technical Bid Evaluation stage.

Gross notional amount calculated from Credential Certificate (CC) of a single works contract completed within the zone of immediate preceding five financial years on the date of this e-NIT, issued in favour of the contractor/bidder /Agency/Firm/Registered Co-operative Society for a similar work defined in the tender should be **at least 30%** of the amount put to tender for the work it is bidding. The power to decide on the criteria of similarity rests without any prejudice, solely with the Bid Evaluation Committee (TEC).

7. Additional eligibility criteria for participating in more than one serial of work in a e-NIT

If the same bidder bids separately for on behalf of another Firm or in a different capacity having financial interests in the same work, all the tenders would be rejected.

8. Penalty for suppression / distortion of facts and withdrawal of L1 bidder before acceptance of LOI

If a contractor/bidder fails to physically produce the originals of documents (especially the Credential Certificates and P/L accounts with audited balance sheets), or any other bid document on demand by the Tender Evaluation Committee (HTEC/TEC) which were submitted as soft copies in PDF files with their e-bids within a specified time frame, need arising due to any material deviations detected in the uploaded soft copies, leading to specific doubts which could not be cleared by enquiry from issuing authority of these documents or if there is any suppression/distortion/falsification noticed/detected/ pointed out at any stage of the e-tender process at any stage prior to signing of Contract-Agreement or the issue of LOA or AOC, the Tender Inviting Authority will immediately bring the matter to the notice of the concerned Chief Engineer and appropriate penal measures as stated in Clause 10 below will be taken. The concerned Chief Engineer then will issue the necessary order in writing with intimation to the defaulting contractor/bidder, other Chief Engineers, Centralized e-Tender Cell and also the Government in the Irrigation & Waterways Department. Copy of the order/starting penal measures should invariably be communicated to the Nodal Officer, e-Governance Cell of the Department with a request for uploading the order in the Departmental website in the link “List of suspended/debarred contractors”.

9. PROCEDURE FOR SUSPENSION AND DEBARMENT OF SUPPLIERS/ CONTRACTORS

A. SCOPE:

The procedures laid down in subsequent paragraphs shall govern the suspension and debarment of suppliers, contractors and bidders (“Contractors” for brevity) involved in Government procurement for offenses or violations committed during competitive bidding and contract implementation, or even later for the works under Irrigation & Waterways Department, Government of West Bengal. The concerned Chief Engineer shall publish the suspension and debarment order in the Departmental website with the approval of I&W Department in the designated link within 1 (one) working day of issuance of such order. The TIA shall recommend the case to HTEC/TEC who with opinion of Chief Engineer will place it before DTC/QBEC/DTTC for approval.

B. PROHIBITION ON SUSPENDED / DEBARRED PERSONS / ENTITIES TO PARTICIPATE IN THE BIDDING OF GOVERNMENT PROJECTS / CONTRACTS OF THE DEPARTMENT

A person / entity that is suspended / debarred by a procuring entity shall not be allowed to participate in any procurement process under Irrigation & Waterways Department during the period of suspension / debarment unless the same has been revoked by the competent authority.

A Joint Venture or Consortium which is suspended / debarred or which has suspended / debarred member/s and/or partner/s as well as a person/entity who is a member of suspended / debarred Joint Venture or Consortium shall, likewise, not be allowed to participate in any procurement process under Irrigation & Waterways Department during the period of suspension / debarment unless the same has been revoked.

C. DEFINITION OF TERMS:-

i. Bidder: A person/Contractor/Agency/Company/Society/Corporation participating in the procurement process and/or a Person/Contractor/Agency/Joint Venture/Consortium/ Corporation having an Agreement/ Contract for any procurement with the Department shall be referred as bidder.

ii. Bid Evaluation Committees or Tender Evaluation Committees (HTEC/TEC/QBEC in short):

a. Bid / Tender Evaluation Committee'(TEC) for the bids upto tender value of Rs. 45.00 lakh (TEC) invited by the Executive Engineer will be comprising of i) Concerned Executive Engineer as Chairperson and Convener, ii) Assistant Engineer concerned to the work as Member, iii) Another Assistant Engineer from Division as Member or the Junior Engineer posted as the Divisional Estimator.

b. or, Evaluation Committee constituted by the Department from time to time.

iii. Consolidated Debarment List: A list prepared by the Departmental Debarment Committee/Chief Engineer containing the list of bidders debarred by the Irrigation & Waterways Department, Government of West Bengal. The list would be displayed prominently in the designated link in website of the Department clearly stating the period of suspension/debarment.

iv. Contract implementation: A process of undertaking a project in accordance with the contract /Agreement documents.

v. Debarment: An administrative penalty, in addition to the contract/Agreement provisions, disqualifying a bidder from participating in any procurement process under Irrigation & Waterways Department, Government of West Bengal for a given period.

vi. Debarred Bidder: A Bidder who was disqualified by the competent authority of the Irrigation & Waterways Department, Government of West Bengal.

vii. Department: Irrigation & Waterways Department, Government of West Bengal

viii. Entity: A person/Contractor/Agency/Joint Venture/Consortium/Corporation participating in the procurement process and/or a Person/Contractor/Agency/Joint Venture/Consortium/Corporation having an agreement/ contract for any procurement with the Department shall be referred as entity.

ix. Offence: A violation or breach of the Constitution of India, laws, regulations, laid down procedure, etc under Prevention of Corruption Act, 1988, Code of Criminal Procedure, 1973 u/s 195(1) and Section 197(1), Competition Act, 2007 and IT Act, 2000 as amended.

x. Procurement: It is the act of buying goods, services or works from an external source. It is favourable the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the acquirer in terms of quality and quantity, time and location.

xi. Procuring Entity/Authority: The officer authorised by the Irrigation & Waterways Department, Government of West Bengal for procurement.

xii. Suspension: Temporary disqualification of a bidder from participating in the procurement process of Irrigation & Waterways Department for a period of 6 (six) months when an offence is made against a bidder.

D GROUNDS FOR SUSPENSION AND DEBARMENT

i. Submission of eligibility requirements containing false information or falsified documents.

ii. Submission of Bids that contain false information or falsified documents, or the concealment of such information in the Bids in order to influence the outcome of eligibility screening or any other stage of the bidding process.

iii. Unauthorised use of one's name/digital signature certified for purpose of bidding process.

iv. Any documented unsolicited attempt by a bidder to unduly influence the outcome of the bidding in his favour.

v. All other acts that tend to defeat the purpose of the competitive bidding such as lodging false complaints about any bidder, posting baseless allegation about any officer duly authorised by the Department, restraining any interested bidder to participate in the bidding process etc.

vi. Refusal to accept an award after issuance of 'Letter of Acceptance' or enter into contract with the Government without justifiable cause.

vii. Refusal or failure to post the required performance security/earnest money within the prescribed time without justifiable cause.

viii. Subcontracting of the contract or any part thereof without prior written approval of the procuring entity.

ix. Failure solely due to fault or negligence of the Contractor, to mobilize and start work within the specified period as mentioned in the 'Letter of Acceptance' / 'Letter of Acceptance cum work Order' / 'Work Order' / 'Notice of Process' / 'Award of Contract' etc. ultimately resulting in rescindment of contract.

x. Failure to fully and faithfully comply with the contractual obligations without valid cause, or failure to comply with any written lawful instruction of the procuring entity or his representative(s) pursuant to the implementation of the contract, ultimately resulting in rescindment of contract.

xi. For the procurement of goods, unsatisfactory progress in the delivery of the goods by the manufacturer, supplier or distributor arising from his fault or negligence and / or unsatisfactory or inferior quality of goods, vis a via as laid down in the contract.

xii. Refusal or failure to upload a self-declaration in specimen format of Form-4 to the effect of any previous debarment imposed by I&WD, any other Department of State Government and or Central Government.

xiii. Wilful or deliberate abandonment or non-performance in a project or contract by the contractor / suppliers resulting to substantial breach thereof without lawful and / or just cause(s).

xiv. The Additional Performance Security shall have to be submitted by the selected L1 bidder after issuance of Letter of Acceptance / Letter of Invitation (LoA/LoI) within next seven working days and before issuance of Award of Contract (AoC) in the form of "Bank Guarantee" of any Scheduled Bank approved by RBI, payable at Kolkata or / in West Bengal, as per specimen format Form-6. Else, its/their Earnest Money Deposit (EMD) will be forfeited without any prejudice by the Tender inviting authority.

E. CATEGORY OF OFFENSE:

a. First degree of offense: Clause 9 D (i) up to (vii), (xii) & (xiv) is to be considered as first degree of offense.

b. Any of the offence under Clause (viii) to (xi) & (xiii) shall lead to termination of contract and its determinations in accordance with Clause (ii) & Clause (iii) of Agreement Form No. WB-2911 and simultaneous debarment for a period of 2 years

c. Second degree of offense: Any one of the offenses as mentioned under Clause 9D (i) to (xiv), committed by a particular bidder/contractor/supplier on more than one occasion would be considered as second degree of offense. Period of debarment will be 2 times the corresponding period penalty applicable for 1st degree offence in addition to other penal provisions contained in 1st degree offence.

F. Procedure and Rules of Debarment :

Debarment procedure and rules are published as Departmental Notification to be read in conjunction with the Corrigenda issued from time to time , as may be seen in the Notification link of the Departmental website wbiwd.gov.in

G. PENALTY FOR OFFENSE:

a. For committing 1st degree offense any of the cases referred under Clause 9 D (i) to (v), forfeiture of earnest money and debarment for a period of six months, if the offense is detected during technical evaluation. If the offence is detected after award of the contract and if the offender happens to be the agency selected for work, and such selection is made due to oversight, forthwith termination of the contract and determination of contract value in accordance with clause 3(ix) (c) of West Bengal Form No. 2911(i)/ (ii), and simultaneous debarment for a period of six months. Further, in case the offense is detected after completion of work and payment of final bill the Work credential earned would be declared as 'null and void', so that the same cannot be used in future as PQ credential for securing other works contracts in the Irrigation & Waterways Department, together with debarment for a period of six months.

b. For committing 1st degree offense in any of the cases referred under Clause 9 D (vi), (vii),(xiii) to (xv), forfeiture of earnest money and debarment for a period of one year. For committing offenses under Clause 9D (xv), debarment period shall be for one calendar year preferably from the date on which the due date for submission of BG had expired (i.e 8th or 15th working day from date of receipt of LOA /LOI) by the concerned Chief Engineer to be notified in the Departmental website.

c. For committing 1st degree offense in any of the other cases under Clause 9 D (viii) to (xii), termination of contract and its determination in accordance with Clauses 2 & 3 of West Bengal Form No. 2911(i)/(ii), including debarment for a period of two years.

d. For committing 2nd degree offenses under above all categories, period of debarment will be twice the corresponding period for 1st degree offenses, in addition to other penal provisions for 1st degree offense.

10. Taxes & duties to be borne by the Contractor/bidder

In view of introduction of GST with effect from 01.7.2017, all the bidders intending to participate in this e-tender should offer their financial bids inclusive of GST applicable for entire composite works/Procurement of goods & services, labour intensive component contained in the BOQ. Income Tax, Royalty, GST (CGST, SGST, IGST), Construction Workers' Welfare Cess, Labour Insurances EPF and similar other statutory levy / cess will have to be borne by the contractor/bidder and his/her quoted rate should be quoted accordingly after considering all these charges, and no separate payment towards any of the statutory taxes rents or levies shall be made by the work implementing authority.

11. Site inspection prior to submission of tender

Before submitting a e-tender, the intending contractor/bidder should make themselves acquainted thoroughly with the local conditions prevailing at site of implementation of the work by undertaking field inspections and taking into consideration all probable factors and difficulties to be involved during execution of the work as per specification in all respects including transportation of materials, communication facilities, climate conditions, nature of soil, availability of local labourers and market rates prevailing in the locality etc. and no claim whatsoever will be entertained on those accounts afterwards. The contractor/bidder may also contact the office of the designated Assistant Engineer/ **Executive Engineer, Metropolitan Electrical Division, Irrigation & Waterways Directorate** in between 11.30 hours to 16.30 hours on any working day, prior to the date of last date for submission of bid in the e-tender.

12. Conditional and incomplete tender

Conditional and incomplete tenders are liable to be summary rejected. No off-line document will be entertained until completion of e-Tender process by way of acceptance of L1 bid by the competent Tender Accepting Authority/Government.

13. Opening & evaluation of tender

13.1 Opening of a Technical Proposal

All works above tender value of Rs 5.00 lakh for which e-tendering is mandatory shall be awarded through open tenders without reservation for any particular class of contractors/bidders. Notices for open off-line tenders for each tender value below Rs 5.00 lakh shall include such clauses as is notified by the Department from time to time.

For e-tenders bids are to be invited in two parts under a two-bid electronic system.

i. Technical proposal will be opened by the Tender Inviting Authority or his/her authorised representative/s electronically in the official website using their authorised valid Digital Signature Certificate/s (DSC).

ii. Intending contractors/bidders may remain present if they so desire.

iii. Technical cover documents (vide Clause 3.2.A) will be opened /decrypted first and if found in order, Cover (Folder) for OID (vide Clause 3.2.B) will be opened/ decrypted. If there is any material deficiency in either of the Technical cover documents, the e-bid is liable to be disqualified & rejected.

iv. Decrypted (transformed into readable format) documents of the Pre-Qual Technical cover and the OID (Other Important Document) Cover will be decrypted/downloaded by the TIA and handed over to the Technical Bid Evaluation Committee (TEC).

13.2 Process of Technical Evaluation in a tender

Within 24 hours of uploading the TBO summery sheet containing Preliminary Technical Qualification result, any of the aggrieved bidder, may seek clarification / redressal / review from the TEC on the list of bidders, in writing/through e-mail with supporting facts / figures / documents. If such clarification /review relates to eligibility of other bidders, on the grounds of submission of false/ forged / manipulated / inappropriate credentials, modalities prescribed in the Departmental Notification shall be followed. In case, the review only seeks the eligibility of the applicant himself, views of the Tender Evaluation Committee (TEC) would be communicated in writing to that bidder within next two (2) working days. If the bidder is not satisfied with the clarification of the TEC, he/she may appeal to the concerned Chief Engineer within 24 hours of receipt of communication from the TEC. The concerned Chief Engineer will dispose such complaints jointly, in associated with at least another available Chief Engineer within next 2 working days. Thereafter final Technical Evaluation Sheet (TBE) of the technically qualified bidders would be uploaded, after incorporating modifications if required. The TIA shall while uploading the final TBE summery sheet accept or reject electronically the admitted bids based on the advice of TEC as per TBE summery sheet. Thus at this stage the rejected bidders will get back their EMD. e-mail communication in official e-mail address of TIA or TAA shall be treated as a valid mode of communication. The minimum time period from date of TBO summery sheet uploading and TBE summery sheet uploading shall be 4 working days or more.

Power is delegated to TEC to verify the authenticity of bid documents by physically summoning the applicant bidder on the basis of specific doubts which could not be cleared, which shall be exercised in exceptional cases, offline verification before issue of LOA needs to be avoided. Only when all other methods of undertaking verification have

been exhausted, and there is ample reason to believe that fairness of the technical bid evaluation of the tender cannot be ensured without such action. Prima-facie, if there is not enough reason to doubt the authenticity of the bid documents, physical summon of the bidder shall be avoided, as after determination of L1 bid in financial bidding and before issuance of LOA, all the on-line documents would be verified with the originals by the Accounts & estimating branches of the designated Executive Engineer, and reported to the Tender Accepting Authority prior to the issuance of LOA.

13.3 Uploading the list of technically qualified contractors/bidders

i. Pursuant to decision arrived after a Technical Bid Evaluation and review, the final list of eligible contractors/bidders having successfully qualified in the Technical Evaluation stage for a particular serial of work whose financial proposal will be thus considered, is uploaded on the web portal/s.

ii. While evaluating, the TEC may, if they so desire, summon the contractors/bidders and seek further clarification/information or seek verifications of original hard copy of any of/all the documents already submitted on-line, and if these cannot be produced within stipulated timeframe, their bids will be liable for rejection.

13.4 Opening and Evaluation of Financial Proposal/bid

i. Financial proposals of the bidders/contractors declared technically qualified by the Bid/Tender Evaluation Committee (TEC) will be opened electronically by the Tender Inviting Authority in the web portal stated above on the pre-notified date and time.

ii. The encrypted copies will be decrypted and the rates will be read out to the contractors/ bidders remaining present at that time, else they may login their respective e-tender accounts to see the (CS) comparative statement in the web portal.

iii. After opening the financial proposal, the preliminary summary result containing inter alia the names of contractors/bidders and the rates quoted by them will be uploaded and the result will be made available in the e-tender platform.

iv. If the Tender Accepting Authority (TAA) is satisfied that the rate obtained is fair and reasonable and there is no scope of further lowering down of rate, he/she may after having the comparative statement test checked by the Divisional Accountant / Divisional Accounts Officer attached to his office and after their acceptance upload the financial bid evaluation summary sheet or result containing the name of contractors/bidders and the rates quoted by them against each work.

v. If there is any scope for lowering down of rate in the opinion of the Tender Accepting Authority being abnormally high, i. e above 10% of the amount put to tender (Tender value), the e-NIT shall be cancelled and invited afresh 2nd or 3rd re-tender. **No post tender negotiations are permitted.**

vi. If there is any scope for lowering down of rate in the opinion of the Tender Accepting Authority being abnormally high above 10% of the amount put to tender i.e Tender value, the e-NIT shall be cancelled and invited afresh. No post tender negotiation is permitted.

vii. If there is no contractor/bidder or the number of contractors / bidders in the 1st tender is less than three, the e-tender has to be cancelled. In case of participation of more than three bidders, if the number of technically qualified bidder falls below three, the tender/e-NIT is to be cancelled as well and fresh e-tender vis-a-vis 2nd call e-Tender or even 3rd call e-Tender may be invited by suitably lowering of minimum eligibility PQ criteria (work & financial) for bidders with wide publicity of Re-tender notices through electronic and print media.

viii. Final result after acceptance of the rate by the Tender Accepting Authority, if within the delegated power of acceptance would have to be uploaded in the e-Procurement platform. Otherwise, the matter may be referred to the Government Appointed DTC and the appropriate Government for decision.

ix. The Tender Accepting Authority may ask the L1 bidder/contractor to submit analysis of rates to justify the rate quoted by that bidder after declaration of financial bid evaluation result.

x. If the lowest (L1) bidder/contractor backs out there should be Re-tendering in a transparent manner. In such a situation the TIA may call for re-tender with bid submission time period should normally be 14 days for value above Rs. 10.00 lakh, and 7 days for value exceeding Rs. 1.00 lakh but up to Rs. 10.00 lakh.

13.5 Tender Accepting Authority (TAA)

Authority to which the power has been delegated to accept tenders as per latest Finance Department Notification will function as the Tender Accepting Authority (TAA) for evaluation of technical and financial proposals of works having tender value within his/her range of acceptance.

As per present delegation, TAA for different tenders within the range above Rs 0.10 Lakh upto Rs 100.00 Lakh would be as follows:

i. For e-Tenders of value up to Rs 100.0 lakh (above Rs 5.00 lakh and up to Rs 100.0 lakh): **Executive Engineer, Metropolitan Electrical Division, Irrigation & Waterways Directorate**

ii. For e-tenders of value up to Rs 5.0 Lakh (above Rs. 1.0 Lakh and upto Rs. 5.0 Lakh): **Assistant Engineer, Metropolitan Electrical Division, Irrigation & Waterways Directorate**.

iii. For tenders of value up to Rs 1.0 Lakh relating to works only, is to be tendered in a single bid system in off-line mode to be accepted by **Assistant Engineer/Sub-Divisional Officer, Metropolitan Electrical Division, I&W Directorate.** [off-line single bid system Manual Tenders] on the basis of technically sanctioned costs.

13.6 Procedure to be followed for final acceptance of tender & Award of Contract

i. The lowest (L1) financial bid for all works tenders is accepted as a rule. If for any reason the lowest (L1) bid is not accepted, reference is to be made to the appropriate Government for orders as to which of the contractor /bidder the work should be awarded.

ii. Maximum 5% excess beyond the 'Tender Value' (Amount put to Tender) may be accepted as per delegated power to the Executive Engineer up to Rs 45.00 lakh, and at least three valid bids have been received in the financial bid stage, provided tender value after abatement is within the administratively approved cost. Maximum 5 % excess beyond the 'Tender Value' (Amount put to Tender) may be accepted above tenders of value below Rs 3.00 lakh upto 5% above amount put to tender and also 5% excess over administratively approved amount, proposal for revised administrative approval/Expenditure sanction would have to be submitted to the Government, but acceptance of tender and issue of work order may not be kept pending for want of revised approval.

iii. Above 5% and up to 10% of the Tender Value can be recommended to the Government for acceptance by the Departmental Tender Committee (DTC) subject to the conditions that valid technically qualified bids should not be less than three and L1 bid is accepted and tendered amount is within the administratively approved cost. In case of excess over administratively approved amount, revised administrative approval would have to submitted to the Government but acceptance of tender, and issue of work order may not be kept pending for want of Revised Administrative Approval/ Revised Financial sanction.

iv. If the response to an e-Tender is less than three, then Tender should be invited afresh. Such Re-Tender notice shall be published in widely circulated dailies as per guidelines and also through e-Tender web portals. Prior to invitation of Re-Tender / fresh e-Tender, the eligibility criteria and other terms & conditions as contained in the first 'Notice Inviting e-Tender' (e-NIT) shall have to be reviewed/relaxed by the Tender Inviting Authority, to ascertain whether (i) it was too much restrictive, say, specifications and qualifications were fixed at higher standards than required, (ii) advertisements in the widely circulated Newspapers were properly published and (iii) other related procedural matters were observed in its entirety.

v. If the number of valid bids received even in re-tender is less than three, it should be referred by the TIA to the DTC and even the appropriate Government along with the recommendation of the DTC for decision, in accordance with Finance Department Memorandum and other relevant orders in vogue at the time of publication of the e-tender.

vi. For acceptance of L1 bid after 2nd / 3rd re-tenders is still above 10% of the Tender Value (Amount put to tender), upon specific recommendation of the DTC as mentioned at clause 13.4, with that of the Department shall have to be sent to the Finance Department for decision.

vii. All above tender rules applies for all types of works and procurements i.e Plan, Non Plan, deposit works tenders.

14. General guidelines for acceptance of e-Tender

Lowest valid rate should normally be accepted in accordance with the procedure stated in clause 13.4. The Tender Accepting Authority reserves the right to distribute the work amongst more than one contractor/bidder with same L1 rate.

15. Signing of formal tender contract/agreement after acceptance of e-tender

The contractor/bidder, whose bid is approved for acceptance, shall within 15 days of the receipt of Letter of Invitation (LOI) or Letter of Acceptance (LOA) in his / her favour, will have to execute a 'Formal Agreement' with the Engineer-in-Charge in quadruplicate in W.B.F. 2911(i)/2911(ii) and all other contract documents, entire set of which may be obtained free of cost from the office of the designated **Executive Engineer, Metropolitan Electrical Division, Irrigation & Waterways Directorate** in-charge of the work tendered.

If the selected L1 bidder fails to turn up even after 30 days after the initial 15 days from the date of uploading of the AOC in the e-Procurement portal or the despatch date of official communication for signing of the Contract/Agreement, the selected bidder is liable for penal actions which shall comprise blacklisting, debarring from future participation in Government tenders, immediate forfeiture of the Earnest Money deposited in the tender, other penal actions as stipulated under clause 9 & 10 of the e-NIT, the Departmental Notification and also contained in contract W.B Form No. 2911(i)/ 2911(ii)/ Agreement.

16. Payment against bills raised by the contractor

Periodic Tax invoice/bills containing bidders GSTIN & other details needs to be submitted by the supplier/contractor/Agency/bidder to the DDO for raising claims for receiving payments of work executed under this contract /upon achieving physical Milestones clearly showing separately the Tax charged in accordance with the provisions of the GST Act, 2017.

The payment of Running Account as well as final bill for any work based on progress and performance will be made according to availability of fund and no claim due to delay in payment will be entertained.

17. No cost escalation in any form is included in the Tender Contract Agreement.

18. Bid validity

The Bid will be normally valid for **120 days** from the date of opening of the financial proposal. However, extension of bid validity may be suitably considered by the Tender Inviting Authority, if required, subject to written confirmation of the contractor/bidder (s) to that effect.

19. Definition of Physical Milestones:

The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor, and which shall be reckoned from the date on which the order to commence work is given to the contractor. The work shall throughout the stipulated period of the contract be proceeded with all due diligence. Time being deemed to be the essence of contract on the part of the contractor; the contractor shall be bound in all cases, to achieve the 'Milestones' as specified by the Engineer-in-Charge with the AOC, defining pertaining to the work. The contractor within 15 days of receipt of Letter of Acceptance shall submit a work programme commensurate with period of construction in the form of a Bar Chart work programme, stating the timeline of such different Milestones. In the event of the contractor failing to comply with any of the conditions related to achieving the 'Milestones' within the specified time period prescribed for such 'Milestone' plus one month, he/she shall be liable to pay compensation.

If the contractor fails to commence and/or maintain required progress over the total time allotted for its full completion and fails to complete the work and clear the site on or before the end of contract period or extended date of completion, he/she shall, without prejudice to any other rights or remedy available under the law on account of such breach, pay as agreed compensation to the implementing Department. This will also apply to items or group of items for which a separate period of completion has been specified.

20. Withdrawal of bid in a Tender

Withdrawal of e-Tender once the bid has been submitted online and after passing of end date for submission and has been accepted for further processing, is not allowed. EMD will be forfeited by the Government and the L1 bidder/contractor penalised in terms of clause 8 referred earlier would be applicable.

21. Critical dates of this e-Tender

Sl. No.	Activity	Date & Time	Remarks
1.	Publishing Date	08.04.2025 at 17.00 Hrs.	To be made available with the e-NIT in the website
2.	Document Download start date	08.04.2025	
3.	Bid submission start date	08.04.2025 at 17.00 Hrs.	
4.	Document Download end date	23.04.2025 at 10.00 Hrs.	
5.	Bid submission end date	23.04.2025 at 10.00 Hrs.	
6.	Technical Bid opening date with preliminary result (TBO Sheet)	23.04.2025 at 12:00 Hrs.	
7.	Uploading of the list of Technically qualified final list of bidders (TBE Sheet)	To be Notified Later	To be notified to all bidders through e-mail & SMS through auto-generation in the system.
8.	Financial Bid opening date (FBO Sheet)	To be suitably decided by TIA	
9.	Uploading of CS (Comparative Statement) and uploading of Final FBE Sheet	To be suitably decided by EE(TAA)	
10.	Uploading of the Letter of Invitation / Acceptance LOI/LAO	-do-	
11.	Uploading of Award of Contract (AOC) (Work Order)	-do-	

TIA: e-Tender Inviting Authority (Assistant Engineer/Executive Engineer)
TAA: e-Tender Accepting Authority (Executive Engineer)

Special Terms & Conditions of the contract

1. The Executive Engineer of the concerned Division shall be the Engineer-in-Charge in respect of the works contract and all correspondence concerning rates, claims, change in specifications and/or design and similar important matters will be valid only if accepted/recommended by the Engineer-in-Charge. If any correspondence of above tender is made with Officers other than the Engineer-in-charge for speedy execution of works, the same will not be valid unless copies are sent to the Engineer-in-Charge and also approved by him/her. Instructions given by the Sub-Divisional Officer/Assistant Engineer and the Junior Engineer/Section Officer (SO) on behalf of the Engineer-in-Charge shall also be valid (who have been authorized to carry out the work on behalf of the Engineer-in-Charge) regarding specification, supervision, approval of materials and workmanship. In case of dispute relating to specifications and work, the decision of Engineer-in-Charge shall be final and binding. The Engineer-in-Charge will however take all decisions relating to works contract only after recommendation/ advice of the Tender Accepting Authority. If there is more than the Executive Engineer assigned for the tender, the Chief Engineer would designate the Engineer-in-Charge for the work.
2. Acceptance of the tender including the right to distribute the work between two or amongst more than two bidders with same L1 rates will rest with the Tender Accepting Authority without assigning reason thereof to any of the bidders. The tender accepting authority reserves the right to reject any or all tenders without assigning sufficient justification thereof to the bidder/contractor. No additional or excess work or additional items of work beyond the tendered amount would be generally allowed. All excess, supplementary or substitute supplementary items of work, if unavoidable are to be accepted by the Tender Accepting Authority only if the total value of work on completion is within the tendered amount. The exiting contract would be terminated after achieving work up to tendered cost (gross value) and balance work would be taken up afresh after fresh sanction and new tender, except in the interest of public services, in rare & special cases under specific approval of the Government.
3. The Contractor/bidder shall have to comply with the provisions of (a) Contract Labour (Regulation & Abolition) Rules, 1970 including its revisions (b) Minimum Wages Act 1948 and the modification thereof or any other laws relating thereto as will be in force from time to time.
4. Engineer-in-Charge shall not entertain any claim whatsoever from the contractor for payment of compensation on account of idle labour on such grounds including non-possession of encumbrance free land. Escalation of cost due to inflationary effects or any other reason is not permitted during construction period or extended time period of contract.
5. Engineer-in-Charge shall not be held liable for any compensation due to machines & equipments becoming idle or any circumstances including untimely rains, other natural calamities, strikes etc.
6. All statutory taxes, viz. GST / labour welfare cess, labour insurance etc or revision of taxation rates even after AOC or commencement and before final completion of the work are to be borne by the contractor/bidder. Original tax invoice/challan or bill of those materials, which are procured by the bidder, may be asked to be submitted for verification if required.
7. Labour Welfare Cess @ 1% of the cost of construction works shall be deducted from the Gross value of all works bills. Also it is instructed to compulsorily register his/her establishment under the Act, under the competent registering authority, i.e. Assistant Labour Commissioner / Dy. Labour Commissioner of the region for disbursing PF and ESI benefits of workers. The bidder should be mandatorily be registered online with Employees Provident Fund Organisation (EPFO) in the on-line system and posses EPF code and all current documents. Penalties and complaints due to non compliance of on-line EPF registration and default is the full responsibility of the bidder even if the TIA is by default the Principal employer
8. Adjustment of original bid prices/escalation cost/ mobilization advance / secured advance shall not be permitted for any reason whatsoever due to cost and time over run unless specified otherwise in the contract or the e-Notice Inviting Tender.
9. GST, Cess, License fees, Royalty for construction materials, forest product etc, Toll Tax, Income Tax, Ferry Charges and other Statutory Government Taxes as applicable during project implementation are to be paid by the contractor/bidder. The rates of supply and finished work items are inclusive of these taxes and levy. Tax invoice/bills needs to be submitted by the supplier/bidder for raising claims under the contract after attaining of physical milestones showing separately the tax charged in accordance with the provisions of GST Act, 2017.
10. All working tools & plants, scaffolding, construction of vats & platforms and arrangement of Labour Camps will have to be arranged by the contractor at his/her own cost. The contractor shall clear the site of work and restore all damages made due to the Labour camp, erection of yards and godowns, stores etc within 30 days of completion of work.
11. The contractor shall supply mazdoors, bamboos, ropes, pegs, flags T&P, Machineries and equipments etc. for laying out the work and for taking and checking measurements for which no extra payment will be made.
12. The contractor/bidder should see the site of works and tender documents, drawings etc. before submitting tender and satisfy himself/herself regarding the condition and nature of works and ascertain difficulties that might be encountered in executing the work, carrying materials to the site of work, availability of drinking water and other human requirements & security etc. Work on river banks may be interrupted due to a number of unforeseen reasons e.g. sudden rise in water levels, inundation during flood, inaccessibility of working site for carriage of materials. Engineer-in Charge may order the contractor to suspend work that may be subjected to damage by climate conditions. No claim will be entertained on this account. There may be variation in alignment, height of embankment or depth of cutting, location of revetment, structures etc. due to change of topography, river condition and local requirements etc. between the preparation and execution of the scheme for which the tendered rate and contract will not stand invalid. The

contractor will not be entitled to any claim or extra rate on any of these accounts.

13. A machine page numbered Site Order book (with triplicate copy) will have to be maintained at site by the contractor and the same has got to be issued from the Engineer-in-Charge before commencement of work. Instructions given by inspecting officers not below the rank of Assistant Engineer will be recorded in this book and the contractor must note down the action to be taken by him in this connection as quickly as possible.
14. The contractor shall be bound to comply with all the Central & State Pollution Control Acts & Rules during entire construction period.
15. All possible precautions should be taken for the safety of the people and work force deployed at worksite as per safety rule in force. Contractor will remain responsible for his labour in respect of his liabilities under the Workmen's Compensation Act etc. He must deal with such cases as promptly as possible. Proper road signs as per P.W.D. practice will have to be erected by the contractor at his own cost while operating public thoroughfares. Also, display boards containing brief description and name of project with completion target dates shall be erected at a prominent location at the work site by the contractor for public awareness. Insurance of workers and materials is the responsibility of the bidder during entire construction period.
16. The contractor will have to maintain qualified technical employees and/or Apprentices at site as per prevailing Apprentice Act or as stipulated in the contract. No compensation for establishment charge will be entertained.
17. The contractor will have to accept the work programme as per modifications and priority of work fixed by the Engineer-in-Charge so that most vulnerable reach and/or vulnerable stretch is completed before impending monsoon or rise in river flood water level or commencement of canal irrigation water release or for other suitable reasons.
18. Quantities of different items of work mentioned in the departmental tender schedule/BOQ or in work order are only tentative. In actual work, these may vary considerably. Payment will be made on the basis of works actually completed in different items as per specifications and codes, and no additional claim will be entertained for reduction of quantities in some items or for omission of some items. For execution of any additional item or supplementary works within the tendered value with the total completion value remaining within the accepted tendered cost, approval of the Tender Accepting Authority/Government in the Irrigation & Waterways Department would be required.
19. In order to cope with the present system of e-pradan billing, departmental supply of construction materials is discouraged. However, Departmental materials may be issued to the contractor/ bidder to the extent of requirements as assessed and following accounts procedure in the Treasury system of bill payment and in instalments as decided by the Engineer-in-Charge. Issue of materials may be of three categories.
    a) Materials issued directly to the work and subject to recovery.
    b) Materials issued from departmental go down and subject to recovery.
    c) Materials issued free of cost.

    Decision of the Engineer-in-Charge should be final and binding in this regard. He also stands solely responsible for reconciliation of accounts, if materials are issued to the contractor.
20. Any materials brought to site by the contractor subject to approval of the Engineer-in-Charge. The rejected materials must be removed by the contractor from the site at his own cost within 48 hours of issue of the order to that effect. The rates in the schedule are inclusive of cost and carriage of all materials to worksite. The materials will have to be supplied in phase with due intimation to the Sub-Divisional Officer/Assistant Engineer concerned in conformity with the progress of the work. For special type of materials, i.e. Geo Synthetic Bags, HDPE Bags, Geo Textile Filter, Geo jute Filter etc. if any, relevant Data Sheet containing the name of the Manufacturers, Test Report etc. will also be submitted in each occasion. Engineer-in-Charge may conduct independent test on the samples drawn randomly before according approval for using the materials at site. In this regard decision of Engineer-in-Charge shall be final and binding.
21. For materials under category 19(a),(b)&(c), the contractor will act as the custodian thereof. The materials will have to be carried from the nearest Departmental go-down to worksite by the contractor at his own cost. The contractor shall remain responsible for the proper storage and safety of the materials. Suitable Go-down/ Store shall have to be made by the contractor at his/her own cost. Penalty charges shall be levied at higher rate for loss, wastage, misuse. Surplus materials of the departmental if any, shall have to be returned to the issuing Go-down or store at the contractor's cost within the time frame as fixed by Engineer-in-Charge, otherwise, the cost at penal rate will be recovered from the bill. Indent for departmental materials shall be submitted by the contractor to the AE/S.D.O. at least 7 days in advance of actual requirement. No claim will be entertained for non-issuance of such materials in time but reasonable extension of time will be granted. All materials, whatever be the category thereof, shall be properly stored by the contractor in suitable go downs near the site of work at his own cost & under no circumstances whatsoever shall any material be removed from the site of work without prior written permission of the Engineer-in-Charge. The contractor shall be responsible for any damage, wastage or loss of such materials.
22. The contractor shall also have to satisfy the Engineer-in-Charge regarding the proper utilization of materials which have been issued departmentally.
23. Value of the material, under category (a) & (b) of clause 19, will be recovered from the bills of the contractor in one or successive instalments as may be decided by the Engineer-in-Charge.

24. Requisite quantity of cement as may be required for the work will be supplied from the nearest Departmental go down if stock permits. The issue rate of cement is shown in the Schedule of materials attached. Any excess consumption of cement by more than 5% over the final consumption statement drawn up as per consumption rate specified in the Schedule will be recovered at a penal rate shown in schedule.
25. Reinforcement steel rods/MS sheet piles/bitumen will be issued if stock permits, from the nearest departmental go-down where such material is available in marketable length/quantities. While issuing the same, for any particular work the quantity actually required as per approved drawing shall only be issued. While executing the work, it will be responsibility of the Contractor/bidder as well as the Engineer-in-Charge to get this quantity properly utilized in the work. Cut pieces, if any will not be taken back by the Department. Recovery for the total quantum of steel issued will be made at the issue rate shown in the Schedule below. In case of misuse over +10%, deduction will be made at a penal rate shown in the Schedule below. This whole principle shall apply in case of other M.S materials like sheet piles and structural steel members as well.
26. The work is to be executed strictly as per specification attached with e-NIT and shall confirm relevant Indian Standard Codal provisions and good industry practice. In the absence of any such provision in some items, the tending authority reserves the right to adopt suitable International Code/specifications/standards.
27. All queries and disputes arising out of the works contract during construction phase are to be brought to the notice of the Chairman of the 'Department Dispute Redressal Committee' in writing for decision within 15 days.

28. SCHEDULE OF RECOVERY RATES OF DEPARTMENTALLY SUPPLIED CONSTRUCTION MATERIALS

Sl. No	Name of materials	Issue rate (in ')	Unit	Penalty recovery rate for loss or misuse or wastage (if otherwise not mentioned specifically in the SoR)	Place of delivery
01	Cement		MT	2 (Two) times issue rate	Departmental Godown
02	Reinforce-ment steel rods, structural steel members, M.S sheet Piles		MT	2 (Two) times issue rate	-do-
03	Bitumen		MT	2(Two) times issue rate	-do-

(Digital Signature verified)

(Sd/)
Executive Engineer
Metropolitan Electrical Division
Irrigation & Waterways Directorate
Govt. of West Bengal

FORM 1

(To be submitted in plain paper/letter head as per specimen, duly filled up and uploaded with digital signature which shall be treated as the self declaration of the bidder)

APPLICATION FOR e-TENDER

To,
The Executive Engineer
Metropolitan Electrical Division,
I&W Directorate, Govt. of West Bengal
Jalasampad Bhawan, (4th Floor)
Bidhannagar, Kolkata-700091.

e-NIT No - WBIW/EE/MED/e-NIT-01/2025-26

Serial No. of Works applied for :-

Amount put to e-Tender: Rs.

Dear Sir,

Having examined the Technical PQ cover, OID cover, Corrigendum (*optional) & entire e-NIT documents, I/we hereby would like to state that I/we wilfully accept all your conditions and offer to execute the work as per the tenders rules in e-NIT, terms & conditions, specifications, drawings, bill of quantities and corrigenda/addenda, SoR, and Agreement (WB Form No. 2911(i)/(ii) involving the e-Tender and Serial no of work stated above. I/We acknowledge that the making of our bid shall be regarded as an unconditional and absolute acceptance of the terms & conditions of the e-NIT. I/We also agree to remedy the defects during execution and upto end of security period of the above work in conformity with the conditions of contract, specifications, drawings, bill of quantities and addenda/corrigenda.

Dated this _____ day of _____ 201___
Full name of Bidder / Contractor: _____
Name in full of Signatory/s*: _____
In the capacity* of: _____
Duly authorized to sign bid
for & on behalf of (Name of Firm): _____
(In block Capital letters or typed)

Office address with seal: .....
Telephone no(s) (office): _____
Mobile No: _____
Fax No: _____
E mail ID: _____

*In case of Joint Venture & Consortium the Lead Member to submit this format.

(DIGITAL SIGNATURE OF BIDDER)

FORM – 2

Declaration against Common Interest

(To be submitted in plain paper/letter head as per specimen, duly filled up and uploaded with digital signature, which shall be treated as the self declaration of the bidder)

Ref:- e-NIT No. WBIW/EE/MED/e-NIT-01/2025-26 **e-Tender ID No……**

Sl. No. of work …… (in the list of work in the e-NIT)

To,
The Executive Engineer
Metropolitan Electrical Division,
I&W Directorate, Govt. of West Bengal
Jalasampad Bhawan, (4th Floor)
Bidhannagar, Kolkata-700091.

I/We, Sri/Smt. _____, the authorized signatory on behalf of …… do hereby affirm that I/We/any of the member of..... bidding against e - NIT No. ..... Sl. No. ..... do not have any common interest either as a partner in any other partnership firm /consortium/Joint Venture or as Proprietor / Principal Share Holder of any other Firm/Company in the same serial for the work I / we want to participate.

Dated this _____ day of _____ 201___
Full name of Bidder / Contractor: _____
Authorised Signatory: _____
In the capacity of: _____
Duly authorized to sign bid
for & on behalf of (Name of Firm): _____
(In block Capital letters or typed)

Office address with seal: .....
Telephone no(s) (office): _____
Mobile No: _____
Fax No: _____
E mail ID: _____

*In case of Joint Venture & Consortium the Lead Member to submit this format.

(DIGITAL SIGNATURE OF BIDDER)

FORM – 4
Declaration on antecedents and performance

(To be submitted in plain paper/letter head as per specimen, duly filled up and uploaded with digital signature, which shall be treated as the self declaration of the bidder)

Ref:- e-NIT No. WBIW/EE/MED/e-NIT-01/2025-26 **e-Tender ID No……**

Work Sl. No……

To,
The Executive Engineer
Metropolitan Electrical Division,
I&W Directorate, Govt. of West Bengal
Jalasampad Bhawan, (4th Floor)
Bidhannagar, Kolkata-700091.

I/We, Sri/Smt. _____, the authorized signatory on behalf of …… do hereby affirm that I/We/any of the member of..... bidding against e - NIT No. ..... Sl. No. ..... are not black listed suspended or debarred from participation in State Government procurements and tenders in the Irrigation & Waterways Directorate, Government of West Bengal, other Departments of the State Government and Government of India on the date of publication of this Notice Inviting Tender (NIT).

If at a later stage this submission (undertaking) is found incorrect, the bidder company along with all its constituent members/owners/partners would be liable to penal actions as decided by the Government under the law.

Dated this _____ day of _____ 201___

Full name of Bidder / Contractor: _____

Authorised Signatory: _____

In the capacity of: _____

Duly authorized to sign bid

for & on behalf of (Name of Firm): _____

(In block Capital letters or typed)

Office address with seal: .....

Telephone no(s) (office): _____

Mobile No: _____

Fax No: _____

E mail ID: _____

(DIGITAL SIGNATURE OF BIDDER)

FORM-6*

SPECIMEN FORMAT FOR THE BANK GUARNATEE FOR ADDITIOANAL PERFORMANCE SECURITY DEPOSIT

(*To be submitted only **if the bid price quoted by the bidder is below 20% of the estimated cost put to tender,** non submission within 7 working days from date of issuance of LOA which may be maximum extended to 14 working days after issuance of LOA/LOI will lead to rejection of selected bidder. Similar standard format issued by RBI approved Bank pledging Bank Guarantee of the required value and period in favour of Engineer-in-Charge is acceptable)

To,
The Executive Engineer
Metropolitan Electrical Division,
I&W Directorate, Govt. of West Bengal
Jalasampad Bhawan, (4th Floor)
Bidhannagar, Kolkata-700091.

WHEREAS (name and address of Contractor) (hereafter called "the Contractor") has undertaken, in pursuance of Contract No: dated to execute (name of Contract and brief description of Works) (hereinafter called "the Contractor").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a Scheduled commercial bank for the sum specified therein for '**ADDITIONAL PERFORMANCE SECURITY DEPOSIT**' for compliance with his obligation in accordance with the Contract:

AND WHEREAS we (Indicate the name of the bank and branch) have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we ; (Indicate the name of bank and branch) hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, upto a total of Rs. (amount of guarantee) (in words). We undertake to pay you, upon your first written demand and without cavil or argument, a sum 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 (Indicate the name of the bank and branch) hereby waive the necessity of your demanding the said debt from the contractor before presenting us with the demand.

We (Indicate the name of the bank and branch) further agree to pay to you any money so demanded not withstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present absolute and unequivocal.

The payment/so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor(s) shall have no claim against us for making such payment.

We (Indicate the name of the bank and branch) further agree that no change or addition to or other modification of the terms of the Contract or of the works to be performed there under or of any of the contract documents which may be made between you and the contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

We (Indicate the name of the bank and branch) lastly undertake not to revoke this guarantee except with the previous consent of you in writing.

This guarantee shall be valid upto ----------. It come into force with immediate effect and shall remain in force and valid for a period upto the time of completion of the work under the stated contract plus claim period of six months for the Bank Guarantee. Notwithstanding, anything mentioned above, our liability against this guarantee is restricted to Rs (Rs.) and unless a claim in writing is lodged with us within the validity period, i.e upto…….of this guarantee all our liabilities under this guarantee shall cease to exist.

Signed and sealed this day of 20 at

SIGNED, SEALED AND DELIVERED

For and on behalf of the BANK by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

i. The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee

The address, telephone number and other details of the Head Office of the Bank as well as of issuing Branch (within West Bengal/AT PAR ANYWHERE IN INDIA only to be accepted) should be mentioned on the covering letter of issuing Branch.

Memo No: 526/1(11)/7E-16/2025-26 **Dated: 04.04.2025**

Copy submitted for favour of kind information to:

1) The Secretary to the Govt. of West Bengal, I&W Department.
2) The Chief Engineer, Mechanical & Electrical, I&W Directorate, Govt. of West Bengal.
3) The Chief Engineer, South, I&W Directorate, Govt. of West Bengal.
4) The Chief Engineer, D & R, I&W Directorate, Govt. of West Bengal.
5) The Joint Secretary (Works) to the Govt of West Bengal, I&W Department.
6) The Deputy Secretary (Works) to the Govt of West Bengal, I&W Department.
7) The Superintending Engineer, Metropolitan Drainage Circle, I&W Dte., Govt. of West Bengal.
8) The Superintending Engineer, Western Circle-I, I&W Dte., Govt. of West Bengal.
9) The Superintending Engineer, Eastern Circle, I&W Dte., Govt. of West Bengal.
10) The Superintending Engineer, Mechanical & Electrical Circle, I&W Dte., Govt. of West Bengal.
11) The Executive Engineer, Metropolitan Drainage Mechanical Division, I&W Dte. Govt. of West Bengal.

Sd/-
(S. Roy)
Executive Engineer
Metropolitan Electrical Division
I & W Dte., Govt. of West Bengal

Memo No: 526/1(11)/1(6)/7E-16/2025-26 **Dated: 04.04.2025**

Copy forwarded for favours of kind information to:

1) The Assistant Engineer, Metropolitan Electrical Division.
2) The Sub-Divisional Officer/ Metropolitan Electrical Sub-Division.
3) The Director of Information, Department of Information & Cultural Affairs, Nabanna, Shibpur, Mandirtala, Howrah -711102 for wide circulation.
4) The Estimating Section, Metropolitan Electrical Division.
5) The Accounts Section, Metropolitan Electrical Division.
6) Notice Board of Metropolitan Electrical Division.

Sd/-
(S. Roy)
Executive Engineer
Metropolitan Electrical Division
I & W Dte., Govt. of West Bengal

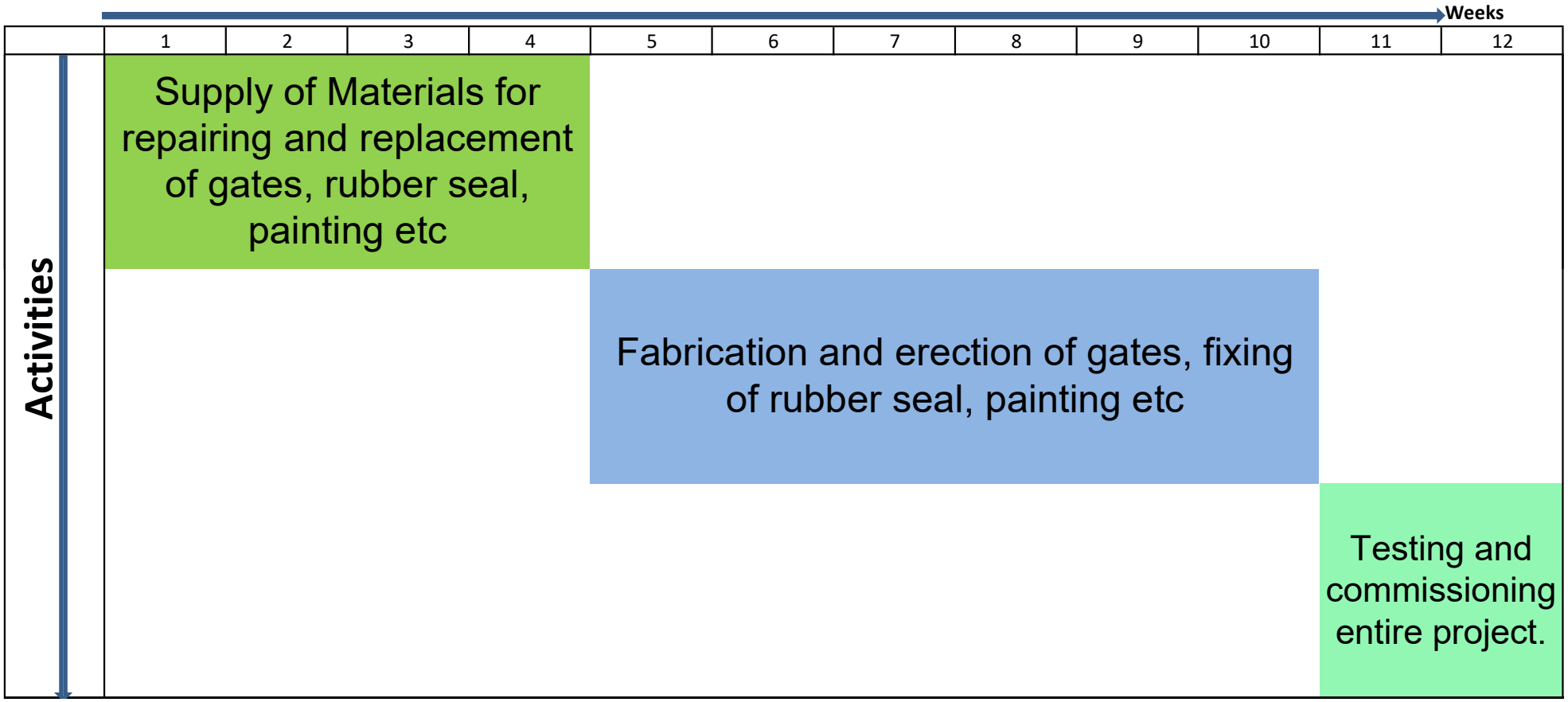
PART-B

"BAR CHART"

Tentative Work Programme for the Work: Replacement of 5 (five) no. draw shutters and 2 (two) no. flap shutters and allied works of 11 vented Fuleswar sluice within Block Uluberia-I, PS- Ulberia, Dist- Howrah.

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26, Sl no-01

Total construction Period:- 84 days

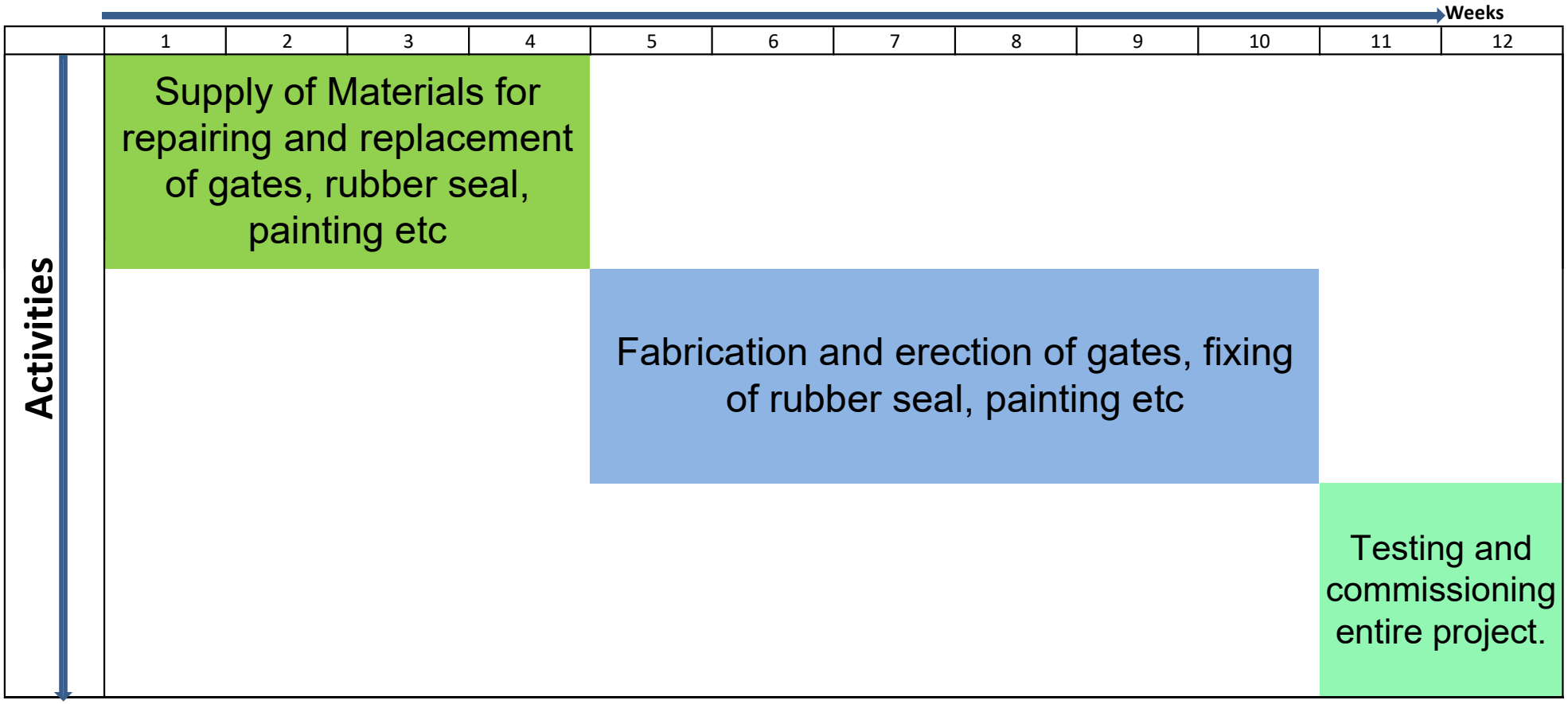


"BAR CHART"

Tentative Work Programme for the Work: Replacement of 4 (four) no. draw shutters and 6 (six) no. flap shutters and allied works of 20 vented Sejberia sluice within Uluberia Municipality , PS- Ulberia, Dist- Howrah.

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26, Sl no-02

Total construction Period:- 84 days

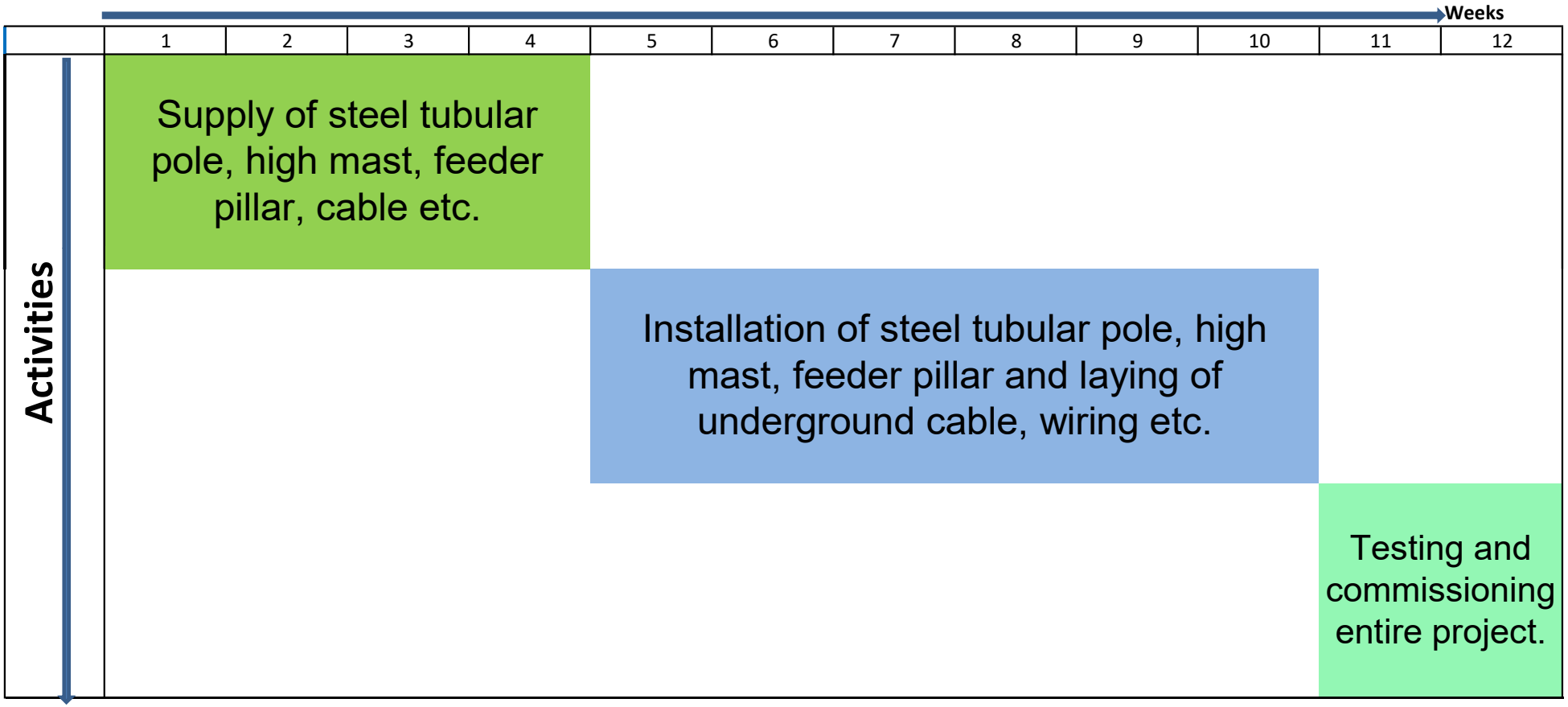


"BAR CHART"

Tentative Work Programme for the Work: Electrical installation work for illumination of Dabu Irrigation Sub-Division compound including re-wiring within Block: Canning-I, P.S: Canning, Dist: 24 Pgs(South).

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26, Sl. No-03

Total construction Period:- 84 days

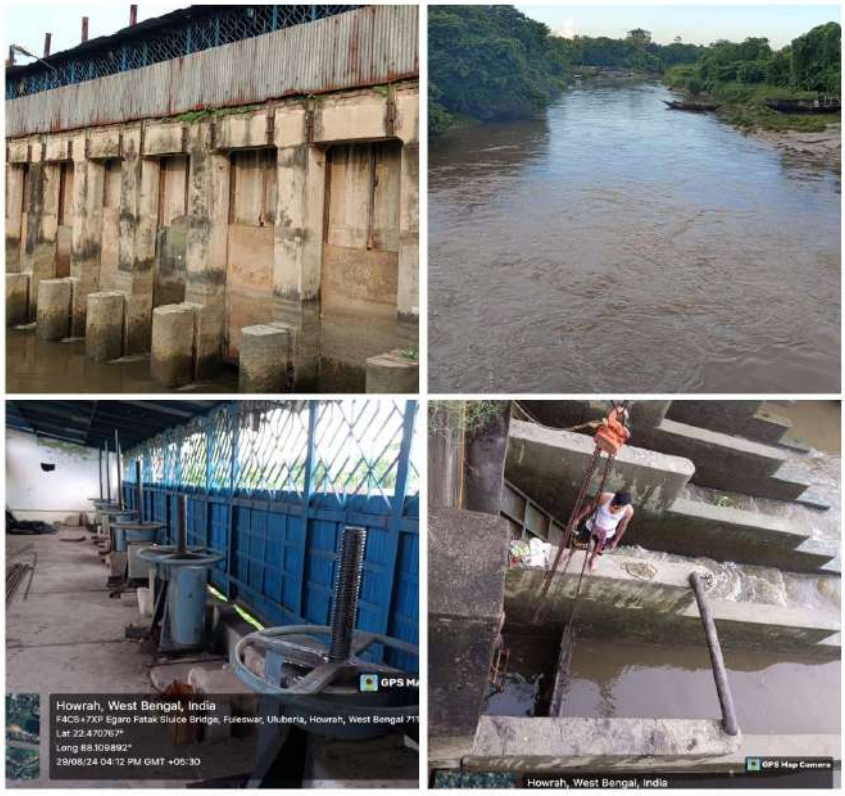


PART-C

GOVERNMENT OF WEST BENGAL
IRRIGATION AND WATERWAYS DIRECTORATE

METROPOLITAN ELECTRICAL DIVISION

DETAILS SCOPE OF WORKS & TECHNICAL SPECIFICATIONS



Name of Project:- Replacement of 5 (five) no. draw shutters and 2 (two) no. flap shutters and allied works of 11 vented Fuleswar sluice within Block Uluberia-I, PS- Ulberia, Dist- Howrah.

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26 (Sl. No.-01)

YEAR-2025-26

INDEX

1.0 GENERAL SPECIFICATION

1.1 Basic Consideration for Scope of works

Description of item in B.O.Q shall be read in conjunction with this chapter alongwith drawing and appendices which provide further information and details. The rates in this B.O.Q are inclusive of cost of all materials, transportation and carriage of material up to works site, labour, plant and equipment, tools and tackles, safety gadgets, insurance, incidentals etc. but exclusive of applicable GST & labour CESS, as may be required for execution of a particular item/works or items /works which is/are to be read in conjunction with the specification. The contractor shall confirm of having visited the site to conceive the work in totality and collected &verified the data relating to site conditions. The contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility. Compliances with this specification do not limit the responsibility of the contractor for overall performance of the said system. Contractor can offer changes in design for better performance. Justification of such changes shall be provided by the contractor.

Unless otherwise stated, the rates in this B.O.Q are inclusive of all type of overhead cost as listed below and **no separate** claim by the contractor shall be entertained.

i) Items which cover both fabrication and erection shall include conveyance and delivery, handling, unloading, storing, hoisting and all labour for finishing to required shape and size.

ii) to establish, as per requirement, office at site with adequate space for contractor's personnel, inclusive of necessary furniture & furnishing, consumables etc., storage space for equipment, materials etc.

iii) Temporary power connections from electricity board, alternative power arrangement telephones, construction and drinking water etc.

iv) General works such as setting out, clearance of site before setting out and clearance of works after completion.

v) Material testing cost.

vi) Scaffolding charges.

vii) All temporary works, formwork and false work.

viii) Cost of labour hutment

ix) Guarding of Material.

x) Cost for implementation of Quality Assurance Plan.

xi) Any other item of work (minor in nature) which could not be specifically provided in the estimate but which is/are necessary for complying the works.

Notwithstanding contained in this document, contractor shall be adhered to General specification of USOR(M&E) of I&W Department[USOR(M&E) of I&W Department is available in the departmental website i.ewww.wbiwd.gov.in]

1.2 General Workmanship(Embedded Parts & Gates)

All fabrication work under this Contract shall be done in accordance with thespecifications, which meet the EIC approval. All the works shall be performedand completed in a thorough workman like manner as per best practice in themanufacture and fabrication of materials of the types covered by these specifications. In all cases the work shall be of highest quality and carefully performed to the satisfaction of the Engineer-in-Charge. The Contractor shall warrant all materials andworkmanshipfurnished by him to be free from injurious defects. All sharp corners edges shall be chamfered. He shall replace, free of cost, any defective material orworkmanship noticed during erection and shall bear all cost of the modification of anydefect, in the field, for which he is responsible.Workmanship shall conform to the lateststandards, laid down in Indian Standards Specifications or industry based best practice.All members shall be free of twists, bends or other deformations and all surfaces thatwill be in contact shall be thoroughly cleaned before assembling, parts shall beadjusted to line and fit and shall be firmly bolted or otherwise held securely together sothat surfaces are in close contact before drilling, reaming or welding iscommenced.Plates with lamination discovered during cutting, welding or at any other time shall berejected. Minor surface imperfections can be repaired wherever possible with the priorapproval of the purchaser. Materials not supplied or workmanship not performed inaccordance with approved drawings and specification shall be rejected and replaced. Iftransport clearances do not permit the weight and size due to limitations, the gate parts and miscellaneous parts **shall be fabricated into sub-assemblies**. The Contractor shallsubmit with his bid a drawing showing the sub-assemblies into which he proposes tofabricate the gates, and other assemblies for transporting them to site.

All the parts of the gates shall be fabricated in accordance with these specifications,and drawings. The manufacturer shall take special care in fabrication of the partsaffecting

strength, rigidity and water tightness of the gates. Attention is directed to thefact that rolled edged plates are not suitable for caulking.

Holes for the wheel pins shall be bored and counter-bored in pairs to a common axis,after the leaf has been assembled and all the shop welding has been completed. Theaxis of these holes shall be in common plane, which shall be parallel to the finishedsurface of the seal bases within specified tolerances. All holes shall be accuratelyspaced, cylindrical and perpendicular to the members. All counter sinking shall be trueand square with holes. The seal rings provided in the wheel assembly shall be productsof established manufacturers and must be perfectly watertight.

1.3 Brief Scope of Works

i. Partly replacement of draw shutters with stiffeners 03 (three) nos. gate and flap shutter 02 (two) nos.
ii. Repairing of flap shutters and draw shutters including their MS structures.
iii. Complete changing thrust plate, GM bush and bearing of respective sizes.
iv. Complete replacements of hanging arrangements for flap shutters consisting of Plummer block, bush, pin, plates etc.
v. Complete replacements of fastening arrangements such as nuts and bolts and washers etc.
vi. Complete changing of rubber seal of respective sizes.
vii. Painting of the steel structures with coal tar epoxy paint of 300 micron.
viii. Concrete cutting, shuttering and mending works.

1.4 Design Consideration and Operation Requirements

i. The intake gates are designed in accordance with the provisions of the latest edition of IS: 4622 in general and in accordance with the provisions specified in these specifications in particular.

ii. The intake gates are designed for operation under maximum head corresponding to full supply level against the normal allowable stresses. The gate shall have upstream skin plate and upstream sealing arrangement and are to be designed for unbalanced head operation.

iii. Earthquake effects are considered and allowed in the design as per stipulations in accordance with IS: 1893. The design shall be checked for additional forces due to horizontal and vertical earthquake acceleration corresponding to relevant zone. The maximum deflection of the gate shall be limited to 1/800 of the span (centre to centre of tracks).

iv. The gate shall satisfy the following requirements:

a) In closed position, the gate must be completely water tight with full pressure acting from upstream side and sealing must be reliable against maximum water level.

b) The sealing of the wheel assemblies should prevent entry of water to the wheel bearings to ensure trouble free operation.

c) The following loads shall be considered:

i) Full hydro-static load on upstream side of the gate with water level at highest level of fore bay.

ii) The total hydro-static and hydro dynamic forces, frictional & wind loads when the gate is raised or lowered with the upstream water level at highest level of fore bay.

1.5 Design criteria for Hoist

1.5.1 The hoists are designed at a rated capacity capable to lift close the gates under all eventualities for which the gate has been designed. The hoist capacity shall be calculated taking into consideration the worst combination of all frictional forces, hydrodynamic loads, dead weights etc. during both raising and lowering cyclesplus a reserve capacity of 20% over and above the worst combination of forces (while lowering, uplift forces and while raising down pull forces shall be taken into considerations) and various factors as enumerated in IS: 6938 shall be taken into consideration. While determining the hoist capacity, positive closure of gate with designed weight and seating pressure @ 1000 Kg/m width of gate shall be ensured. The contractor shall submit detailed calculations in support of hoist capacity. The coefficient of friction used for working out hoist capacity shall not be less than those provided in the design criteria for gates or those specified in IS: 4622 unless otherwise specified in these specifications. Necessary down pull force shall be considered while computing the hoist capacity.

1.5.2 The mechanical parts of the hoist are to be designed for the specific loads with a factor of safety of five based on the ultimate strength of the materials. Under breakdown torque condition of the motor, stress in any portion of the hoist, bridge & trestles shall not exceed 80% of the yield point of the materials (or 33.33 % higher than normal stresses whichever is lower). The rope shall have a factor of safety of six for normal conditions and of 3 for breakdown torque condition. The hoist mechanism shall be covered by suitable cover frames to protect it form dust, dirt and direct exposure to moisture.

1.6 Erection Procedure

The contractor shall prepare a complete erection procedure which shall describe the **sequence of operation to be carried out**. The method to be used the measurements to be taken and the tolerance to be met, in the erection and aliment of the equipment such procedure shall have the approval of the Engineer-in- Charge to the commencement of erection and when approved, shall form a part of the specification.

1.7 Installation

All site erection of gate frames i.e., embedded parts shall be complete before second stage concrete at the level. After installation it shall be checked that the Gate frames have smooth surfaces. The waviness of the surface shall be limited to 0.5mm. all surfaces designed to fit snugly and to be watertight shall be so assembled as to ensure water tightness.

1.8 Field Test

Engineer-in-Charge shall carry out such tests on the gates. Tests shall be repeated if necessary, until successfully carried out to the satisfaction of the Engineer-in-Charge. Leakage tests and operational test shall be other portions of the work and when the reservoir is at full reservoir level project authorities shall have the right to carry out such tests also when the reservoir is at a level other than full reservoir level.

1.9 Operation Test in The Dry

Operational tests in the dry shall be carried out as soon as possible after completion of erection when all controls and permanent power supply have been connected and adjusted. The test shall include at test two complete traverses from the maximum raised

position to the full seating positing position. All adjustments, clearances etc. shall be checked for proper operation.

1.10 Operational Tests with Designed Pond Level

These tests shall simulate the actual operating conditions as closely as possible and all equipment checked for proper functioning. At least two complete travels shall be made from the fully closed to the normally raised position.

1.11 Leakage Test

Leakage tests shall be carried out with the gates lowered on to the sill. Before measuring the leakage, the gate shall be raised and lowered several times by a meter or so in order to dislodge any debris that may have lodged in the side seals. The leakage shall then be measured and recorded. **The permissible leakage shall be 10 liters per min. per meter length of seals.**

1.12 Acceptance Test

Final acceptance of the equipment shall be based on the following:

1. Quality of workmanship and material.
2. Satisfactory operation of the equipment, after reaction as required under this specification.
3. Acceptance of various tests and test certificates by Engineer-in-Charge.

The contractor or his authorized representatives may witness all tests.

2.0 METALWORK FABRICATION AND MACHINE WORK

2.1 General

All equipment, materials and suppliers shall be of the most suitable quality for the work. The contractor shall without extra cost provide samples and co-operation in the testing of materials and inspection of the works. The Engineer-in –charge shall have access at all times to the places of storage and to the places where material are being fabricated or processed to determine whether their fabrication and process are proceeding in accordance with the specifications.

The Engineer-in charge may reject at any stage, any work which he considers to be defective in quality and he shall not be debarred from rejecting the brought out materials

by reason of his having previously passed in an un-worked condition. Any portion of the materials rejected shall be removed from the work site by the Contractor at his expense, upon written instructions to that effect by the Engineer-in –charge. Replacement of such materials shall be made by the Contractor at his expense.

In lieu of removing the materials which are not accordance with the work, the Engineer-in –charge may allow such materials to remain, and in the case, such work may be paid at reduced rates as may be decided by the Engineer-in-charge, provided it is technically acceptable.

No work shall be covered up or put out of view without the approval of the Engineer-in-charge and the contractor shall afford full opportunity for examination and measurement of the materials. The contractor shall given due notice to the Engineer-in-charge whenever such material is ready for examination.

2.2 Screw Threads

The threads for both and nuts shall have metric threads of international standard organization and confirming to Indian standard, ISO Metric Screw.

2.3 Fits and Tolerance

First used for different components shall be according to the best modern shop practice. Due considerations shall be given to the special nature of function of the parts and to the corresponding accuracy required to secure proper operation. The fits shall be accordance with Indian Standard Guided for the selection of fits (Latest revision) IS:2709". These shall be subjected to the approval of the Engineer-in-charge .

The tolerances for embedded parts and components of gates shall be as given in IS:4622 & IS:4623 (Latest version).

2.4 Machine Finish

The type of finished surfaces shall be in accordance with the approved drawings. Where a smooth finish corresponding to roughness value ranging between 0.2 and 0.8 mm, is specified or required the machine work shall be performed in such a manner as to

produce smooth surface free from tool marks. This grade finish shall be required for highly loaded bearing surfaces and or for surface to be polished for appearances. Where an average finish corresponding to roughness value ranging between 0.2 and 0.5 mm. is specified or required, smooth surface shall be allowed. This grade of finish shall be required for ordinary work.

This grade of finish shall be used primarily for surfaces which are not in contract, but which require finish for dimensional accuracy.

2.5 Fabrication of Structural Steel

The structural steel work for the equipment covered by the specification shall conform to the requirement of "Reamed work" and shall conform to the following requirements unless otherwise called for in these specifications. All completed members shall be free form twists, bends and open joints. Attention is called to the special nature of the work involved in the manufacture of equipment which required close adherence to the dimensions, tolerances and finish called for.

2.6 Straightening

Before being laid off or worked in any manner, structural material shall be straight without twist , bends or kinks and shall be cleared of all rust and dirt , if straightening is necessary , it shall be done by method that will not injure or mar the material .

2.7 Shearing, chipping and Gas cutting

Shearing chipping and gas cutting shall be done carefully by torch or by electric are and all portions of thework which shall be exposed to view shall present a neat appearance. Gas cutting shall be mechanically controlled re-entrant cuts and copes in beams and channels shall be filleted before cutting.

2.8 Planning or Finishing

Planning or finishing the sheared or cut edges or plates or rolled shapes shall not be accepted except as otherwise specified for welded edges or as shown on the approved drawings.

2.9 Welded Edge

The edges of plates or shapes to be joined by welding shall be formed properly to suit the selected type of welding. Sheared edges or plates and shapes to be joined by welding shall be machined or chipped to sound metal before welding.

2.10 Bent plates and Shapes

Where bending of plates or forming shapes is required, these shall be bent to the proper curvature by cold forming. Bends in grill plates shall be made across the gains of the plates with the axis of redial of bends, normal to the direction in which the plates were rolled. Afterwards, bent plates shall be tested by any approved method to ensure that all surfaces at the bends are free from cracks and incipient fractures. Heating and hammering to correct curvature shall not be permitted.

2.11 Reamed Works

Holes in material 20mm or less in thickness shall be sub punched or sub drilled before assembly and reamed full size after assembly. Holes in material more than 20mm in thickness shall be sub-drilled before assembly and reamed to full size after assembly.

Counter-boring shall be done carefully to meet the requirement for clearance and fit of welded studs. Anchor bolt holes shall be punched or flamed out to full size. All other holes shall be made by the following method.

2.11.1 Drilling And Reaming:-

For sub-drilling the diameter of the drill shall be 3mm, small earthen the nominal diameter of holes used. Except where trapping is required or where tight fit bolts, ribbed bolts or dowels are to be used full sized drilled or reamed holes shall not be less than 1.5 mm nor more 2.5 mm larger than nominal diameter of the bolts used Holes for ribbed blots shall drilled or reamed to 1.5mm less than the diameters of the ribbed shank of the bolts or ensure tight fit. Reaming for the tap used and shall be tapped carefully so that the threads will be continuous, smoothly cut and free from imperfections.

2.12 Accuracy of Punching, Drilling and Reaming

(a) Before Assembly:

The accuracy of all holes shall be such that during assembly a cylindrical pin 3mm less in diameter than the normal size of the holes shall be entered perpendicular to the dace of the members, without drifting in not less than 75 percent of any group of continuous holes in the same place. All holes shall pass a pin 5 mm smaller in diameter than the nominal diameter of the holes.

(b) After Assembly:

The accuracy of remaining and drilling after assembly shall be such that not less than 85 percent of any group of continuous holes in the same plane shall show no offset greater than 0.5mm.between adjacent thickness of material, unless a greater degree of accuracy is called for on the Contractors drawing approved by the Engineer-in –charge or in these specifications.

3.0 WELDING

3.1 Preparation of Welding

Members to the jointed by the welding shall be cut accurate to size and where required shall be rolled and pressed to the proper curvature in accordance with the dimensions shown on the approved drawings. The edges of the members to be jointed by welding shall be sheared, flame-cut or machined to suit the required type of welding and to allow through penetration. The cut surfaces shall expose sound metal free from laminations, surface defects caused by shearing or flame cutting operation on and other injurious defects. The surface of plates to be welded shall be free from rust,grease and other foreign matter for a distance of welding the components parts of edge of the weld. In assembling during welding the components parts of built up members shall be held in place with sufficient and proper clamps or other adequate means to keep with all parts in proper position. Before commencement of welding the contractor shall **submit complete programmed of welding sequence** to minimize stresses and distortion of finishing member of the equipment for the approval of the Engineer-in-charge.

Particular care shall be taken in aligning and separating the edges or members to be jointed by butt welding so that complete penetration and fusion at the bottom of the joint shall be ensured. All pin holes, cracks and other defects shall be repaired by chipping or

grading the defects to sound metal and rewelding. Where fillet welds are used, the member shall fit closely and shall held together during welding. The welding roods used for manual welding shall be of heavily coated type and shall be suitable for all position welding where required in welding precautions shall be taken to minimize stresses due to expansion and contraction and distortion due to heat by using the proper sequence in welding i.e. penning the welds while hot or by other satisfactory methods. Distortions by blows after welding shall not be permitted, welds shall not be primer coated until they have been inspected and approved by the Engineer-in-charge. The welding shall conform to Indian standard. "Code of practice for use of metal are welding for General construction in Mid Steel (First Revision) (with Amendments no 1 and 2II) "IS 810-1969. All skin plate welds shall be continuous and water tight and shall develop the full strength of plate. The Electrode shall conform to the Indian Standards "Specification for covered Electrodes for metal arc welding of structural steel for welding products other than sheets and for welding sheets (PartI and II): IS 814-1974"

The contractor shall prepare shop and field welding procedure including stress and pre-heat requirements and shall submit his procedure to the Engineer-in-charge for approval. The procedure shall be in accordance with the modern welding practice such as to minimize residual stress and distortion of the finished members of thestructure. Approval of any procedure, shall not relieve the Contractor of the sole responsibility of producing a finished product meeting all requirements of these specifications. Welds in contact with runner seals shall be ground flush, all corners and corner welds in contact with rubber seals shall be rounded.

3.2 Approval of Welding Process

Specification of the welding procedure that are "proposed to be used shall be" established and recorded and a copy of such procedure specification together with certified copes of report and results of test made in accordance with the procedure a specifications shall conform to the India Standard "Approval test for welding procedures part:{Fusion welding of steel" I.S.7307 (Part-1)-1974.

3.3 Qualification of Welders

The Contractor shall be responsible for the quality of work performed by his welding staff. All welders assigned to the work shall have passed qualification test for welders.

3.4 Radiographic Examination

The radiographic examination of at least 10% of total length of butt welds for plate greater than 12 mm but no exceeding 20 mm in thickness for slide gates and fixed wheel type stop-log gates shall be carried out by the contractor.

Whenever dissimilar materials are butt welded together at last one X-ray radiographic examination for each component of sub-assembly shall be carried out at the selected points. The numbers point to be taken would depend upon the results obtained after the first series of tests are carried out. Point to making radiographs of butt welds, the contractor shall place suitable identification markers adjacent to the welds. Each marker shall also be so designed and located the image will appear in the radiographs The markers shall be painted , stamped and fastened as directed by Engineer-In Charge and shall not be removed until all welds have been accepted .All radiographs of the welded joins shall be property of the Engineer-in -Charge . The radiographic test shall be carried out by the qualified technician and at such time as decided by the Engineer-in-charge. The technician's interpretation reports on the radio graphic examination shall be furnished by the contractor to the Engineer-in-charge. All precautions shall be taken to minimize radiation hazards.

3.5 Stress Relieving

Stress reliving of parts, where required shall be carried out after all welding including their radiographic examination is completed but before they are machined or assembled into structure.

The equipment as a whole in an enclosed furnace shall be heated for stress relieving purposes within the temperature rang of 580 degree C and 620 degree C with the followings requirement.

1) The temperature of the furnace at the time the equipment is placed in shall not exceed 300 degree C.
2) The rate of heating above 30 degree C shall be (5500) degree C per hour or 550° C per hour. (Maximum plate thickness in mm) per hour, whichever is greater.
3) During the Heating period there shall not be a greater variation in temperature throughout the portion of equipment being heated than 150 degree C within any 4.5 m. interval of length and when at the holding temperature, the temperature not

more than 50 degree C throughout the portion of the equipment being heated shall be within the range 580 degree C to 620 degree C.

When the equipment shall attain a uniform temperature specified above, temperature shall be held constant for
minimum period of 2.5 minutes per millimeter of the maximum metal thickness of the equipment subject to a
minimum of one hour.

During the heating and holding period, furnace atmosphere shall be so controlled as to avoid excessive oxidation of the surface of the equipment. There shall be no directed impingement of the flame on the equipment.

The equipment shall be cooled in the furnace to 400 degree C at a rate not exceeding 700 degree per
maximum plate thickness in mm in hour degree per hour, or 55 degree C per hour whichever is greater. Bellow 400 degree C the equipment shall be cooled in still air.

When it is impracticable to stress relieve at a temperature of 580 degree C to 620 degree C the stress-relieving
operation at lower temperature for longer period of time in accordance with the following shall be permitted after obtaining prior approval of the Engineer-in-charge.

Metal temperature Degree C	Time of heating in Minutes / mm of thickness
575	3.0
550	6.0
525	9.0

For intermediate temperature, the time of heating shall be determined by straight line interpolation.

The furnace to be used shall be capable of being uniformly heated under automatic temperate controls.

Automatic recording pyrometers shall be used to record of the temperature range of the temperature range of strees relieving cycle so as to have record of the actual operation. The record will become the property of the Engineer-in-charge. Stress relieving of the equipment, materials and supplies shall conform to the relevant Indian Standard.

4.0 OTHER MECHANICAL PROCESSING WORK

4.1 Casting

AH casting shall be true to pattern and the thickness of the material shall not vary at any point by more than
1.5 mm from that shown on the drawing approved by the Engineer-in-charge. Care shall be taken in the foundry to cool the casting properly so that they shall not warp or twist. No casting will be accepted if it is wrapped and / or twisted to such extent that machined surfaces cannot be properly fixed to the dimensions shown in the drawings approved by the Engineer-in-charge or require so much metal to be removed as to leave the thickness of the metal less than that shown in the drawings approved by the Engineer-in-charge by more than 1.5 mm. AH casting shall be free cracks, large or injurious blow holes or sand holes and other blemished. They shall have workmanlike finish, inside angle having proper filets and unfinished edges of bases ribs and similar parts being nearly east with rounded corners.

All casting shall be suitable heat treated. The method of heat treatment and the relevant records of heat treatment shall be furnished by the Contractor to the Engineer-in-charge. Subsequently all casting shall be subject to radiographic method of inspection.

Repairs of major defects in casting shall not be allowed, but if the repairs of major detect in casting can be
ensured, the casting shall be rectified by welding with the prior approval of the Engineer-in-charge. AH casting shall be welded in accordance with the procedure laid down in Indian standard code of procedure for repairs and rectification of steel casting by metal-arc welding process IS 5530. AH such casting in the areas of repairs shall be re-examined as directed by and to the satisfaction of the Engineer-in-charge.

4.2 Forging

All forging shall be supplied in the as-forged and normalized condition. They shall be sound and free from
scale, cracks, crevices or any other flaws that can be detrimental to their use.

All forging shall be suitable heat treated. The method of heat treatment to be adopted shall be as suggested by

the contractor and approved by the Engineer-in-charge. Finished surfaces of the all forging shall be smooth and free from tool marks.

The sample shall be tested for each east and heat-treatment batch. The chemical composition and mechanical
properties obtained from the sample shall comply with the specified requirement. In case, the sample fails to meet the specified requirements, the material represented shall be liable to rejection. The contractor with prior approval of the Engineer-in-charge shall be allowed to reheat-treat (not more than twice) forging rejected and resubmit for testing. All forging shall be subjected to bend test to carried out the accordance with Indian Standard "Method for Bend Test for Steel products other than sheet strip wire and Tube" IS :1599 where the dimensions permit, test piece,230 mm longand 32 mm square with edges rounded off, shall be machined lengthwise from each test sample and bent cold by direct pressure round a former a diameter appropriate to the class of steel as shown in Fig. 1 on page 9 of Indianstandard" specification for carbon steel forging for General engineering purposes IS 2004, until the sides of test pieces are parallel. Subsequently the ends of the test piece shall not fracture, one forging from each delivery run batch shall also be examined for grain flow by sectioning and macro etching.

4.3 Fastening

Erection blots, nuts washers and other fasteners shall be furnished in the amount of 15 percent more often
bots, nuts, washers and other fastener whichever is greater, in excess of the normal number of each size and length required for complete installation of equipment.
Bolts in tension shall have a net section at root of thread 15 percent in excess of the net section required in tension
Nuts, bolts, studs and washers for incorporation in the equipment shall confirm to the requirements of the
appropriate standards. Where the contract includes nuts and bolts of different standard the tools shall be provided with this specification and shall include spanners, taps and dies for these nuts and bolts, nuts and bolts for pressure parts shall be of the best quality bright steel, machined on the shank, under the head and nut. All washers shall be included under the contract including locking devices and anti-vibration arrangements. Taper washer shall be fitted, wherever necessary. Where there is risk of corrosion, bolts, and studs shall be finished flush with the surface of the Nuts- Bolts except for high strength friction drip bolts shall be designed so that with the nuts fully tightened, the

stress intensity at the bottom of the thread shall not exceed half the yield point of the material under all conditions. All bolts, nuts and screws which shall be subjected to frequent adjustment or frequent removal in the course of operation shall be made of corrosion resistant or bronze. Spring type washer will not be permitted where they may damage any protectivecoatings Special tools, wrenches and devices found to be necessary for the completion of work shall also beprovided under contract.

5.0TOLERANCES

TOLERANCES FOR EMBEDDED PARTS AND COMPONENTS OF RADIAL GATE (IS: 4623)		
Sl. No.	**COMPONENTS**	**TOLERANCES (in mm)**
1	**Embedded parts**	
i	Wall plate and sill plate	
	a) Distance between centre line of opening and face of wall plate at sill end	± 0.00
		2.00
	b) Distance between centre line of opening and face of wall plate at top end	± 2.00
		0.00
	c) Straightness of face of wall plates and sill plates	Offset at joints to be ground smooth
	d) Normally of face of wall plates to gate sill and centre line of trunnion bearings	+ 0.01°
		0.00°
	e) Alignment of sill plate in horizontal plane	± 0.25
ii	**COMPONENTS OF GATE**	
	1) Guide Roller/ guide shoe	
a	Distance between centre line of gate and face of side seal	+ 1.00
		2.00
	2. Side seal	
	Distance between centre line of gate and face of side seal	± 1.00
	3. Trunnion Bearings	
	a) Colinearity of centre lines of both the trunnion bearings	± 0.25
	b) horizontality of centre lines of both the trunnion bearings	± 0.25
	c) Parallel distance of centre lines of both the trunnion bearings from uptream bottom edge of skin plat	± 3.00
	d) Tolerances in diamenter's of pin , bush, hub and bracket of trunnion assemly	To suit diameters and required fits.

6.0 RUBBER FOR SEAL

Rubber for seals shall be nature of synthetic containing not less that 1 percent weight of copper inhibitions. The rubber compound shall not absorb more than 10% by weight of water in a 7 day test. The tensile strength of a test specimen after being subjected to an accelerated aging test of 48 hours in oxygen at 70 degree C and 21 Kg/Cm2 pressure, shall not be less than 80% of the strength of test specimen before again. The material shall be properly aired in a manner to ensure a dense homogenous cross sector free from pitting blisters, porosity and other imperfection and different elements shall be well bounded together. Physical properties of the compound furnished shall be as follows: -

Ultimate tensile strength minimum	14.50N/mm2
Minimum elongation	450%
Durometer Harness shore “a” type	65+5

Manufacture of Rubber Seal:-

The rubber compound material shall be properly cured in manner so as to ensure a dense homogenous sections, free pitting, blisters, porosity and there imperfections and different elements of the rubber seal shall be well bounded together. This shall conform to IS 4623 (latest edition)

7.0 PAINTING

7.1 General

The contractor shall furnish prepare and supply all materials for cleaning and coating of metalwork as hereinafter specified. All metal surfaces for equipment, materials and supplies shall be cleaned and primer coated with two coats of applicable primer conforming to the specifications given herein. The cost of furnishing, preparing and applying all materials which are required for cleaning and primer coating operations, including supply of all labour, tools and equipments shall be included in the rate for fabrications and supply of all supply of metal work and machinery.

7.2. Preparation of Surfaces

Surface preparation shall be made in accordance with the following procedure:

i) Weld spatters or any other surface irregularity shall be removed by any suitable means before cleaning.

ii) All grease and dirt shall be removed from the surface by the use or clean mineral spirits or white gasoline (lead free) and clean wiping materials.

iii) Following the solvent cleaning, the surface to be painted shall be cleaned of all rust, mill scale and other tightly adhering objectionable substances by sand blasting or grits blasting to uniform bright base metal. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing airing section or other effective means before the surface is painted.

iv) Surface of stainless-steel maker bronze and machined surface adjacent to metal work being cleaned or part shall be protected by masking type or by other suitable means during the cleaning and painting operation.

v)

7.3 Cleaning Surfaces

Surface shall be cleaned and prepared in accordance with Indian standards " code of practice for painting of ferrous Metal in Building Part I pretreatment (first Revision)" IS:147.7 (part 1)-1971 for pretreatment and by the method to be used for each item of installation of metal work and machinery which is indicated in the primer coating schedule. Weld spatter or machinery which is indicated in the primer coating schedule. Weld spatter or any other objection able surface irregularities shall be removed by any suitable means before cleaning. The following method shall be applied.

METHOD-A: All oil, grease and dirt shall be removed by from the surface by using clean mineral spirits, xylol or white gasoline and clean wiping material.

METHOD-B: All oil, grease and dirt shall be removed from the surface to be primer coated by use of mineral spirit petroleumnaptha or white gasoline.

Final cleaning shall be done by using clean wiping material and clean solvent. Following the solvent cleaning the surfaces of metalwork machinery shall be cleaned of all rust, mill scale or other tightly adhering foreign material by sand blasting or grit blasting as directed by the Engineer-in-charge to uniform bright base metal. After dry blast cleaning the surface shall be dusted off or blown off with compressed air free of oil and water. It wet blasted the surface shall be cleaned by moving air with clean fresh water to which sufficient corrosion inhibitor has been added to prevent rusting. Corrosion inhibitor

compounds are the material used to prevent or retard the oxidation of metal they shall be especially phosphate and chromate and shall contain a Ferro cyanide synergist. This treatment shall be supplemented by wire brushing. If necessary, to remove the residue in the event of rust formations or the surfaces becoming otherwise contaminated in the interval between cleaning and primer coating re cleaning will be required surface of stainless steel. Bronze and machined surfaces adjacent to metal work being cleaned or primer coated shall be protected by masking tape or other suitable means during cleaning and primer coating operations.

However, depending upon the site requirement and as per BOQ provision, EIC shall decide the particular portion formachine/ manual cleaning.

7.4 Application Procedure:

Primer coating materials shall be applied in accordance with the content of this sub-paragraph and the primer coating schedule. All primer coating materials shall be in thoroughly mixed condition at the time of application and shall not be thinned except where hereinafter specifically provided.

Any warming of the primer shall be performed by means of a hot water bath and except as specially provided the primer shall not be heated to a temperature higher than 38 degree C. surfaces shall be free from moisture at the time of primer coating. Each coat of primer shall be done to completion each and shall be free from runs and sags. Except other-wise specifically provided each coat shall be allowed to dry or harden before the succeeding coat is applied. Coverage rates and application procedure for zinc rich primer shall be follows.

The thickness of each coat of zinc rich primer shall be minimum 50 micrometer and the total thickness of two coats of primer shall be minimum 100 micrometer to the surfaces of metal work in accordance with the specifications. The contractor shall ensure that all irregularities such as welds, nuts, other fastener and seems shall also receive total thickness of minimum 100 micrometer after application of two coats of zinc rich primer.

The zinc rich primer shall be of mixed thoroughly so as to ensure intimate contact of the reaching chemicals at the time of application and shall not be thinned except as approved by the Engineer-in-charge. Zinc rich primer shall contain not less than 85 percentage of metallic zinc dust in epoxies media. The dry film shall contain at least 90 percentage of

zinc to given electrical contact between the zinc and the steel if necessary, to improve the application properties, the primer may be treated by means of hot water bath to temperature as recommended by the manufacture of the primer. The primer shall be prepared in small quantities so that if can be utilized within the workable period for application as recommended by the manufacture.

The surface shall be free from moisture at the time of primer coating items to the primer coated that are not thoroughly dried shall be heated to a sufficient temperature or as specified by the manufacture to drive of all the moisture before the primer is applied. The primer shall not be applied when the temperature of the metal or surrounding air is below 10° C or as specified by the manufacture. It shall however, be noted that the primer shall be applied only when the humidity and temperature of air and the surfaces to be primer coated will result in evaporation rather condensation. Each primer coat shall be free from runs, sags and pin holes.

The first coat shall be applied immediately after the surfaces has been cleaned by brushing and the second coat by brushing or spraying when the primer is applied by spraying, suitable means shall be provided to prevent segregation during the primer coating operation. Effective means shall be provided to remove all free oil and moisture from the air supply lines of spraying and blasting equipment. Nozzle pressure consistent with acceptable finish results shall be applied while spray primer coating.

The inter coat time between two successive coats of primer shall not exceed those recommended by the manufacture. Similarly, the minimum inters coating time between two successive coats of primer, recommended by the manufacture shall be observed strictly, so that each coat of primer will be allowed to dry or harden, before the succeeding coat is applied. Curing condition shall conform to time and temperature limitation specified by the manufacture.

7.5 Primer Coating Schedule:

Cleaning and primer coating shall be in accordance with the following schedule.

Sr. No.	Item No.	Method of cleaning surface for operation	Primer coating Material
1	Embedded parts all exterior surfaces of potassium embedded metal work viz track base, sill beam wall plate, anchor plates etc that will remain in contact with concrete	A1	Cement wash mixed with 5 percent dichromate
2	Metal surface exposed to atmosphere of water	B2	Zinc rich primer

8.0 Inspection and Acceptance Test of Primer Coating

Preparation of the materials for primers used and their labeling shall comply with the rules applicable to primers. The safety rules required during these applications shall be strict observed.

The contractor shall have to bring up the thickness of the coating wherever it recognized to be insufficient. The thickness measuring until shall be calibrated and cross check by both the Engineer-in-charge and contractor.

8.1 Precautions

Air paints and coating materials shall be in a thoroughly mixed condition at the time of application. The air temperature at the time of application must not be below 10 deg.Celsius and relative humidity must be below 65% to 70% . Surfaces to be paint should be free moisture at the time of applications. Effective means shall be provided for removing all free oil and moisture from the air supply lines of all spraying equipment.The first coat shall be applied by brushing immediately after cleaning the surface.

8.2 Painting Schedule:

The following are the various painting systems to be used for the purpose of specification.

SYSTEM-I

To be prepared as per IS:290-1961 (reaffirmed 1986)-coal Tar Black. Paint (revised) or relevant (8S) specification.

Primer. Coal tar epoxy one coat to obtain a dry firm at a coverage rate of 2.5sq. m /liter for the faces exposed to water or atmosphere.

For embedded parts the surfaces exposed to water or atmosphere shall be primed as above but the surfaces coming in contact with concrete shall be given a cement wash.

1st coat finishing :Coal tar epoxy paint one coat to, obtain a dry film thickness of 50 Micron.

2nd coat finishing : Same as 1st coat finishing, interval between the coats 24 hours.

SYSTEM-II:

To be prepared as per IS:51-1972 zinc for paints (Amendment 1989) and IS:289-1963 (amendment 1989)-Aluminum paste, for painting revised. Primer zinc chromate -1st coat to obtain a dry film at a overage rate of 10 sq. m/ liter for the surface exposed to atmosphere. For embedded parts the surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contract with concrete shall be given a cement wash.

1st coat finishing : Sanded aluminum (phenolic) paint- one coat to obtain a dry film at a coverage rate of 5.5sq. m. / litre.

2nd coat finishing : Sanded aluminum (phenlic) paint-one coat. To obtain a dry film at a coverage rate of 7.0 sq. m/ litre.

Interval between coats :24 hours

SYSTEM-III

Primer Zinc Chromate :1st coat to obtain a dry film at a coverage rate of 10 sq. m/ liter and 2nd coat to be applied to obtain a dryfilm at coverage rate of 10sq. m /litre for the surfaces exposed to atmosphere. For embedded parts

the, surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contract with, concrete shall be given a cement wash.

Aluminum paint or machinery finish paint one coat to obtain a dry film at a coverage rate of 10 sq. m/ litre.

Interval between coats 24 hours

Heavy uniform coating of gasoline soluble rust preventive compound

SYSTEM-V:

Smooth coating of a thin mixture of white lead oil graphite.

SYSTEM-VI:

Primer: Zinc Chromate 1st and 2nd coat to obtain a dry film at a coverage rat of 10 sq. m/ litre and 2nd coat to be applied to obtain a dry film at coverage rate to be applied to obtain a dry film at coverage rate of 10 sq. m. / liter for the surfaces exposed to atmosphere. For embedded parts the surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contact with concrete shall be given a cement wash.

1st and 2nd coat Superior quality synthetic enamel paint conforming to IS: 9034-1978 or as approved by the Engineer-in-charge.

Interval between coats 24 Hours.

The following shall be application of the above painting systems.

System application

SYSTEM-I or II All un-matched ferrous surfaces of gates, lifting beams and embedded parts exposed to atmosphere or water. The surfaces or embedded parts, which are to come in contact with concrete shall not be required to be given finishing coats but shall be given cement wash before erection / embodiments.

System-III All surfaces, of machinery (except machined surfaces) including motors, hoists, gearing housing, shifting bearing pedestals, base plates, hoist bridge, hoist frames, tresties, railings etc.

System-IV All furnished surfaces of ferrous metal including screw threads that will be exposed during shipment or while awaitng installations machined surfaces in rolling or sliding contact.

System-V Finished surfaces of bolt joints in sections that are to be shipped assembled and the shanks threads of bolts etc.

System-VI External and internal surfaces of control cubicles/ panels crane girders cabins" ladders, hydraulic piping (external surfaces), support anchors, brackets, crane shackles, hooks extern al surfaces of oil and air tanks etc.

In case of system -I and II the priming coats shall be applied in the shop. The first finishing coat shall be applied in the field after repair or any damage of shop coat and 2nd finishing coat shall be applied after creation. For system-III the primer and 1 st coat shall be applied in the shop. The 2nd finishing coat shall be applied in the field as above and final coat shall be applied after creation. In case of parts which become inaccessible after erection an extra coat is to be applied in the shop and the final coat in the field before election. In case of system VI on the primer coat be applied in the shop and both prior to or after erection as found convenient.

8.3 Application Procedures:

All the points and coating materials shall be in a thoroughly mixed condition at the time of application and shall not be thinned except as hereinafter specially provided. Any warming of the paints shall be performed by means of hot bath. Paint shall not be applied when the temperature of metal or surrounding air is below 10 degree C (50 deg F) and relative humidity is above 60% to 70% unless otherwise specified by the paint manufacture to the approval of the Engineer-in-charge.

All surface to be painted shall be free from moisture at the time of painting. The first or printing coat of shall be applied immediately after clearing and except otherwise specifically provided shall be applied by either brushing or spraying. When paint is

applied by spraying a mechanical agitator type paint pot shall be used if the contractor uses the special equipment designed for spraying heavy bodied materials,means shall be provided for removing all free oil moisture from the air supply line of a spraying equipment. Each coat of paints shall completely covered areas. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. Rust preventive compound shall be applied by any convenient method to ensure complete coverage of heavy coating.

8.4 Method of Painting

All paint shall be applied by skilled workers in a workman like manner and each coat of paint shall be permitted to dry properly before the succeeding coat is applied. Paint shall be not be applied during humid weather conditions
on surface that are not entirely free from moisture. Equipment used for applying paint by spraying shall be of highest quality and shall include an agitator and means of removing all free oil and moisture from the air supply line. Thinning or heating of paint will not be permitted, except with special approval and in accordance with instructions. Any warming of paint shall be performed by means of hot water bath. All finished coats shall be free from pinholes, shady, granular or fibrous appearances or any conspicuous brush marks.

9.0 TECHNICAL PROVISION FOR CROSS REGULATOR / HEAD REGULATOR/ESCAPE GATES / OUTFALL SLUICE

9.1 The materials shall conform to the specifications as mentioned in the approved drawings and as per direction of the E.I.C. The bidder shall go through the approved drawings thoroughly and bring to notice of the E.I.C. immediately of any discrepancy or deficiency before taking up fabrication. The E.I.C. shall not be responsible if any problem arises due to discrepancy in the drawings noticed during or after fabrication. The bidder shall be fully responsible for smooth operating of the gates under all conditions. The gates shall be capable of being operative at any opening under all conditions of unbalanced operations and shall be free from vibrations at all conditions of gate operation. The leakage through the gates shall not exceed the permissible limits.

9.2 **Intent of Specification**

Certain performance requirements, materials, features and design requirements are specified herein. Experience and practice of manufacturer shall meet, in all respects, the specified requirements in regard to performance, durability and satisfactory operation. However, certain features, materials and design requirements are specified to establish minimum standards for the work.

9.3 Responsibility of Contractor

Contractor shall guarantee and be responsible for:

- Design of the complete work for submission, to Engineer-in charges for approval, showing all principle forces, analysis of all components, centers of lift and gravity, and hoist forces, uplift and downward forces.
- The quality of all materials and workmanship of the complete work.
- Rigid adherence to the dimensions of parts as shown on accepted drawings, except for deviations specifically authorized in writing by engineer-in Charge.
- Strength of all parts to withstand all mechanical, hydraulic and other forces which may be experienced in the specified operation or during shipment of the equipment.
- Delivery within the period of time given or subsequently fixed by contract. Satisfactory performance of the entire work under all specified operations conditions without signs of undue strain, and without breakdown, damage, or deterioration of any of the parts due to faulty or unsuitable material, workmanship, installation or design.
- Freedom from abnormal vibrations of any part or under the most severe operating conditions.
- The water tightness of the gate seals.
- The strength, accuracy and adequacy in all respects of the installation of all machinery and equipment supplied under this Contract.

It is Contractor's responsibility to ensure that all components supplied in accordance with these specifications shall fit correctly to each other. In the event of any field modifications being required due to errors in shop fabrication.

To ensure timely approval of the design and drawings, these should be submitted by the contractor strictly as per schedule, in proper sequence and in accordance with the requirements of the technical specifications supported by technical documents,

literature etc, as required in one lot after complete scrutiny and checking from his end so that the comments from Engineer-in charge and number of resubmission are kept to a minimum.

9.4 **Drawing data to be submitted with the tender by the bidder**

(a)Technical data

(b) Basic design, estimated weight, hoist/ crane capacity calculations and general arrangement drawings for each of the equipment to be supplied

(c) Detailed schedule of submission of design calculations, drawings, fabrication, erection, testing and commissioning.

(d) Deviations from technical specifications, if any.

(i) Any item not specifically mentioned or covered but necessary to complete the job shall be considered included in the scope of work by the contractor.

(ii) Any item or services which the bidder desires to be supplied / provided by the purchaser shall be specifically mentioned failing which it shall be presumed that such item / services are included in the scope of supplies / work by the contractor.

9.5 **Contractor's drawings/documents**

Contractor shall submit required sets for each detailed design computations and drawings to the Engineer-in- charge for approval which shall include complete details of the equipment. All drawings shall be carefully checked by Contractor for accuracy, completeness and clarity before submission for review and approval. Contractor shall be responsible for correctness and adequacy of the design in relationship to the specifications.

9.6 **Inspection and Tests**

All materials shall be of tested quality and all work performed shall be subject to rigid inspection and no article or material shall be dispatched until all tests, analysis and shop inspection have been completed or certified copies of reports or results of test and analysis have been accepted. Copies of manufacture's test certificates including chemical analysis and mechanical properties shall be made available for all materials. In case test certificates are not available for any of the material, the same shall be got tested and only those materials which fulfill the requirements of these specifications shall be used. From

any part / item, it should be possible to locate its manufactures batch / lot mark, which shall be achieved by transferring the batch marks before parting the materials.

All castings shall be annealed and forging shall be normalized.

9.7 Shop assembly and testing

9.7.1 During the course of manufacture, the equipment included in the scope of supply shall be subject to rigorous inspection and testing.

9.7.2 All components, sub-assemblies and assemblies will be dimensionally and functionally checked against the
relevant drawing.

9.7.3 All gate units shall be fully shop assembled (With temporary bolting where necessary), and checked for

dimensional and flatness checks with all fitments such as wheels, guides, seals, etc, attached. The correct C.G.

shall be established during shop assembly before final welding of lifting lugs

9.7.4 Embedment frames and guides shall be assembled on the shop floor for dimensional and straightness checks,
also alignment of connecting members within the required tolerances.

9.7.5 In all cases the various connecting parts shall be match marked to facilitate site erection.

9.7.6 Hoisting units shall be fully assembled on the hoist platform and test run to at least 20 minutes and load tested
to 1.25 times the rated capacity. During test run all the components of the hoist shall be tested for their
performance.

9.8 Site testing and commissioning

9.8.1 All embedded reception frames and support frames etc, shall be erected and checked for dimensional accuracy and alignment in accordance with the assembly drawing within the required tolerances and level limits before and after concreting.

9.8.2 After site assembly of the gate units within their respective embedded frames, all gates will be checked for roller alignment, seal compression and guide clearances.

9.8.3 The operating equipment will be checked for correct positioning and alignment, and undergo full functional tests over the operation range of the particular gate, checking operating speeds and performance of the mechanical and electrical control systems.

9.8.4 Hoists shall be load tested, all in accordance with standard's requirements, and all hoist and travel motions checked, including brakes, interlocks and safety devices.

9.8.5 All gates shall be dry tested before impounding of water to ensure that there is no clearance between seals and seal seats, all rollers are in contact with roller path, the clearance between guide rollers/ guide shoes and guide is within the prescribed limits and the gate travels smoothly in the groove up and down without excessive sway throughout the travel.

9.8.6 Wet test of all gates and associated equipment after impounding will include checking of seal efficiency and full operational test under maximum design water load.

9.9 Non destructive test

The fabricated gate, embedded parts, hoist components and other load carrying members shall be subjected to the Non destructive tests. General practice followed for NDT is shown in table .

Table : Non Destructive Test

Sl.No.	Item	Test	Percentage
1	Butt welds	Radiography	100%
2	All fillet welds in the gate beam, particle end plate and lifting point	Magnetic particle	100%
3	Other fillet welds	Magnetic particle	100%
4	Root runs of important load bearing joints	Dye-penetrant	100%

9.10 Stress relieving

Welded plates thicker than 28 mm will be stress relived. The procedure for stress relieving shall be as per ASME section VIII Division I/ IS:2825.

9.11 **Erection**

9.11.1 The equipment covered by these specifications shall be furnished and erected by the contractor at the project site. The contractor shall be required to furnish all erection drawings. The contractor shall prepare a complete erection procedure, which shall describe the sequence of operations to be carried out and the method to be used, the measurements to be taken out and the tolerances to be met, in the erection and alignment of the equipment. Such procedure shall have the approval of the EIC prior to the commencement of fabrication and when approved shall form a part of thespecification furnished by the contractor.

9.12 **Erection of Gate**

All the components of the gates, and operating mechanism for gates shall be erected perfectly, giving due cognizance to the unit and match marks on the components. All components shall be designed and assembled to fit snugly and shall be watertight. It is desirable to avoid the flood period perform erection of gates. Should it be necessary to do so, due precaution shall be taken against floods, as the gates may be submerged in water sustaining damages, or the half erected gates may disturb the water flow causing damages to the civil structures.

9.13 **Erection Personnel**

Except for the concreting, skilled as well as unskilled personnel shall be arranged by the contractor for erection of the equipment covered in these specifications.

9.14 **Tools & Tackles**

At the time of tender, the contractor shall submit the list of tool & tackles that he proposed to supply for erection, testing and maintenance of equipments. The contractor shall provide all tools & tackles used in the erection testing and maintenance work.

9.15.1 Special instruction:

a) for Embedded parts:

Embedded parts play an important role in any Gate system. Quality of Gate functioning is largely affected by embedded parts.All the embedded parts for Gates should be made lined with corrosion resistance steel / Stainless steel. The BHN of S.S. for wheel track face shall be 50 points higher than the wheel. Anchor bolts

shall be provided to hold the 2nd stage embedded parts. The anchor bolts shall be with double nuts and washers having suitable length and minimum diameter of 16mm. Contractor shall be required to provide sufficient & skilled manpower along with all necessary T&P in time for fixing of insert plates during 1st stage concrete along with the progress of work of civil counterpart. Contractor are to give due attention and vigilance during concreting work (in both 1st stage and 2nd stage) so as to ensure verticality of pier & designed size of concrete block out. No bulging of concrete into the block out should happen. It will not only facilitate the fitting, fixing of 2nd stage embedded parts successfully but also provide free passage to the gate so as to move up & down freely. No separate claim by contractor shall be entertained in this regard.

b) Staging/ scaffolding:

Suitable temporary support, staging/ scaffolding shall be required for erection of structural steel work, painting work and other similar work as may be cropped up during execution of work so that work shall be safe and accurate. Staging/scaffolding must be strong and rigid stiffened with necessary cross bracers and always decked and boarded on the sills with close boarded veiling and swings to prevent any injury to persons or materials. Cost of such staging/ scaffolding shall deem to have included in the bid by contractor.No separate claim by contractor shall be entertained in this regard.

c) Material testing:

Contractor shall intimate time to time to department regarding the status of raw material procurement. Department shall inspect the material on intimation by the contractor. Department shall also invite any NABL accredited/govt approved laboratory for material testing. Cost of such material testing shall be borne by contractor and same are deemed to have included in their bid.

10.0 INSPECTION, TESTING AND ASSEMBLY AT MANUFACTURING

10.1 General

10.1.1 All material and compounds used for the work shall be new and free from defects and subject to the tolerances specified under this standard.

10.1.2 Compete inspection shall be made at the place of manufacturing prior to dispatch.

10.2 Material

10.2.1 All materials and compounds supplied by the manufacture shall conform to the requirements of the latest relevant Indian standards for the absence of Indian Standard for any particular material or component, other specifications mutually agreed to between the Engineer-in-charge and the contractor many be used.

10.2.2 All materials used shall be of tested quality. Original manufacture's test certificates for or bought-out item such as casting forgings and scales shall be furnished by the gate manufacture to the engineer-in-charge on demand.

10.3 Casting

10.3.1 All castings shall conform to the relevant Indian standards.

10.3.2 Visual examination shall be done to find out the general soundness of the casting and if required nondestructive test shall be conducted on the casting.

10.3.3 Repairs of major defects, incasting by welding shall not generally be allowed, but if the strength and machinability of the casting can be ensured, the repairing may be undertaken with the approval of Engineer-in-charge**.**

10.3.4 Defective casting as permitted under 9.1.2.(c) (iii) shall be heat treated after repairs by welding where deemed essential.

10.4 Forgings

i) All forgings shall conform to the latest relevant Indian standards.

ii) All forgings shall be suitably heat treated according to relevant Indian Standard.

iii) Visual inspection of forgings shall be done and finished surface shall be smooth and free from defects., if
required non destructive test shall be conducted the forging.

10.5 Welding

A) All welding shall conform to the latest relevant Indian standards and approved electrodes shall be used.

B) Welding procedure for all major welds shall be draw up and carried out and if required by the Engineer-in charge, test pieces may be made to ensure the soundness of welding.

C) Only qualified and experienced welders shall be employed for the welding work.

D) Visual inspection shall be carried out of all welded joints to ensure that welding is free from.

i) Cracks on the surfaces of the joints or parent metals located near the heat affected zones.

ii) Undercuts in the parent metals.

iii) Non-uniform with of filet joints

iv) Mis-alignment and distortion of the welded member, and

v) Irregular reinforcing beads of welds.

(D-1) Welds found to be defective shall be subjected to non destructive tests to ensure soundness of welding.

E) Proper sequence of welding shall be following for welding of heavy structural parts in order to minimize distortion.

F) Defective welds after testing shall be removed and re-welded.

G) All major stress carrying welded joints shall be subject to suitable non-destructive testing as specified by Engineer-in-charge.

H) All items or part may be stress relieved according to the requirements and procedure laid down in I.S.2825-1969(code for unfired pressure vessels) Generally following items require stress relieving.

I) Trunnio, girders, anchor, girders and Trunnion brackets where heavy welding is involved and

II) Trunnion hub if part of the arm (structural portion) is welded to the casting.

11.0 MATERIALS FOR THE COMPONENTS OF FIXED WHEEL GATES

Sl. No.	Component Part	Recommended Materials	Standard reference
i)	Structural Parts of gate leaf including skin plate, stiffeners, horizontal girders, diaphragms, track base, seal base, seal seat base, liners, seal clamp, lifting lugs, structural parts of lifting beam, rail	Structural Steel	IS 2062

	guide, sill beam, anchor bolts, load carrying anchors etc.		
ii)	a) Wheels	Cast steel Forged steel	IS 1030 Gr27-54 IS 2004 CL.IV
	b) Self aligning spherical roller be	Standard make SKF or equivalent approved make	———
	c) Wheel pins	Corrosion resistant steel Forged steel	IS:1570(5) Gr.15 Cr.13 IS:2004 with 40 microns hard chromium plating.
	d) Retainers	Structural steel	IS:2062
	e) Sleeves for pin (distant pieces)	Corrosion resistant steel Structural steel Hard chromium plated to 20 microns.	IS:1570(5) Gr.15 Cr.13 IS:2062
iii)	a) Guide roller	Cast steel	IS 1030 Gr.27-54 or Gr.26-52
	b) Guide roller pin	Corrosion resistant steel carbon steel hard chromium plated to 40 microns	IS:1570(5) Gr.15 Cr.13 IS:1570(4) C-40.
	c) Bushing	Bronze	IS: 305 / IS: 318
iv)	Track base/ sill base /side seal base/ guide roller track / bumper track	Structural steel	IS:2062
v)	Rubber Seals	Rubber	IS:11855

vi)	Track	Corrosion resistant steel	IS:1570(5) Gr.20 Cr.13
vii	Seal seats (side, bottom & top)	Stainless Steel	IS1570(5) 04 CR.19Ni9 Or 07 Cr19 Ni9
viii	Seal fasteners	Stainless steels	IS1570(5) 04 CR.19Ni9 Or 07 Cr19 Ni9
ix	Ballast if any	Cast iron	IS : 210

12.0 APPLICABLE BIS STANDARDS STAGE- VERTICAL LIFT GATES.

Applicable BIS Standards

All works shall be carried out according to technical specifications; the Indian Standard Code(s) of practice. Any work not covered in the Indian Standard Code(s) & specification, it shall be carried out as per best practice adopted in this country and /or reference may be made to other appropriate & relevant ASTM, ASME, DIN, JIS or BS according to the direction andsatisfaction of the Engineer-in charge. Here are some relevant BIS references are included but not limited to the following:

A.General

IS 800 (2007): General Construction In Steel - Code of Practice

IS : 816-1992 – Code of practice for use of metal are welding for general instruction in mild steel.

IS : 822-1991 – Code of practice for inspection of welds.

IS 808 (1989): Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections

IS 919-1 (1993): ISO Systems of limits and fits, Part 1: Bases of tolerance, deviations and fits

IS 919-2 (1993): ISO systems of limits and fits, Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts

IS : 1023-1987 – Code of practice for Oxygen- Acetylene welding for structural work in mild steel.

IS 1030 (1998): Carbon steel castings for generalengineering purposes

IS 1200 (Part-8): Methods of measurement of building & civil engineering works (steel work & iron work)

IS 1367-3 (2002): Technical Supply Conditions for Threaded Steel Fasteners, Part 3: Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel - Bolts, Screws and Studs

IS 1570-5 (1985): Schedules for Wrought Steels, Part 5: Stainless and Heat-resisting Steels

IS 1732 (1989): Steel Bars round and square for structural and general engineering purposes

IS 2048 (1983): Parallel Keys and Keyways

IS 2062 (2011): Hot Rolled Medium and High Tensile Structural Steel

IS 2102-1 (1993): General tolerances, Part 1: Tolerances for linear and angular dimensions without individualtolerance indications

IS 2102-2 (1993): General tolerances, Part 2: Geometrical tolerances for features without individual toleranceindications

IS : 2595-1991- Code of practice for radiographic testing.

IS 2629 (1985): Recommended Practice for Hot-Dip Galvanizing of Iron and Steel

B.HYDRAULIC GATES, HOIST, RUBBER SEAL, PAINTING & TRASH RACK

IS 13623 (1993): Criteria for choice of gates and hoists

IS 5620 (1985): Recommendations for Structural Design Criteria for Low Head Slide Gates

IS 9349 (2006): Recommendations for structural design of medium and high head slide gates

IS 11228 (1985): Recommendations for design of screw hoists for hydraulic gates

IS 6938 (2005): Design of rope drum and chain hoists for hydraulic gates - Code of practice

IS 7718 (1991): Recommendations for inspection, testing and maintenance of fixed wheel and slide gates

IS 11855 (2004): Guidelines for Design and Use of Different Types of Rubber Seals for Hydraulic Gates

IS 15466 (2004): Rubber seals for hydraulic gates

IS 14177 (1994): Guidelines for painting system for hydraulic gates and hoists.

GOVERNMENT OF WEST BENGAL
IRRIGATION AND WATERWAYS DIRECTORATE

METROPOLITAN ELECTRICAL DIVISION

DETAILS SCOPE OF WORKS & TECHNICAL SPECIFICATIONS

Name of Project:- Replacement of 4 (four) no. draw shutters and 6 (six) no. flap shutters and allied works of 20 vented Sejberia sluice within Uluberia Municipality , PS- Ulberia, Dist- Howrah.

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26 (Sl. No.-02)

YEAR-2025-26

1.0 GENERAL SPECIFICATION

1.1 Basic Consideration for Scope of works

Description of item in B.O.Q shall be read in conjunction with this chapter alongwith drawing and appendices which provide further information and details. The rates in this B.O.Q are inclusive of cost of all materials, transportation and carriage of material up to works site, labour, plant and equipment, tools and tackles, safety gadgets, insurance, incidentals etc. but exclusive of applicable GST & labour CESS, as may be required for execution of a particular item/works or items /works which is/are to be read in conjunction with the specification. The contractor shall confirm of having visited the site to conceive the work in totality and collected &verified the data relating to site conditions. The contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility. Compliances with this specification do not limit the responsibility of the contractor for overall performance of the said system. Contractor can offer changes in design for better performance. Justification of such changes shall be provided by the contractor.

Unless otherwise stated, the rates in this B.O.Q are inclusive of all type of overhead cost as listed below and **no separate** claim by the contractor shall be entertained.

i) Items which cover both fabrication and erection shall include conveyance and delivery, handling, unloading, storing, hoisting and all labour for finishing to required shape and size.

ii) to establish, as per requirement, office at site with adequate space for contractor's personnel, inclusive of necessary furniture & furnishing, consumables etc., storage space for equipment, materials etc.

iii) Temporary power connections from electricity board, alternative power arrangement telephones, construction and drinking water etc.

iv) General works such as setting out, clearance of site before setting out and clearance of works after completion.

v) Material testing cost.

vi) Scaffolding charges.

vii) All temporary works, formwork and false work.

viii) Cost of labour hutment

ix) Guarding of Material.

x) Cost for implementation of Quality Assurance Plan.

xi) Any other item of work (minor in nature) which could not be specifically provided in the estimate but which is/are necessary for complying the works.

Notwithstanding contained in this document, contractor shall be adhered to General specification of USOR(M&E) of I&W Department[USOR(M&E) of I&W Department is available in the departmental website i.ewww.wbiwd.gov.in]

1.2 General Workmanship(Embedded Parts & Gates)

All fabrication work under this Contract shall be done in accordance with thespecifications, which meet the EIC approval. All the works shall be performedand completed in a thorough workman like manner as per best practice in themanufacture and fabrication of materials of the types covered by these specifications. In all cases the work shall be of highest quality and carefully performed to the satisfaction of the Engineer-in-Charge. The Contractor shall warrant all materials andworkmanshipfurnished by him to be free from injurious defects. All sharp corners edges shall be chamfered. He shall replace, free of cost, any defective material orworkmanship noticed during erection and shall bear all cost of the modification of anydefect, in the field, for which he is responsible.Workmanship shall conform to the lateststandards, laid down in Indian Standards Specifications or industry based best practice.All members shall be free of twists, bends or other deformations and all surfaces thatwill be in contact shall be thoroughly cleaned before assembling, parts shall beadjusted to line and fit and shall be firmly bolted or otherwise held securely together sothat surfaces are in close contact before drilling, reaming or welding iscommenced.Plates with lamination discovered during cutting, welding or at any other time shall berejected. Minor surface imperfections can be repaired wherever possible with the priorapproval of the purchaser. Materials not supplied or workmanship not performed inaccordance with approved drawings and specification shall be rejected and replaced. Iftransport clearances do not permit the weight and size due to limitations, the gate parts and miscellaneous parts **shall be fabricated into sub-assemblies**. The Contractor shallsubmit with his bid a drawing showing the sub-assemblies into which he proposes tofabricate the gates, and other assemblies for transporting them to site.

All the parts of the gates shall be fabricated in accordance with these specifications,and drawings. The manufacturer shall take special care in fabrication of the partsaffecting

strength, rigidity and water tightness of the gates. Attention is directed to thefact that rolled edged plates are not suitable for caulking.

Holes for the wheel pins shall be bored and counter-bored in pairs to a common axis,after the leaf has been assembled and all the shop welding has been completed. Theaxis of these holes shall be in common plane, which shall be parallel to the finishedsurface of the seal bases within specified tolerances. All holes shall be accuratelyspaced, cylindrical and perpendicular to the members. All counter sinking shall be trueand square with holes. The seal rings provided in the wheel assembly shall be productsof established manufacturers and must be perfectly watertight.

1.3 Brief Scope of Works

i) Replacement of draw shutters with stiffeners 04 (four) nos. gate and flap shutter 06 (six) nos.
ii) Repairing of flap shutters and draw shutters including their MS structures.
iii) Complete changing thrust plate, GM bush and bearing of respective sizes.
iv) Complete replacements of hanging arrangements for flap shutters consisting of Plummer block, bush, pin, plates etc.
v) Complete replacements of fastening arrangements such as nuts and bolts and washers etc.
vi) Complete changing of rubber seal of respective sizes.
vii) Painting of the steel structures with coal tar epoxy paint of 300 micron.
viii) Concrete cutting, shuttering and mending works.

1.4 Design Consideration and Operation Requirements

i. The intake gates are designed in accordance with the provisions of the latest edition of IS: 4622 in general and in accordance with the provisions specified in these specifications in particular.

ii. The intake gates are designed for operation under maximum head corresponding to full supply level against the normal allowable stresses. The gate shall have upstream skin plate and upstream sealing arrangement and are to be designed for unbalanced head operation.

iii. Earthquake effects are considered and allowed in the design as per stipulations in accordance with IS: 1893. The design shall be checked for additional forces due to horizontal and vertical earthquake acceleration corresponding to relevant zone. The maximum deflection of the gate shall be limited to 1/800 of the span (centre to centre of tracks).

iv. The gate shall satisfy the following requirements:

a) In closed position, the gate must be completely water tight with full pressure acting from upstream side and sealing must be reliable against maximum water level.

b) The sealing of the wheel assemblies should prevent entry of water to the wheel bearings to ensure trouble free operation.

c) The following loads shall be considered:

i) Full hydro-static load on upstream side of the gate with water level at highest level of fore bay.

ii) The total hydro-static and hydro dynamic forces, frictional & wind loads when the gate is raised or lowered with the upstream water level at highest level of fore bay.

1.5 Design criteria for Hoist

1.5.1 The hoists are designed at a rated capacity capable to lift close the gates under all eventualities for which the gate has been designed. The hoist capacity shall be calculated taking into consideration the worst combination of all frictional forces, hydrodynamic loads, dead weights etc. during both raising and lowering cyclesplus a reserve capacity of 20% over and above the worst combination of forces (while lowering, uplift forces and while raising down pull forces shall be taken into considerations) and various factors as enumerated in IS: 6938 shall be taken into consideration. While determining the hoist capacity, positive closure of gate with designed weight and seating pressure @ 1000 Kg/m width of gate shall be ensured. The contractor shall submit detailed calculations in support of hoist capacity. The coefficient of friction used for working out hoist capacity shall not be less than those provided in the design criteria for gates or those specified in IS: 4622 unless otherwise specified in these specifications. Necessary down pull force shall be considered while computing the hoist capacity.

1.5.2 The mechanical parts of the hoist are to be designed for the specific loads with a factor of safety of five based on the ultimate strength of the materials. Under breakdown torque condition of the motor, stress in any portion of the hoist, bridge & trestles shall not exceed 80% of the yield point of the materials (or 33.33 % higher than normal stresses whichever is lower). The rope shall have a factor of safety of six for normal conditions and of 3 for breakdown torque condition. The hoist mechanism shall be covered by suitable cover frames to protect it form dust, dirt and direct exposure to moisture.

1.6 Erection Procedure

The contractor shall prepare a complete erection procedure which shall describe the **sequence of operation to be carried out**. The method to be used the measurements to be taken and the tolerance to be met, in the erection and aliment of the equipment such procedure shall have the approval of the Engineer-in- Charge to the commencement of erection and when approved, shall form a part of the specification.

1.7 Installation

All site erection of gate frames i.e., embedded parts shall be complete before second stage concrete at the level. After installation it shall be checked that the Gate frames have smooth surfaces. The waviness of the surface shall be limited to 0.5mm. all surfaces designed to fit snugly and to be watertight shall be so assembled as to ensure water tightness.

1.8 Field Test

Engineer-in-Charge shall carry out such tests on the gates. Tests shall be repeated if necessary, until successfully carried out to the satisfaction of the Engineer-in-Charge. Leakage tests and operational test shall be other portions of the work and when the reservoir is at full reservoir level project authorities shall have the right to carry out such tests also when the reservoir is at a level other than full reservoir level.

1.9 Operation Test in The Dry

Operational tests in the dry shall be carried out as soon as possible after completion of erection when all controls and permanent power supply have been connected and adjusted. The test shall include at test two complete traverses from the maximum raised

position to the full seating positing position. All adjustments, clearances etc. shall be checked for proper operation.

1.10 Operational Tests with Designed Pond Level

These tests shall simulate the actual operating conditions as closely as possible and all equipment checked for proper functioning. At least two complete travels shall be made from the fully closed to the normally raised position.

1.11 Leakage Test

Leakage tests shall be carried out with the gates lowered on to the sill. Before measuring the leakage, the gate shall be raised and lowered several times by a meter or so in order to dislodge any debris that may have lodged in the side seals. The leakage shall then be measured and recorded. **The permissible leakage shall be 10 liters per min. per meter length of seals.**

1.12 Acceptance Test

Final acceptance of the equipment shall be based on the following:

1. Quality of workmanship and material.
2. Satisfactory operation of the equipment, after reaction as required under this specification.
3. Acceptance of various tests and test certificates by Engineer-in-Charge.

The contractor or his authorized representatives may witness all tests.

2.0 METALWORK FABRICATION AND MACHINE WORK

2.1 General

All equipment, materials and suppliers shall be of the most suitable quality for the work. The contractor shall without extra cost provide samples and co-operation in the testing of materials and inspection of the works. The Engineer-in –charge shall have access at all times to the places of storage and to the places where material are being fabricated or processed to determine whether their fabrication and process are proceeding in accordance with the specifications.

The Engineer-in charge may reject at any stage, any work which he considers to be defective in quality and he shall not be debarred from rejecting the brought out materials

by reason of his having previously passed in an un-worked condition. Any portion of the materials rejected shall be removed from the work site by the Contractor at his expense, upon written instructions to that effect by the Engineer-in –charge. Replacement of such materials shall be made by the Contractor at his expense.

In lieu of removing the materials which are not accordance with the work, the Engineer-in –charge may allow such materials to remain, and in the case, such work may be paid at reduced rates as may be decided by the Engineer-in-charge, provided it is technically acceptable.

No work shall be covered up or put out of view without the approval of the Engineer-in-charge and the contractor shall afford full opportunity for examination and measurement of the materials. The contractor shall given due notice to the Engineer-in-charge whenever such material is ready for examination.

2.2 Screw Threads

The threads for both and nuts shall have metric threads of international standard organization and confirming to Indian standard, ISO Metric Screw.

2.3 Fits and Tolerance

First used for different components shall be according to the best modern shop practice. Due considerations shall be given to the special nature of function of the parts and to the corresponding accuracy required to secure proper operation. The fits shall be accordance with Indian Standard Guided for the selection of fits (Latest revision) IS:2709". These shall be subjected to the approval of the Engineer-in-charge .

The tolerances for embedded parts and components of gates shall be as given in IS:4622 & IS:4623 (Latest version).

2.4 Machine Finish

The type of finished surfaces shall be in accordance with the approved drawings. Where a smooth finish corresponding to roughness value ranging between 0.2 and 0.8 mm, is specified or required the machine work shall be performed in such a manner as to

produce smooth surface free from tool marks. This grade finish shall be required for highly loaded bearing surfaces and or for surface to be polished for appearances. Where an average finish corresponding to roughness value ranging between 0.2 and 0.5 mm. is specified or required, smooth surface shall be allowed. This grade of finish shall be required for ordinary work.

This grade of finish shall be used primarily for surfaces which are not in contract, but which require finish for dimensional accuracy.

2.5 Fabrication of Structural Steel

The structural steel work for the equipment covered by the specification shall conform to the requirement of "Reamed work" and shall conform to the following requirements unless otherwise called for in these specifications. All completed members shall be free form twists, bends and open joints. Attention is called to the special nature of the work involved in the manufacture of equipment which required close adherence to the dimensions, tolerances and finish called for.

2.6 Straightening

Before being laid off or worked in any manner, structural material shall be straight without twist , bends or kinks and shall be cleared of all rust and dirt , if straightening is necessary , it shall be done by method that will not injure or mar the material .

2.7 Shearing, chipping and Gas cutting

Shearing chipping and gas cutting shall be done carefully by torch or by electric are and all portions of thework which shall be exposed to view shall present a neat appearance. Gas cutting shall be mechanically controlled re-entrant cuts and copes in beams and channels shall be filleted before cutting.

2.8 Planning or Finishing

Planning or finishing the sheared or cut edges or plates or rolled shapes shall not be accepted except as otherwise specified for welded edges or as shown on the approved drawings.

2.9 Welded Edge

The edges of plates or shapes to be joined by welding shall be formed properly to suit the selected type of welding. Sheared edges or plates and shapes to be joined by welding shall be machined or chipped to sound metal before welding.

2.10 Bent plates and Shapes

Where bending of plates or forming shapes is required, these shall be bent to the proper curvature by cold forming. Bends in grill plates shall be made across the gains of the plates with the axis of redial of bends, normal to the direction in which the plates were rolled. Afterwards, bent plates shall be tested by any approved method to ensure that all surfaces at the bends are free from cracks and incipient fractures. Heating and hammering to correct curvature shall not be permitted.

2.11 Reamed Works

Holes in material 20mm or less in thickness shall be sub punched or sub drilled before assembly and reamed full size after assembly. Holes in material more than 20mm in thickness shall be sub-drilled before assembly and reamed to full size after assembly.

Counter-boring shall be done carefully to meet the requirement for clearance and fit of welded studs. Anchor bolt holes shall be punched or flamed out to full size. All other holes shall be made by the following method.

2.11.1 Drilling And Reaming:-

For sub-drilling the diameter of the drill shall be 3mm, small earthen the nominal diameter of holes used. Except where trapping is required or where tight fit bolts, ribbed bolts or dowels are to be used full sized drilled or reamed holes shall not be less than 1.5 mm nor more 2.5 mm larger than nominal diameter of the bolts used Holes for ribbed blots shall drilled or reamed to 1.5mm less than the diameters of the ribbed shank of the bolts or ensure tight fit. Reaming for the tap used and shall be tapped carefully so that the threads will be continuous, smoothly cut and free from imperfections.

2.12 Accuracy of Punching, Drilling and Reaming

(a) Before Assembly:

The accuracy of all holes shall be such that during assembly a cylindrical pin 3mm less in diameter than the normal size of the holes shall be entered perpendicular to the dace of the members, without drifting in not less than 75 percent of any group of continuous holes in the same place. All holes shall pass a pin 5 mm smaller in diameter than the nominal diameter of the holes.

(b) After Assembly:

The accuracy of remaining and drilling after assembly shall be such that not less than 85 percent of any group of continuous holes in the same plane shall show no offset greater than 0.5mm.between adjacent thickness of material, unless a greater degree of accuracy is called for on the Contractors drawing approved by the Engineer-in –charge or in these specifications.

3.0 WELDING

3.1 Preparation of Welding

Members to the jointed by the welding shall be cut accurate to size and where required shall be rolled and pressed to the proper curvature in accordance with the dimensions shown on the approved drawings. The edges of the members to be jointed by welding shall be sheared, flame-cut or machined to suit the required type of welding and to allow through penetration. The cut surfaces shall expose sound metal free from laminations, surface defects caused by shearing or flame cutting operation on and other injurious defects. The surface of plates to be welded shall be free from rust,grease and other foreign matter for a distance of welding the components parts of edge of the weld. In assembling during welding the components parts of built up members shall be held in place with sufficient and proper clamps or other adequate means to keep with all parts in proper position. Before commencement of welding the contractor shall **submit complete programmed of welding sequence** to minimize stresses and distortion of finishing member of the equipment for the approval of the Engineer-in-charge.

Particular care shall be taken in aligning and separating the edges or members to be jointed by butt welding so that complete penetration and fusion at the bottom of the joint shall be ensured. All pin holes, cracks and other defects shall be repaired by chipping or

grading the defects to sound metal and rewelding. Where fillet welds are used, the member shall fit closely and shall held together during welding. The welding roods used for manual welding shall be of heavily coated type and shall be suitable for all position welding where required in welding precautions shall be taken to minimize stresses due to expansion and contraction and distortion due to heat by using the proper sequence in welding i.e. penning the welds while hot or by other satisfactory methods. Distortions by blows after welding shall not be permitted, welds shall not be primer coated until they have been inspected and approved by the Engineer-in-charge. The welding shall conform to Indian standard. “Code of practice for use of metal are welding for General construction in Mid Steel (First Revision) (with Amendments no 1 and 2II) “IS 810-1969. All skin plate welds shall be continuous and water tight and shall develop the full strength of plate. The Electrode shall conform to the Indian Standards “Specification for covered Electrodes for metal arc welding of structural steel for welding products other than sheets and for welding sheets (PartI and II): IS 814-1974”

The contractor shall prepare shop and field welding procedure including stress and pre-heat requirements and shall submit his procedure to the Engineer-in-charge for approval. The procedure shall be in accordance with the modern welding practice such as to minimize residual stress and distortion of the finished members of thestructure. Approval of any procedure, shall not relieve the Contractor of the sole responsibility of producing a finished product meeting all requirements of these specifications. Welds in contact with runner seals shall be ground flush, all corners and corner welds in contact with rubber seals shall be rounded.

3.2 Approval of Welding Process

Specification of the welding procedure that are “proposed to be used shall be” established and recorded and a copy of such procedure specification together with certified copes of report and results of test made in accordance with the procedure a specifications shall conform to the India Standard “Approval test for welding procedures part:{Fusion welding of steel” I.S.7307 (Part-1)-1974.

3.3 Qualification of Welders

The Contractor shall be responsible for the quality of work performed by his welding staff. All welders assigned to the work shall have passed qualification test for welders.

3.4 Radiographic Examination

The radiographic examination of at least 10% of total length of butt welds for plate greater than 12 mm but no exceeding 20 mm in thickness for slide gates and fixed wheel type stop-log gates shall be carried out by the contractor.

Whenever dissimilar materials are butt welded together at last one X-ray radiographic examination for each component of sub-assembly shall be carried out at the selected points. The numbers point to be taken would depend upon the results obtained after the first series of tests are carried out. Point to making radiographs of butt welds, the contractor shall place suitable identification markers adjacent to the welds. Each marker shall also be so designed and located the image will appear in the radiographs The markers shall be painted , stamped and fastened as directed by Engineer-In Charge and shall not be removed until all welds have been accepted .All radiographs of the welded joins shall be property of the Engineer-in -Charge . The radiographic test shall be carried out by the qualified technician and at such time as decided by the Engineer-in-charge. The technician's interpretation reports on the radio graphic examination shall be furnished by the contractor to the Engineer-in-charge. All precautions shall be taken to minimize radiation hazards.

3.5 Stress Relieving

Stress reliving of parts, where required shall be carried out after all welding including their radiographic examination is completed but before they are machined or assembled into structure.

The equipment as a whole in an enclosed furnace shall be heated for stress relieving purposes within the temperature rang of 580 degree C and 620 degree C with the followings requirement.

1) The temperature of the furnace at the time the equipment is placed in shall not exceed 300 degree C.
2) The rate of heating above 30 degree C shall be (5500) degree C per hour or 550° C per hour. (Maximum plate thickness in mm) per hour, whichever is greater.
3) During the Heating period there shall not be a greater variation in temperature throughout the portion of equipment being heated than 150 degree C within any 4.5 m. interval of length and when at the holding temperature, the temperature not

more than 50 degree C throughout the portion of the equipment being heated shall be within the range 580 degree C to 620 degree C.

When the equipment shall attain a uniform temperature specified above, temperature shall be held constant for
minimum period of 2.5 minutes per millimeter of the maximum metal thickness of the equipment subject to a
minimum of one hour.

During the heating and holding period, furnace atmosphere shall be so controlled as to avoid excessive oxidation of the surface of the equipment. There shall be no directed impingement of the flame on the equipment.

The equipment shall be cooled in the furnace to 400 degree C at a rate not exceeding 700 degree per
maximum plate thickness in mm in hour degree per hour, or 55 degree C per hour whichever is greater. Bellow 400 degree C the equipment shall be cooled in still air.

When it is impracticable to stress relieve at a temperature of 580 degree C to 620 degree C the stress-relieving
operation at lower temperature for longer period of time in accordance with the following shall be permitted after obtaining prior approval of the Engineer-in-charge.

Metal temperature Degree C	Time of heating in Minutes / mm of thickness
575	3.0
550	6.0
525	9.0

For intermediate temperature, the time of heating shall be determined by straight line interpolation.

The furnace to be used shall be capable of being uniformly heated under automatic temperate controls.

Automatic recording pyrometers shall be used to record of the temperature range of the temperature range of strees relieving cycle so as to have record of the actual operation. The record will become the property of the Engineer-in-charge. Stress relieving of the equipment, materials and supplies shall conform to the relevant Indian Standard.

4.0 OTHER MECHANICAL PROCESSING WORK

4.1 Casting

AH casting shall be true to pattern and the thickness of the material shall not vary at any point by more than
1.5 mm from that shown on the drawing approved by the Engineer-in-charge. Care shall be taken in the foundry to cool the casting properly so that they shall not warp or twist. No casting will be accepted if it is wrapped and / or twisted to such extent that machined surfaces cannot be properly fixed to the dimensions shown in the drawings approved by the Engineer-in-charge or require so much metal to be removed as to leave the thickness of the metal less than that shown in the drawings approved by the Engineer-in-charge by more than 1.5 mm. AH casting shall be free cracks, large or injurious blow holes or sand holes and other blemished. They shall have workmanlike finish, inside angle having proper filets and unfinished edges of bases ribs and similar parts being nearly east with rounded corners.

All casting shall be suitable heat treated. The method of heat treatment and the relevant records of heat treatment shall be furnished by the Contractor to the Engineer-in-charge. Subsequently all casting shall be subject to radiographic method of inspection.

Repairs of major defects in casting shall not be allowed, but if the repairs of major detect in casting can be
ensured, the casting shall be rectified by welding with the prior approval of the Engineer-in-charge. AH casting shall be welded in accordance with the procedure laid down in Indian standard code of procedure for repairs and rectification of steel casting by metal-arc welding process IS 5530. AH such casting in the areas of repairs shall be re-examined as directed by and to the satisfaction of the Engineer-in-charge.

4.2 Forging

All forging shall be supplied in the as-forged and normalized condition. They shall be sound and free from
scale, cracks, crevices or any other flaws that can be detrimental to their use.

All forging shall be suitable heat treated. The method of heat treatment to be adopted shall be as suggested by

the contractor and approved by the Engineer-in-charge. Finished surfaces of the all forging shall be smooth and free from tool marks.

The sample shall be tested for each east and heat-treatment batch. The chemical composition and mechanical
properties obtained from the sample shall comply with the specified requirement. In case, the sample fails to meet the specified requirements, the material represented shall be liable to rejection. The contractor with prior approval of the Engineer-in-charge shall be allowed to reheat-treat (not more than twice) forging rejected and resubmit for testing. All forging shall be subjected to bend test to carried out the accordance with Indian Standard "Method for Bend Test for Steel products other than sheet strip wire and Tube" IS :1599 where the dimensions permit, test piece,230 mm longand 32 mm square with edges rounded off, shall be machined lengthwise from each test sample and bent cold by direct pressure round a former a diameter appropriate to the class of steel as shown in Fig. 1 on page 9 of Indianstandard" specification for carbon steel forging for General engineering purposes IS 2004, until the sides of test pieces are parallel. Subsequently the ends of the test piece shall not fracture, one forging from each delivery run batch shall also be examined for grain flow by sectioning and macro etching.

4.3 Fastening

Erection blots, nuts washers and other fasteners shall be furnished in the amount of 15 percent more often
bots, nuts, washers and other fastener whichever is greater, in excess of the normal number of each size and length required for complete installation of equipment.
Bolts in tension shall have a net section at root of thread 15 percent in excess of the net section required in tension
Nuts, bolts, studs and washers for incorporation in the equipment shall confirm to the requirements of the
appropriate standards. Where the contract includes nuts and bolts of different standard the tools shall be provided with this specification and shall include spanners, taps and dies for these nuts and bolts, nuts and bolts for pressure parts shall be of the best quality bright steel, machined on the shank, under the head and nut. All washers shall be included under the contract including locking devices and anti-vibration arrangements. Taper washer shall be fitted, wherever necessary. Where there is risk of corrosion, bolts, and studs shall be finished flush with the surface of the Nuts- Bolts except for high strength friction drip bolts shall be designed so that with the nuts fully tightened, the

stress intensity at the bottom of the thread shall not exceed half the yield point of the material under all conditions. All bolts, nuts and screws which shall be subjected to frequent adjustment or frequent removal in the course of operation shall be made of corrosion resistant or bronze. Spring type washer will not be permitted where they may damage any protectivecoatings Special tools, wrenches and devices found to be necessary for the completion of work shall also beprovided under contract.

5.0TOLERANCES

TOLERANCES FOR EMBEDDED PARTS AND COMPONENTS OF RADIAL GATE (IS: 4623)		
Sl. No.	**COMPONENTS**	**TOLERANCES (in mm)**
1	**Embedded parts**	
i	Wall plate and sill plate	
	a) Distance between centre line of opening and face of wall plate at sill end	± 0.00
		2.00
	b) Distance between centre line of opening and face of wall plate at top end	± 2.00
		0.00
	c) Straightness of face of wall plates and sill plates	Offset at joints to be ground smooth
	d) Normally of face of wall plates to gate sill and centre line of trunnion bearings	+ 0.01°
		0.00°
	e) Alignment of sill plate in horizontal plane	± 0.25
ii	**COMPONENTS OF GATE**	
	1) Guide Roller/ guide shoe	
a	Distance between centre line of gate and face of side seal	+ 1.00
		2.00
	2. Side seal	
	Distance between centre line of gate and face of side seal	± 1.00
	3. Trunnion Bearings	
	a) Colinearity of centre lines of both the trunnion bearings	± 0.25
	b) horizontality of centre lines of both the trunnion bearings	± 0.25
	c) Parallel distance of centre lines of both the trunnion bearings from uptream bottom edge of skin plat	± 3.00
	d) Tolerances in diamenter's of pin , bush, hub and bracket of trunnion assemly	To suit diameters and required fits.

6.0 RUBBER FOR SEAL

Rubber for seals shall be nature of synthetic containing not less that 1 percent weight of copper inhibitions. The rubber compound shall not absorb more than 10% by weight of water in a 7 day test. The tensile strength of a test specimen after being subjected to an accelerated aging test of 48 hours in oxygen at 70 degree C and 21 Kg/Cm2 pressure, shall not be less than 80% of the strength of test specimen before again. The material shall be properly aired in a manner to ensure a dense homogenous cross sector free from pitting blisters, porosity and other imperfection and different elements shall be well bounded together. Physical properties of the compound furnished shall be as follows: -

Ultimate tensile strength minimum	14.50N/mm2
Minimum elongation	450%
Durometer Harness shore “a” type	65+5

Manufacture of Rubber Seal:-

The rubber compound material shall be properly cured in manner so as to ensure a dense homogenous sections, free pitting, blisters, porosity and there imperfections and different elements of the rubber seal shall be well bounded together. This shall conform to IS 4623 (latest edition)

7.0 PAINTING

7.1 General

The contractor shall furnish prepare and supply all materials for cleaning and coating of metalwork as hereinafter specified. All metal surfaces for equipment, materials and supplies shall be cleaned and primer coated with two coats of applicable primer conforming to the specifications given herein. The cost of furnishing, preparing and applying all materials which are required for cleaning and primer coating operations, including supply of all labour, tools and equipments shall be included in the rate for fabrications and supply of all supply of metal work and machinery.

7.2. Preparation of Surfaces

Surface preparation shall be made in accordance with the following procedure:

i) Weld spatters or any other surface irregularity shall be removed by any suitable means before cleaning.

ii) All grease and dirt shall be removed from the surface by the use or clean mineral spirits or white gasoline (lead free) and clean wiping materials.

iii) Following the solvent cleaning, the surface to be painted shall be cleaned of all rust, mill scale and other tightly adhering objectionable substances by sand blasting or grits blasting to uniform bright base metal. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing airing section or other effective means before the surface is painted.

iv) Surface of stainless-steel maker bronze and machined surface adjacent to metal work being cleaned or part shall be protected by masking type or by other suitable means during the cleaning and painting operation.

v)

7.3 Cleaning Surfaces

Surface shall be cleaned and prepared in accordance with Indian standards " code of practice for painting of ferrous Metal in Building Part I pretreatment (first Revision)" IS:147.7 (part 1)-1971 for pretreatment and by the method to be used for each item of installation of metal work and machinery which is indicated in the primer coating schedule. Weld spatter or machinery which is indicated in the primer coating schedule. Weld spatter or any other objection able surface irregularities shall be removed by any suitable means before cleaning. The following method shall be applied.

METHOD-A: All oil, grease and dirt shall be removed by from the surface by using clean mineral spirits, xylol or white gasoline and clean wiping material.

METHOD-B: All oil, grease and dirt shall be removed from the surface to be primer coated by use of mineral spirit petroleumnaptha or white gasoline.

Final cleaning shall be done by using clean wiping material and clean solvent. Following the solvent cleaning the surfaces of metalwork machinery shall be cleaned of all rust, mill scale or other tightly adhering foreign material by sand blasting or grit blasting as directed by the Engineer-in-charge to uniform bright base metal. After dry blast cleaning the surface shall be dusted off or blown off with compressed air free of oil and water. It wet blasted the surface shall be cleaned by moving air with clean fresh water to which sufficient corrosion inhibitor has been added to prevent rusting. Corrosion inhibitor

compounds are the material used to prevent or retard the oxidation of metal they shall be especially phosphate and chromate and shall contain a Ferro cyanide synergist. This treatment shall be supplemented by wire brushing. If necessary, to remove the residue in the event of rust formations or the surfaces becoming otherwise contaminated in the interval between cleaning and primer coating re cleaning will be required surface of stainless steel. Bronze and machined surfaces adjacent to metal work being cleaned or primer coated shall be protected by masking tape or other suitable means during cleaning and primer coating operations.

However, depending upon the site requirement and as per BOQ provision, EIC shall decide the particular portion formachine/ manual cleaning.

7.4 Application Procedure:

Primer coating materials shall be applied in accordance with the content of this sub-paragraph and the primer coating schedule. All primer coating materials shall be in thoroughly mixed condition at the time of application and shall not be thinned except where hereinafter specifically provided.

Any warming of the primer shall be performed by means of a hot water bath and except as specially provided the primer shall not be heated to a temperature higher than 38 degree C. surfaces shall be free from moisture at the time of primer coating. Each coat of primer shall be done to completion each and shall be free from runs and sags. Except other-wise specifically provided each coat shall be allowed to dry or harden before the succeeding coat is applied. Coverage rates and application procedure for zinc rich primer shall be follows.

The thickness of each coat of zinc rich primer shall be minimum 50 micrometer and the total thickness of two coats of primer shall be minimum 100 micrometer to the surfaces of metal work in accordance with the specifications. The contractor shall ensure that all irregularities such as welds, nuts, other fastener and seems shall also receive total thickness of minimum 100 micrometer after application of two coats of zinc rich primer.

The zinc rich primer shall be of mixed thoroughly so as to ensure intimate contact of the reaching chemicals at the time of application and shall not be thinned except as approved by the Engineer-in-charge. Zinc rich primer shall contain not less than 85 percentage of metallic zinc dust in epoxies media. The dry film shall contain at least 90 percentage of

zinc to given electrical contact between the zinc and the steel if necessary, to improve the application properties, the primer may be treated by means of hot water bath to temperature as recommended by the manufacture of the primer. The primer shall be prepared in small quantities so that if can be utilized within the workable period for application as recommended by the manufacture.

The surface shall be free from moisture at the time of primer coating items to the primer coated that are not thoroughly dried shall be heated to a sufficient temperature or as specified by the manufacture to drive of all the moisture before the primer is applied. The primer shall not be applied when the temperature of the metal or surrounding air is below 10° C or as specified by the manufacture. It shall however, be noted that the primer shall be applied only when the humidity and temperature of air and the surfaces to be primer coated will result in evaporation rather condensation. Each primer coat shall be free from runs, sags and pin holes.

The first coat shall be applied immediately after the surfaces has been cleaned by brushing and the second coat by brushing or spraying when the primer is applied by spraying, suitable means shall be provided to prevent segregation during the primer coating operation. Effective means shall be provided to remove all free oil and moisture from the air supply lines of spraying and blasting equipment. Nozzle pressure consistent with acceptable finish results shall be applied while spray primer coating.

The inter coat time between two successive coats of primer shall not exceed those recommended by the manufacture. Similarly, the minimum inters coating time between two successive coats of primer, recommended by the manufacture shall be observed strictly, so that each coat of primer will be allowed to dry or harden, before the succeeding coat is applied. Curing condition shall conform to time and temperature limitation specified by the manufacture.

7.5 Primer Coating Schedule:

Cleaning and primer coating shall be in accordance with the following schedule.

Sr. No.	Item No.	Method of cleaning surface for operation	Primer coating Material
1	Embedded parts all exterior surfaces of potassium embedded metal work viz track base, sill beam wall plate, anchor plates etc that will remain in contact with concrete	A1	Cement wash mixed with 5 percent dichromate
2	Metal surface exposed to atmosphere of water	B2	Zinc rich primer

8.0 Inspection and Acceptance Test of Primer Coating

Preparation of the materials for primers used and their labeling shall comply with the rules applicable to primers. The safety rules required during these applications shall be strict observed.

The contractor shall have to bring up the thickness of the coating wherever it recognized to be insufficient. The thickness measuring until shall be calibrated and cross check by both the Engineer-in-charge and contractor.

8.1 Precautions

Air paints and coating materials shall be in a thoroughly mixed condition at the time of application. The air temperature at the time of application must not be below 10 deg.Celsius and relative humidity must be below 65% to 70% . Surfaces to be paint should be free moisture at the time of applications. Effective means shall be provided for removing all free oil and moisture from the air supply lines of all spraying equipment.The first coat shall be applied by brushing immediately after cleaning the surface.

8.2 Painting Schedule:

The following are the various painting systems to be used for the purpose of specification.

SYSTEM-I

To be prepared as per IS:290-1961 (reaffirmed 1986)-coal Tar Black. Paint (revised) or relevant (8S) specification.

Primer. Coal tar epoxy one coat to obtain a dry firm at a coverage rate of 2.5sq. m /liter for the faces exposed to water or atmosphere.

For embedded parts the surfaces exposed to water or atmosphere shall be primed as above but the surfaces coming in contact with concrete shall be given a cement wash.

1st coat finishing :Coal tar epoxy paint one coat to, obtain a dry film thickness of 50 Micron.

2nd coat finishing : Same as 1st coat finishing, interval between the coats 24 hours.

SYSTEM-II:

To be prepared as per IS:51-1972 zinc for paints (Amendment 1989) and IS:289-1963 (amendment 1989)-Aluminum paste, for painting revised. Primer zinc chromate -1st coat to obtain a dry film at a overage rate of 10 sq. m/ liter for the surface exposed to atmosphere. For embedded parts the surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contract with concrete shall be given a cement wash.

1st coat finishing : Sanded aluminum (phenolic) paint- one coat to obtain a dry film at a coverage rate of 5.5sq. m. / litre.

2nd coat finishing : Sanded aluminum (phenlic) paint-one coat. To obtain a dry film at a coverage rate of 7.0 sq. m/ litre.

Interval between coats :24 hours

SYSTEM-III

Primer Zinc Chromate :1st coat to obtain a dry film at a coverage rate of 10 sq. m/ liter and 2nd coat to be applied to obtain a dryfilm at coverage rate of 10sq. m /litre for the surfaces exposed to atmosphere. For embedded parts

the, surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contract with, concrete shall be given a cement wash.

Aluminum paint or machinery finish paint one coat to obtain a dry film at a coverage rate of 10 sq. m/ litre.

Interval between coats 24 hours

Heavy uniform coating of gasoline soluble rust preventive compound

SYSTEM-V:

Smooth coating of a thin mixture of white lead oil graphite.

SYSTEM-VI:

Primer: Zinc Chromate 1st and 2nd coat to obtain a dry film at a coverage rat of 10 sq. m/ litre and 2nd coat to be applied to obtain a dry film at coverage rate to be applied to obtain a dry film at coverage rate of 10 sq. m. / liter for the surfaces exposed to atmosphere. For embedded parts the surfaces exposed to water or atmosphere shall be primed as above, but the surfaces coming in contact with concrete shall be given a cement wash.

1st and 2nd coat Superior quality synthetic enamel paint conforming to IS: 9034-1978 or as approved by the Engineer-in-charge.

Interval between coats 24 Hours.

The following shall be application of the above painting systems.

System application

SYSTEM-I or II All un-matched ferrous surfaces of gates, lifting beams and embedded parts exposed to atmosphere or water. The surfaces or embedded parts, which are to come in contact with concrete shall not be required to be given finishing coats but shall be given cement wash before erection / embodiments.

System-III All surfaces, of machinery (except machined surfaces) including motors, hoists, gearing housing, shifting bearing pedestals, base plates, hoist bridge, hoist frames, tresties, railings etc.

System-IV All furnished surfaces of ferrous metal including screw threads that will be exposed during shipment or while awaitng installations machined surfaces in rolling or sliding contact.

System-V Finished surfaces of bolt joints in sections that are to be shipped assembled and the shanks threads of bolts etc.

System-VI External and internal surfaces of control cubicles/ panels crane girders cabins" ladders, hydraulic piping (external surfaces), support anchors, brackets, crane shackles, hooks extern al surfaces of oil and air tanks etc.

In case of system -I and II the priming coats shall be applied in the shop. The first finishing coat shall be applied in the field after repair or any damage of shop coat and 2nd finishing coat shall be applied after creation. For system-III the primer and 1 st coat shall be applied in the shop. The 2nd finishing coat shall be applied in the field as above and final coat shall be applied after creation. In case of parts which become inaccessible after erection an extra coat is to be applied in the shop and the final coat in the field before election. In case of system VI on the primer coat be applied in the shop and both prior to or after erection as found convenient.

8.3 Application Procedures:

All the points and coating materials shall be in a thoroughly mixed condition at the time of application and shall not be thinned except as hereinafter specially provided. Any warming of the paints shall be performed by means of hot bath. Paint shall not be applied when the temperature of metal or surrounding air is below 10 degree C (50 deg F) and relative humidity is above 60% to 70% unless otherwise specified by the paint manufacture to the approval of the Engineer-in-charge.

All surface to be painted shall be free from moisture at the time of painting. The first or printing coat of shall be applied immediately after clearing and except otherwise specifically provided shall be applied by either brushing or spraying. When paint is

applied by spraying a mechanical agitator type paint pot shall be used if the contractor uses the special equipment designed for spraying heavy bodied materials,means shall be provided for removing all free oil moisture from the air supply line of a spraying equipment. Each coat of paints shall completely covered areas. Each coat of paint shall be allowed to dry or harden thoroughly before the succeeding coat is applied. Rust preventive compound shall be applied by any convenient method to ensure complete coverage of heavy coating.

8.4 Method of Painting

All paint shall be applied by skilled workers in a workman like manner and each coat of paint shall be permitted to dry properly before the succeeding coat is applied. Paint shall be not be applied during humid weather conditions
on surface that are not entirely free from moisture. Equipment used for applying paint by spraying shall be of highest quality and shall include an agitator and means of removing all free oil and moisture from the air supply line. Thinning or heating of paint will not be permitted, except with special approval and in accordance with instructions. Any warming of paint shall be performed by means of hot water bath. All finished coats shall be free from pinholes, shady, granular or fibrous appearances or any conspicuous brush marks.

9.0 TECHNICAL PROVISION FOR CROSS REGULATOR / HEAD REGULATOR/ESCAPE GATES / OUTFALL SLUICE

9.1 The materials shall conform to the specifications as mentioned in the approved drawings and as per direction of the E.I.C. The bidder shall go through the approved drawings thoroughly and bring to notice of the E.I.C. immediately of any discrepancy or deficiency before taking up fabrication. The E.I.C. shall not be responsible if any problem arises due to discrepancy in the drawings noticed during or after fabrication. The bidder shall be fully responsible for smooth operating of the gates under all conditions. The gates shall be capable of being operative at any opening under all conditions of unbalanced operations and shall be free from vibrations at all conditions of gate operation. The leakage through the gates shall not exceed the permissible limits.

9.2 **Intent of Specification**

Certain performance requirements, materials, features and design requirements are specified herein. Experience and practice of manufacturer shall meet, in all respects, the specified requirements in regard to performance, durability and satisfactory operation. However, certain features, materials and design requirements are specified to establish minimum standards for the work.

9.3 Responsibility of Contractor

Contractor shall guarantee and be responsible for:

- Design of the complete work for submission, to Engineer-in charges for approval, showing all principle forces, analysis of all components, centers of lift and gravity, and hoist forces, uplift and downward forces.
- The quality of all materials and workmanship of the complete work.
- Rigid adherence to the dimensions of parts as shown on accepted drawings, except for deviations specifically authorized in writing by engineer-in Charge.
- Strength of all parts to withstand all mechanical, hydraulic and other forces which may be experienced in the specified operation or during shipment of the equipment.
- Delivery within the period of time given or subsequently fixed by contract. Satisfactory performance of the entire work under all specified operations conditions without signs of undue strain, and without breakdown, damage, or deterioration of any of the parts due to faulty or unsuitable material, workmanship, installation or design.
- Freedom from abnormal vibrations of any part or under the most severe operating conditions.
- The water tightness of the gate seals.
- The strength, accuracy and adequacy in all respects of the installation of all machinery and equipment supplied under this Contract.

It is Contractor's responsibility to ensure that all components supplied in accordance with these specifications shall fit correctly to each other. In the event of any field modifications being required due to errors in shop fabrication.

To ensure timely approval of the design and drawings, these should be submitted by the contractor strictly as per schedule, in proper sequence and in accordance with the requirements of the technical specifications supported by technical documents,

literature etc, as required in one lot after complete scrutiny and checking from his end so that the comments from Engineer-in charge and number of resubmission are kept to a minimum.

9.4 **Drawing data to be submitted with the tender by the bidder**

(a)Technical data

(b) Basic design, estimated weight, hoist/ crane capacity calculations and general arrangement drawings for each of the equipment to be supplied

(c) Detailed schedule of submission of design calculations, drawings, fabrication, erection, testing and commissioning.

(d) Deviations from technical specifications, if any.

(i) Any item not specifically mentioned or covered but necessary to complete the job shall be considered included in the scope of work by the contractor.

(ii) Any item or services which the bidder desires to be supplied / provided by the purchaser shall be specifically mentioned failing which it shall be presumed that such item / services are included in the scope of supplies / work by the contractor.

9.5 **Contractor's drawings/documents**

Contractor shall submit required sets for each detailed design computations and drawings to the Engineer-in- charge for approval which shall include complete details of the equipment. All drawings shall be carefully checked by Contractor for accuracy, completeness and clarity before submission for review and approval. Contractor shall be responsible for correctness and adequacy of the design in relationship to the specifications.

9.6 **Inspection and Tests**

All materials shall be of tested quality and all work performed shall be subject to rigid inspection and no article or material shall be dispatched until all tests, analysis and shop inspection have been completed or certified copies of reports or results of test and analysis have been accepted. Copies of manufacture's test certificates including chemical analysis and mechanical properties shall be made available for all materials. In case test certificates are not available for any of the material, the same shall be got tested and only those materials which fulfill the requirements of these specifications shall be used. From

any part / item, it should be possible to locate its manufactures batch / lot mark, which shall be achieved by transferring the batch marks before parting the materials.

All castings shall be annealed and forging shall be normalized.

9.7 Shop assembly and testing

9.7.1 During the course of manufacture, the equipment included in the scope of supply shall be subject to rigorous inspection and testing.

9.7.2 All components, sub-assemblies and assemblies will be dimensionally and functionally checked against the
relevant drawing.

9.7.3 All gate units shall be fully shop assembled (With temporary bolting where necessary), and checked for

dimensional and flatness checks with all fitments such as wheels, guides, seals, etc, attached. The correct C.G.

shall be established during shop assembly before final welding of lifting lugs

9.7.4 Embedment frames and guides shall be assembled on the shop floor for dimensional and straightness checks,
also alignment of connecting members within the required tolerances.

9.7.5 In all cases the various connecting parts shall be match marked to facilitate site erection.

9.7.6 Hoisting units shall be fully assembled on the hoist platform and test run to at least 20 minutes and load tested
to 1.25 times the rated capacity. During test run all the components of the hoist shall be tested for their
performance.

9.8 Site testing and commissioning

9.8.1 All embedded reception frames and support frames etc, shall be erected and checked for dimensional accuracy and alignment in accordance with the assembly drawing within the required tolerances and level limits before and after concreting.

9.8.2 After site assembly of the gate units within their respective embedded frames, all gates will be checked for roller alignment, seal compression and guide clearances.

9.8.3 The operating equipment will be checked for correct positioning and alignment, and undergo full functional tests over the operation range of the particular gate, checking operating speeds and performance of the mechanical and electrical control systems.

9.8.4 Hoists shall be load tested, all in accordance with standard's requirements, and all hoist and travel motions checked, including brakes, interlocks and safety devices.

9.8.5 All gates shall be dry tested before impounding of water to ensure that there is no clearance between seals and seal seats, all rollers are in contact with roller path, the clearance between guide rollers/ guide shoes and guide is within the prescribed limits and the gate travels smoothly in the groove up and down without excessive sway throughout the travel.

9.8.6 Wet test of all gates and associated equipment after impounding will include checking of seal efficiency and full operational test under maximum design water load.

9.9 Non destructive test

The fabricated gate, embedded parts, hoist components and other load carrying members shall be subjected to the Non destructive tests. General practice followed for NDT is shown in table .

Table : Non Destructive Test

Sl.No.	Item	Test	Percentage
1	Butt welds	Radiography	100%
2	All fillet welds in the gate beam, particle end plate and lifting point	Magnetic particle	100%
3	Other fillet welds	Magnetic particle	100%
4	Root runs of important load bearing joints	Dye-penetrant	100%

9.10 Stress relieving

Welded plates thicker than 28 mm will be stress relived. The procedure for stress relieving shall be as per ASME section VIII Division I/ IS:2825.

9.11 **Erection**

9.11.1 The equipment covered by these specifications shall be furnished and erected by the contractor at the project site. The contractor shall be required to furnish all erection drawings. The contractor shall prepare a complete erection procedure, which shall describe the sequence of operations to be carried out and the method to be used, the measurements to be taken out and the tolerances to be met, in the erection and alignment of the equipment. Such procedure shall have the approval of the EIC prior to the commencement of fabrication and when approved shall form a part of thespecification furnished by the contractor.

9.12 **Erection of Gate**

All the components of the gates, and operating mechanism for gates shall be erected perfectly, giving due cognizance to the unit and match marks on the components. All components shall be designed and assembled to fit snugly and shall be watertight. It is desirable to avoid the flood period perform erection of gates. Should it be necessary to do so, due precaution shall be taken against floods, as the gates may be submerged in water sustaining damages, or the half erected gates may disturb the water flow causing damages to the civil structures.

9.13 **Erection Personnel**

Except for the concreting, skilled as well as unskilled personnel shall be arranged by the contractor for erection of the equipment covered in these specifications.

9.14 **Tools & Tackles**

At the time of tender, the contractor shall submit the list of tool & tackles that he proposed to supply for erection, testing and maintenance of equipments. The contractor shall provide all tools & tackles used in the erection testing and maintenance work.

9.15.1 Special instruction:

a) for Embedded parts:

Embedded parts play an important role in any Gate system. Quality of Gate functioning is largely affected by embedded parts.All the embedded parts for Gates should be made lined with corrosion resistance steel / Stainless steel. The BHN of S.S. for wheel track face shall be 50 points higher than the wheel. Anchor bolts

shall be provided to hold the 2nd stage embedded parts. The anchor bolts shall be with double nuts and washers having suitable length and minimum diameter of 16mm. Contractor shall be required to provide sufficient & skilled manpower along with all necessary T&P in time for fixing of insert plates during 1st stage concrete along with the progress of work of civil counterpart. Contractor are to give due attention and vigilance during concreting work (in both 1st stage and 2nd stage) so as to ensure verticality of pier & designed size of concrete block out. No bulging of concrete into the block out should happen. It will not only facilitate the fitting, fixing of 2nd stage embedded parts successfully but also provide free passage to the gate so as to move up & down freely. No separate claim by contractor shall be entertained in this regard.

b) Staging/ scaffolding:

Suitable temporary support, staging/ scaffolding shall be required for erection of structural steel work, painting work and other similar work as may be cropped up during execution of work so that work shall be safe and accurate. Staging/scaffolding must be strong and rigid stiffened with necessary cross bracers and always decked and boarded on the sills with close boarded veiling and swings to prevent any injury to persons or materials. Cost of such staging/ scaffolding shall deem to have included in the bid by contractor.No separate claim by contractor shall be entertained in this regard.

c) Material testing:

Contractor shall intimate time to time to department regarding the status of raw material procurement. Department shall inspect the material on intimation by the contractor. Department shall also invite any NABL accredited/govt approved laboratory for material testing. Cost of such material testing shall be borne by contractor and same are deemed to have included in their bid.

10.0 INSPECTION, TESTING AND ASSEMBLY AT MANUFACTURING

10.1 General

10.1.1 All material and compounds used for the work shall be new and free from defects and subject to the tolerances specified under this standard.

10.1.2 Compete inspection shall be made at the place of manufacturing prior to dispatch.

10.2 Material

10.2.1 All materials and compounds supplied by the manufacture shall conform to the requirements of the latest relevant Indian standards for the absence of Indian Standard for any particular material or component, other specifications mutually agreed to between the Engineer-in-charge and the contractor many be used.

10.2.2 All materials used shall be of tested quality. Original manufacture's test certificates for or bought-out item such as casting forgings and scales shall be furnished by the gate manufacture to the engineer-in-charge on demand.

10.3 Casting

10.3.1 All castings shall conform to the relevant Indian standards.

10.3.2 Visual examination shall be done to find out the general soundness of the casting and if required nondestructive test shall be conducted on the casting.

10.3.3 Repairs of major defects, incasting by welding shall not generally be allowed, but if the strength and machinability of the casting can be ensured, the repairing may be undertaken with the approval of Engineer-in-charge**.**

10.3.4 Defective casting as permitted under 9.1.2.(c) (iii) shall be heat treated after repairs by welding where deemed essential.

10.4 Forgings

i) All forgings shall conform to the latest relevant Indian standards.

ii) All forgings shall be suitably heat treated according to relevant Indian Standard.

iii) Visual inspection of forgings shall be done and finished surface shall be smooth and free from defects., if
required non destructive test shall be conducted the forging.

10.5 Welding

A) All welding shall conform to the latest relevant Indian standards and approved electrodes shall be used.

B) Welding procedure for all major welds shall be draw up and carried out and if required by the Engineer-in charge, test pieces may be made to ensure the soundness of welding.

C) Only qualified and experienced welders shall be employed for the welding work.

D) Visual inspection shall be carried out of all welded joints to ensure that welding is free from.

i) Cracks on the surfaces of the joints or parent metals located near the heat affected zones.

ii) Undercuts in the parent metals.

iii) Non-uniform with of filet joints

iv) Mis-alignment and distortion of the welded member, and

v) Irregular reinforcing beads of welds.

(D-1) Welds found to be defective shall be subjected to non destructive tests to ensure soundness of welding.

E) Proper sequence of welding shall be following for welding of heavy structural parts in order to minimize distortion.

F) Defective welds after testing shall be removed and re-welded.

G) All major stress carrying welded joints shall be subject to suitable non-destructive testing as specified by Engineer-in-charge.

H) All items or part may be stress relieved according to the requirements and procedure laid down in I.S.2825-1969(code for unfired pressure vessels) Generally following items require stress relieving.

I) Trunnio, girders, anchor, girders and Trunnion brackets where heavy welding is involved and

II) Trunnion hub if part of the arm (structural portion) is welded to the casting.

11.0 MATERIALS FOR THE COMPONENTS OF FIXED WHEEL GATES

Sl. No.	Component Part	Recommended Materials	Standard reference
i)	Structural Parts of gate leaf including skin plate, stiffeners, horizontal girders, diaphragms, track base, seal base, seal seat base, liners, seal clamp, lifting lugs, structural parts of lifting beam, rail	Structural Steel	IS 2062

	guide, sill beam, anchor bolts, load carrying anchors etc.		
ii)	a) Wheels	Cast steel Forged steel	IS 1030 Gr27-54 IS 2004 CL.IV
	b) Self aligning spherical roller be	Standard make SKF or equivalent approved make	———
	c) Wheel pins	Corrosion resistant steel Forged steel	IS:1570(5) Gr.15 Cr.13 IS:2004 with 40 microns hard chromium plating.
	d) Retainers	Structural steel	IS:2062
	e) Sleeves for pin (distant pieces)	Corrosion resistant steel Structural steel Hard chromium plated to 20 microns.	IS:1570(5) Gr.15 Cr.13 IS:2062
iii)	a) Guide roller	Cast steel	IS 1030 Gr.27-54 or Gr.26-52
	b) Guide roller pin	Corrosion resistant steel carbon steel hard chromium plated to 40 microns	IS:1570(5) Gr.15 Cr.13 IS:1570(4) C-40.
	c) Bushing	Bronze	IS: 305 / IS: 318
iv)	Track base/ sill base /side seal base/ guide roller track / bumper track	Structural steel	IS:2062
v)	Rubber Seals	Rubber	IS:11855

vi)	Track	Corrosion resistant steel	IS:1570(5) Gr.20 Cr.13
vii	Seal seats (side, bottom & top)	Stainless Steel	IS1570(5) 04 CR.19Ni9 Or 07 Cr19 Ni9
viii	Seal fasteners	Stainless steels	IS1570(5) 04 CR.19Ni9 Or 07 Cr19 Ni9
ix	Ballast if any	Cast iron	IS : 210

12.0 APPLICABLE BIS STANDARDS STAGE- VERTICAL LIFT GATES.

Applicable BIS Standards

All works shall be carried out according to technical specifications; the Indian Standard Code(s) of practice. Any work not covered in the Indian Standard Code(s) & specification, it shall be carried out as per best practice adopted in this country and /or reference may be made to other appropriate & relevant ASTM, ASME, DIN, JIS or BS according to the direction andsatisfaction of the Engineer-in charge. Here are some relevant BIS references are included but not limited to the following:

A.General

IS 800 (2007): General Construction In Steel - Code of Practice

IS : 816-1992 – Code of practice for use of metal are welding for general instruction in mild steel.

IS : 822-1991 – Code of practice for inspection of welds.

IS 808 (1989): Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections

IS 919-1 (1993): ISO Systems of limits and fits, Part 1: Bases of tolerance, deviations and fits

IS 919-2 (1993): ISO systems of limits and fits, Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts

IS : 1023-1987 – Code of practice for Oxygen- Acetylene welding for structural work in mild steel.

IS 1030 (1998): Carbon steel castings for generalengineering purposes

IS 1200 (Part-8): Methods of measurement of building & civil engineering works (steel work & iron work)

IS 1367-3 (2002): Technical Supply Conditions for Threaded Steel Fasteners, Part 3: Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel - Bolts, Screws and Studs

IS 1570-5 (1985): Schedules for Wrought Steels, Part 5: Stainless and Heat-resisting Steels

IS 1732 (1989): Steel Bars round and square for structural and general engineering purposes

IS 2048 (1983): Parallel Keys and Keyways

IS 2062 (2011): Hot Rolled Medium and High Tensile Structural Steel

IS 2102-1 (1993): General tolerances, Part 1: Tolerances for linear and angular dimensions without individualtolerance indications

IS 2102-2 (1993): General tolerances, Part 2: Geometrical tolerances for features without individual toleranceindications

IS : 2595-1991- Code of practice for radiographic testing.

IS 2629 (1985): Recommended Practice for Hot-Dip Galvanizing of Iron and Steel

B.HYDRAULIC GATES, HOIST, RUBBER SEAL, PAINTING & TRASH RACK

IS 13623 (1993): Criteria for choice of gates and hoists

IS 5620 (1985): Recommendations for Structural Design Criteria for Low Head Slide Gates

IS 9349 (2006): Recommendations for structural design of medium and high head slide gates

IS 11228 (1985): Recommendations for design of screw hoists for hydraulic gates

IS 6938 (2005): Design of rope drum and chain hoists for hydraulic gates - Code of practice

IS 7718 (1991): Recommendations for inspection, testing and maintenance of fixed wheel and slide gates

IS 11855 (2004): Guidelines for Design and Use of Different Types of Rubber Seals for Hydraulic Gates

IS 15466 (2004): Rubber seals for hydraulic gates

IS 14177 (1994): Guidelines for painting system for hydraulic gates and hoists.

GOVERNMENT OF WEST BENGAL
IRRIGATION AND WATERWAYS DIRECTORATE

METROPOLITAN ELECTRICAL DIVISION

DETAILS SCOPE OF WORKS & TECHNICAL SPECIFICATIONS

Name of Project:- Electrical installation work for illumination of Dabu Irrigation Sub-Division compound including re-wiring within Block: Canning-I, P.S: Canning, Dist: 24 Pgs(South).

e-NIT No.-WBIW/EE/MED/e-NIT-01/2025-26 (Sl. No.-03)

YEAR-2025-26

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1.1 Interpretation

In this General Conditions of Contract, unless the context requires otherwise

(i) Words shall have their normal meaning under the language of the Agreement unless specifically denied.

(ii) The title of the Agreement and descriptive headings of Sections are used solely for convenience of reference and are not intended as complete or accurate descriptions of the content thereof and shall not be used to interpret the provisions of this Agreement.

(iii) Any reference to any law shall be deemed to include a reference to such law as is re-enacted, modified or amended from time to time.

(iv) Unless that context otherwise requires, (a) words importing the masculine gender shall also include the feminine gender and vice versa; and (b) the use of the singular shall include the plural and vice-versa.

1.2 Interpreting Specification

In interpreting specification, the following order of decreasing importance shall be followed in case contradictions.

(a) B.O.Q

(b) Technical Specification

(c) Drawing(if any)

(d) Relevant BIS or other international code , in the case of BIS code is not available .

1.3 Documents on Site

The Contractor shall keep on the Site one complete set of the documents forming the Contract, the Construction Documents, other communications given or issued and the documents mentioned in Sub-Clause (Technical Standards and Regulations). The EIC and his Representative and assistants shall have the right to use such documents at all reasonable times.

1.4 Communications

Wherever provision is made for the giving or issue of any notice, instruction, consent, approval, certificate or determination by any person, unless otherwise specified such communication shall be in writing and shall not be unreasonably withheld or delayed.

Wherever provision is made for a communication to be "written" or "in writing", this means any hand-written, type written or printed communication, including the agreed systems of electronic transmission.

All certificates, notices or written orders to be given to the Contractor by the Engineer-in –charge , and all notices to be given to the Engineer-in –charge by the Contractor, shall either be delivered by hand against written acknowledgement of receipt, or be sent by

registered post or one of the agreed systems of electronic transmission to Engineer-in –charge.

1.5 Co- ordination of the Works

The Contractor shall be responsible for the co-ordination and proper execution of the Works. The Contractor shall, as specified elsewhere in the document afford all reasonable opportunities for carrying out their work to:

i. the workmen and Engineer-in –charge or his authorized representatives, and

ii. the workmen of any legally constituted public authorities who may be employed in the execution on or near the Site of any work not included in the Contract, which the Engineer-in –charge may require.

The Contractor shall obtain, co-ordinate and submit to the Engineer-in –charge for his information all details (including details of work to be carried out off the Site) from Subcontractors. The Contractor shall ensure that there is no conflict with the work of other Subcontractors, the Contractor or other Contractors.

The contractor shall coordinate his work and co operate with other agencies by exchange of all technical information like details of foundation, if required , weight , overall dimension , clearance other technical data required for successful and proper completion of work of his portion of work in relation to the works of other contractor without any reservation.

1.6 Extent of Work

The work shall comprise of entire labour including supervision and all materials necessary to make a complete Installation and such tests and adjustments and commissioning, as may be required by the department. The term complete installation shall not only mean major items of the plant and equipments covered by the specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation.

1.7 Contractor's Risks

The Contractor shall be responsible for all risks of loss or damage to physical property and of personal injury and death which arise during and in consequence of its performance of the Contract.

1.8 Correction of Defects

The Engineer-in –charge shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion.

Every time notice of a Defect is given, a Defects Correction Period for the notified Defect begins. The Contractor shall correct the notified Defect within the Defects Correction Period at no cost to the Purchaser. The length of the Defects Correction Period is the length specified by the Engineer-in –charge of his representative's notice.

The Contractor shall correct Defects which he notices himself before the end of the

Defects Liability Period. If the defect or damage is such that it cannot be remedied expeditiously on the Site, the Contractor may, with the consent of Engineer-in –charge, remove from the Site for the purposes of repair any part of the Works which is defective or damaged.

The Contract Period shall be extended by a period equal to the sum of any periods, after the Works are taken-over, during which the Works or any Section or item of Plant cannot be used, for the purposes for which they are intend, by reason of a defect or damage.

1.9 As Built Drawing

The Contractor shall prepare, and keep up-to-date, a complete set of "as-built" records of the execution of the works, showing the exact "as-built" locations, sizes and details of the works as executed with cross references to relevant specifications and data sheets. These records shall be kept on the site and shall be used exclusively for the purposes of this Sub clause. Two copies shall be submitted to the Purchaser prior to the commencement of the test on completion.

In addition, the Contractor shall prepare and submit to the "As-built Drawings" of the works, showing all works as executed. The drawings shall be prepared as the works proceed, and shall be submitted to the Engineer-in –charge for his inspection. The Contractor shall obtain the consent of the Engineer-in –charge as to their size, the referencing system, and other pertinent details.

Prior to the issue of any taking over certificate, the Contractor shall submit the Purchaser six sets of CDs and six printed copies of the relevant "As-built Drawings", and any further Construction Documents specified in the Contract. The Works shall not be considered to be completed for the purposes of taking-over until such documents have been submitted to the Purchaser.

1.10 Security of Site

The Contractor shall be responsible for keeping unauthorized persons off the Site and authorized persons shall be limited to the employees of the Contractor, employees of his subcontractors and persons authorized by the Engineer-in –charge.

1.11 Contractor's personnel

The Contractor shall employ (or cause to be employed) only persons who are careful and appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer-in –charge may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative, who in the opinion of the Engineer-in –charge:

(a) Persists in any misconduct,

(b) is incompetent or negligent in the performance of his duties,

(c) Fails to conform with any provisions of the Contract, or

(d) Persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

1.12 Scope of Work

i. SITC of 8M steel tubular pole with street light fixtures.
ii. SITC of 12.5 Mts High Mast poles with luminaries.
iii. SITC of feeder pilar panel boxes for street light control, High Mast Control & main panel board.
iv. Supplying and laying of under ground cables for power connection
v. SITC of 2 nos Glow Signage boards
vi. Complete wiring including S7F of luminaries, fan etc at Rest shed.
vii. Bidder shall submit an undertaking to engage workman having valid electrical license and work plan permit of appropriate voltage in its name issued by the State Government concerned under Section 45 of the Indian Electricity Rules, 1956 s amended from time to time, for execution of work which requires such a license. Such associate agency shall keep valid electrical license throughout the period of execution of work by getting it renewed at suitable intervals. In the event of any default on the part of the contractor in this regard, he/she is liable to be debarred.

2.0 GENERAL COMMERCIAL/ TECHNICAL

2.1 Related Documents : Each work has its own particular requirements. Therefore, in addition to the General Specifications, governing BIS, CEA regulations, Standard Contract Conditions etc. there would be necessity of additional conditions/ specifications for a particular work. In case of any discrepancy such additional conditions/ specifications will override these General Specifications.

2.2 Terminology :

2.2.1 : The definition of terms shall be in accordance with IS 732: 2019 (Indian Standard Code of Practice for Electrical Wiring), except for the definitions of point, circuit, and sub main wiring, which are defined in this specification. Some of the commonly used terms are indicated in Chapter 17- Appendix A.

2.2.2 : The conventional signs and symbols for technical work shall be as shown in Chapter 17-Appendix B.

2.3 Rates : The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes, GST (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to the supplied by the contractor, watch and ward of all materials (including those, if any, supplied by the department) for the work at site etc.

2.4 Taxes and Duties :

2.4.1 Being an indivisible works contract, GST or any other taxes or duties etc. are not payable separately.

2.4.2 The GST/works contract tax shall be deducted from the bills of the contractor as applicable in the State in which the work is carried out, at the time of payments.

2.5 Works to be done by the Contractor :

2.5.1 Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost:

2.5.2 Foundations for equipment and components where required, including foundation bolts.

2.5.3 Cutting and making good all damages caused during installation and restoring the same to their original finish.

2.5.6 Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.

2.5.7 Painting at site of all exposed metal surfaces of the installation other than pre-painted items like fittings, fans, switchgear/ distribution gear items, cubicle switchboard etc. Damages to finished GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS INTERNAL 3 surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-charge.

2.5.8 Testing and commissioning of complete installation.

2.5.9 The openings/sleeves for the cables, Conduits, Pipes, ducts, rising mains etc. shall be marked in the drawing and provided during construction. No core cutting / openings in walls shall be allowed one the slab is cast or wall is constructed.

2.6 Power Supply:

1. Unless otherwise specified, 3 phase, 415 Volts, 50 Hz power supply shall be provided by the department free of charge to the contractor at one point. Termination switchgear however, shall be provided by the contractor. Further extension if required shall be done by the contractor and nothing extra shall be paid on this account.
2. Unless otherwise specified in the contract, further power distribution to the various equipment shall be done by the contractor.
3. Where the power supply has to be arranged by the Department at more than one point as per the terms of the contract, the termination of all such power feeders in the incomer of respective control panels (provided by the contactor) shall be the responsibility of the contractor.
4. The contractor shall not use the power supply for any other purpose than that for which it is intended for. No major fabrication work shall be done at site. The power supply shall be disconnected in case of such default and the contractor shall then have to arrange the required power supply at his cost.
5. Contractor may have to install their DG Set for construction activity. The department do not guarantee for continuous power supply for the work to be carried out.

2.7 Co-ordination with Other Agencies : The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in the work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

2.8 Work in Occupied Buildings:

When work is executed in occupied buildings, there would be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-

charge and the occupying department. If so required, the work may have to be done even before and after office hours.

2.9 Drawings:

1. The work shall be carried out in accordance with the drawings enclosed with the tender documents and also in accordance with modification thereto from time to time as approved by the Engineer-in-charge.
2. All wiring diagrams shall be deemed to be 'Drawings' within the meaning of the term as used in Clause 11 of the Conditions of Contract (PWD 7 or PWD 8). They shall indicate the main switch board, the distribution boards (with circuit numbers controlled by them), the runs of various mains and sub-mains and the position of all points with their controls.
3. All circuits shall be indicated and numbered in the wiring diagram and the points shall be given the same number as the circuit to which they are electrically connected.

- **Submission of drawings and compliance sheet:**
  The contractor shall submit the drawings and compliance sheet to the Engineer-in-charge for approval before start of work.
- **Conformity to The Electricity Act 2003:**
  Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations 2023.

2.10 SUBMISSION OF PROGRAMME :

As per the time stipulated in the NIT from the date of receipt of the letter of acceptance, the successful tender shall submit a program indicating submission of drawings, supply of equipment, installation, testing, commissioning and handing over of the installation to the Engineer-in-Charge. This program shall be framed keeping in view the milestones stipulated in the contract.

- **QUALITY OF MATERIALS :**All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site. None of the material/ items/ equipment etc supplied shall be more than six months old from date of supply at site. Copy of GST Gate Pass/ Invoice/ Shipment / Custom Clearance certificate/ details (in case of imported equipment) shall be submitted to prove the date of manufacture & genuineness of the equipment/ machines supplied.
- **Inspection of Materials and Equipment:** Materials and equipment to be used in the work shall be inspected by the Departmental officers. Such inspection will be of following categories.
  - **I.** Inspection of materials/ equipment to be witnessed at the manufacturer's premises in accordance with relevant standards of BIS/ Agreement Inspection Procedure.
  - **II.** To receive materials at site with Manufacturer's Test Certificate(s).
  - **III.** To inspect materials at the Authorized Dealer's Go downs to ensure delivery of genuine materials at site.
  - **IV.** To receive materials after physical inspection at site.

V. The Departmental officers will take adequate care to ensure that only tested and genuine materials of proper quality are used in work.

VI. Similarly, for fabricated equipment, the contractor will first submit dimensional detailed drawings for approval before fabrication is taken up in the factory. Suitable stage inspection at factory also will be made to ensure proper use of materials, workmanship and quality control.

VII. The tender specifications will stipulate the inspection requirements or their waiver for various materials/ equipment including norms of inspection in specific cases.

- **Ratings of Components:**

I. All components in a wiring installation shall be of appropriate ratings of voltage, current, an/d frequency, as required at the respective sections of the electrical installation in which they are used.

II. All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current, which will normally flow through them, without their respective ratings being exceeded and compliant to related to Indian Standards (BIS).

- **Conformity to Standards:**

I. All components shall conform to relevant Indian Standard Specifications, wherever existing. Materials with ISI certification mark shall be preferred.

II. A broad list of relevant Indian Standards is given in Chapter 17 - Appendix D. These Indian Standards, including amendments or revisions thereof up to the date of tender acceptance, shall be applicable in the respective contracts.

- **Interchangeability:**

Similar parts of all switches, lamp holders, distribution fuse boards, switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

2.11 Workmanship :

i) Good workmanship is an essential requirement to be complied with. The entire work of manufacture/ fabrication, assembly and installation shall conform to sound engineering practice.

ii) Proper Supervision/Skilled Workmen The contractor shall be a licensed electrical contractor of appropriate class suitable for execution of the electrical work. He shall engage suitably skilled/licensed workmen of various categories for execution of work supervised by supervisors / Engineer of appropriate qualification and experience to ensure proper execution of work. They will carry out instructions of Engineer-in-charge and other senior officers of the Department during the progress of work.

iii) Use of Quality Materials Only quality materials of reputed make as specified in the tender will be used in work.

iv) Fabrication in Reputed Workshop Switch boards and LT panels shall be fabricated in a factory/ workshop having modern facilities like quality fabrication, seven tank process, powder/epoxy paint plant, proper testing facilities, manned by qualified technical personnel. The tender shall specify some quality makes of fabricators with modern facilities of design, fabrication and testing capable of delivering high quality LT panels and switch boards after testing as per relevant specifications and having proper certification for the related type tests as applicable.

v) Testing All tests prescribed in these General Specifications, to be done before, during and after installation, shall be carried out, and the test results shall be submitted to the Engineer-in-charge in prescribed Performa, forming part of the Completion Certificate.

vi) Commissioning on Completion After the work is completed, it shall be ensured that the installation is tested and commissioned. GENERAL SPECIFICATIONS FOR ELECTRICAL WORKS INTERNAL

vii) Completion Plan and Completion Certificate

viii) For all works completion certificate after completion of work as given in Chapter 17 -Appendix E shall be submitted to the Engineer-in-charge. The proformas as enclosed shall also be referred to for the check list, related necessary action and the testing as applicable.

ix) Completion plan drawn to a suitable scale indicating the following, along with three print copies of the same shall also be submitted along with related soft copy in pen-drive and/ or CD.

(a) General layout of the building.

(b) Locations of main switchboard and distribution boards, indicating the circuit numbers controlled by them. (c) Position of all points and their controls.

(d) Types of fittings, viz LED, pendants, brackets, bulk head, fans and exhaust fans etc.

(e) Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division, and name of the firm who executed the work with their signature.

2.12 WARRANTY:

Comprehensively all the goods supplied under the contract shall be new, unused and incorporate all recent improvements in design and materials unless prescribed otherwise in the contract. The supplier further warrants that the goods supplied under the contract shall have no defect arising from design, materials (except when the design adopted and/or the material used are as per the Purchaser's/Consignee's specifications) or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under the conditions prevailing in India. The warranty shall include all spares, labour and preventive maintenance from the date of completion of the satisfactory installation and acceptance till warranty period. The Comprehensive Annual Maintenance Contract, wherever applicable, shall include all spares, labour and preventive maintenance from the date of completion of the satisfactory installation and acceptance till warranty period.

The Bidders' confirmation to the required warranty as per standard formats given in Tender Documents. This is necessary to ensure a quotation from a responsible party offering a genuine product backed by a warranty obligation from the concerned manufacturer.

3 : LT PANEL AT PANEL ROOM

3.1 Scope

This specification covers the requirements of design, manufacture, supply testing erection and commissioning of extensible, multi-tier, multi-panel cubicle type double or single front construction switch board as per requirement and to be installed in the substation LT room and pump house.

The LT supply shall be received by the L.T switch board at the incoming point either from the Transformer secondary independently for feeding the loads of the substation of the pumping stations.

3.2 Ambient Conditions

The Switchboard shall be suitable for continuous operation at rated load for maximum ambient temperature of 500 C and maximum relative humidity of 100%, the maximum temperature and humidity, however, not occurring simultaneously.

3.3 Standards & Codes

All switch-gear and other equipment incorporated in the switch board shall comply with,but not be limited to the following :

I.S 13947 (IEC 60947) : Air Circuit Breaker

I.S 13947 (IEC 60947) :Moulded Case Circuit Breaker

I.S 13947 (IEC 60947) : Fuse Switch Units, contactors etc.

I.S 13947 (IEC 60947) : Metal enclosed switchgear

I.S 2705 : Current Transformers

I.S 1248 &2419 : Indicating Instruments

I.S 3231 : Protective Relays

I.S 375 : Busbar Markings

I.S 1554 : Cables

3.4 Operational requirements

The LT switchboard shall be extensible type and suitable for coupling for future extension of switch boards through the busbars on either side.

3.5 Equipment Details

General

LT switchboard shall be floor mounting, vertical fully compartmentalized front operated free standing with jig set pressed and formed sheet steel cubicle having tiered compartments. The switch board shall be extensible on either sides with double door front arrangement as per requirement with two sides access. The thickness of sheet steel of the enclosures shall be not less than 2.0 mm for outside walls and the partition walls.

The compartments housing Incomer and outgoing MCCBs, change over switches, with indicating instruments and protection equipment (as necessary), and front operated either MCCB units with components mounted on chassis plate having incoming and outgoing power and control terminals in the cable compartment.

All Panel doors shall be interlocked with corresponding switches enclosed and all live parts shall be fully shrouded. All cable termination points shall have insulating/ metal shields to prevent accidental contacts during maintenance and inspection of cable alleys. All terminals shall be busbar type suitable to connect the required number and size of cables considered. Feeder compartments and cable compartment shall be provided with hinged door with screw knob arrangement whereas the bas bar compartment shall be provided with bolted type arrangement. Truck for racking out Air Circuit Breaker shall be provided.

All technical requirements of different circuits of switchboard are furnished in the schematic electrical single line diagram and schedule of items attached. The switch board shall comprise of all component units of reputed makes. Only one make (as mentioned in the BOQ) for ACB/MCCB shall be used.

3.6 *Panel board Construction*

The panel board shall be constructed from 14 SWG (2 mm thick). M.S Sheets with integral angle iron frame work as required. The panel board shall be provided with mounting channels (size ISMC 100 x 50 mm) at bottom, covered by skirting. Foundation bolt hole shall have easy accessibility.

Each section of the vertical panel shall comprise of one busbar chamber / compartment, one feeder equipment compartment and one cable chamber/compartment. Each chamber shall be fully segregated with 1.6 mm thick sheet steel all round.

All cables shall enter from bottom having drilled gland plates for fixing compression type cable gland and routed through a cable alley.

The hinged doors, as well as other detachable covers shall be provided with heat resistant type neoprene rubber gaskets. The panel board shall have IP 54 degree of protection.

The panel board shall have an Earth Bus running the entire length of panel board and shall have provision of extending the same on either side in future. The earth bus section shall be not less than 50 x 6 mm tinned copper with green colour identification.

The incoming MCCB (LT) shall have proper termination arrangement for connection of requisite nos. of 3.5 core or appropriate numbers of single core (AL) PVC armoured cable from bottom or top or bus duct at the top as per requirement.

The switch board shall be finished with powder coated paints (Siemens-Grey) after proper surface treatment by 7 tank process of cleaning. Panel board shall be touched up after installation and commissioning at site as necessary.

Name plate, inscription plates and labels etc shall be on laminated white phylum plates of 3 mm thick and 12 mm high black engraved lettering to be screwed on the front door panel of all the feeder compartment as well as on the main panel. The panel markings shall be provided on the top with 100 mm laminated phylum plate and 75 mm letter size. Each side and openable back cover of cable and bus bar chamber doors shall be provided with appropriate type of danger board.

Active Component Details
The active components to be housed in the switchboard shall be as follows:

3.7 ***Busbars and Connections:***

The busbars shall be extensible type of hard drawn high conductivity electrolytic grade tinned copper as specified with complete PVC sleeving except at the joints. Three busbars for phases and one busbar for neutral of adequate capacity shall be provided for each set.

Dimensions of copper bar as mentioned in the BOQ for copper bus bar shall be considered. Mounting insulators shall be of DMC, SMC or equivalent type. The bus bar supports shall be placed not more than 450 mm apart. (Technical data sheet of the insulation support shall be furnished by vendor). Minimum clearance between phase bars shall be 32 mm and between phase and earth shall be 25 mm. The busbars shall be properly insulated and colour coded. The construction of the panel board shall be robust enough to withstand system fault of minimum 35 MVA.

Moulded case Circuit Breaker(MCCB):

The Moulded Case Circuit Breakers (MCCB) shall be used in the L.T switch board/Power Control Centre/Motor Control Centre wherever specified. These shall be having rupturing capacity not less than 50 KA at 415 V unless stated otherwise (CPRI tested). The MCCBs shall be either TP & N or 4 poles as specified in the tender schedule.

The MCCBs shall be provided with built in solid state adjustable type over current and earth fault releases with current setting range 70-100% for over current elements and 20-80% for earth fault with time delay setting element for the above.

The MCCBs shall be panel mounting type and shall be provided with operating handle fixed with the door frame for operation of the MCCB from the front of the panel with the

cubicle door in closed position. The MCCB operating handle shall be door interlocking type with defeat mechanism and padlocking facility.

The MCCBs shall be provided with 2 NO + 2 NC auxiliary 240 V, 10A, AC change over contacts for control and indication purposes. Shunt trip or under voltage releases shall be also fitted and supplied with the MCCB as per requirement.

All the feeders specified with MCCBs shall be provided with ON/OFF indication lamps in front of the compartment door with suitable HRC type protective fuses wherever specified.

3.8 *Ammeters*

Ammeters shall be analog type and of reputed make, 96 mm sq. dial, 1.0 class accuracy. All ammeters shall be 5 Amps CT operated unless specified otherwise and ammeter (3 nos.) shall be provided. Each Ammeter shall be provided with ammeter selector switch.

3.9 Current Transformer

The current transformer shall be as follows :

i) Metering of specified rating and adequate VA burden accuracy class 1.0

ii) Protection CT of adequate VA burden and accuracy class 5P10 or compatible with various protective relays as specified.

3.10 Voltmeters

Voltmeters shall be analog type and of reputed make, 0-500V AC. 96 mm sq dial. 1.0 class accuracy. Separate MCBs shall be provided for voltmeter and phase indication lamps, wherever specified. Each voltmeter shall be provided with voltmeter selector switch.

Voltmeter/ Ammeter Selector Switches

These shall be of reputed make standard instrument switches permitting measurement of all the three line & phase voltages as necessary with an off position.

3.11 Wiring

Internal wiring for fixed and draw-out chassis - mounted active parts of all panels, shall be carried out as follows :

a) Minimum conductor section for control wiring shall be of 4.0 sq. mm copper.

b) Control wiring shall be multi-strand flexible type. 1.1 KV grade PVC insulated and PVC sheathed.

c) Conductor insulation shall be 1.1 KV grade PVC.

d) All cable ends shall be sleeved, ferruled and terminated at external terminal box with crimped sockets.

All feeder Panels shall be provided with identification labels having 12 mm high black engraved lettering on 3 mm thick white laminate materials.

3.12 Earth Busbar

An earth bus of minimum size of 50 x 6 mm tinned copper with PVC sleevings shall be provided all along the length of the switch board. This shall be extensible on either side.
The earth bus of the panel board shall be suitable for connection with earth conductor at the place of installation at two points from the two sides of switchboard.
All metal stationary items of the panels shall be directly connected with the Earth Bus.

Cable compartments
Fully segregated cable compartment of adequate size shall be provided in the panels for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate and proper supports shall be provided in cable compartments to support cables. All incoming and outgoing terminals shall be brought out to terminal blocks in the cable compartment.
Tests
The switch boards shall be accepted on the basis of routine and type / performance tests conducted as per latest issue of ISS/IES at manufacturer's premises, complete test reports shall be submitted to the Employer/Employer's representative before despatch of the switchboard.

3.13 Painting

All sheet metal parts (both inside and outside) of the switch board shall be given anticorrosive treatment by seven tank process and powder coated finish of approved shade unless specified otherwise.

Guarantee

The panel board and all components shall be guaranteed for 18 months from the date of despatch or 12 calendar months from the date of commissioning and handing over whichever is later against defective design material and/or workmanship. The bidder shall be responsible for complete operation and routine as well as breakdown maintenance of the board including supply of all spares and consumables (except HRC fuses and lamps) during 1 year defect liability period. The cost of the same shall be included in the offer. No extra amount will be paid on this account.

4.0 EARTHING SYSTEM

4.1 SCOPE

4.2 This section covers the general requirements of the earthing system for Panel Board and buildings

4.3 SYSTEMS

Earthing system shall comprise earth electrodes in accordance with these specifications .

4.3 ELECTRODES

The earth electrodes shall be as per specification in the B.O.Q.

4.4 LOCATION OF EARTH ELECTRODES

Normally an earth electrode shall not be situated less than 1.5 m from any building/ Panel. Care shall be taken that the excavation of earth electrode may not affect the column footings or foundation of the building/ High mast. In such cases electrodes may be farther away from the building. Location of the electrode earth will be a place where the soil has reasonable chance of remaining moist. As far as possible, entrances, pavements and road ways, are to be definitely avoided for locating the earth electrode.

4.5 WATERING ARRANGEMENT

Method of watering arrangement shall comply with as per standard practice in industry.

4.6 INSTALLATION

All joints shall be riveted and sweated. Joints in the earth bar shall be bolted and the joints faces tinned. Where the diameter of the bolt for connecting earth bar to apparatus exceeds one quarter of the width of the earth bar, the connection to the bolt shall be made with a wider piece of flange of copper jointed to earth bar. These shall be tinned at the point of connection to equipment and special care taken to ensure permanent low resistance contact to iron or steel. All steel bolts, nuts, washers etc. shall be cadmium plated, main earth bars shall be spaced sufficiently on the surface to which they are fixed such as walls or the side trenches to allow for ease of connections. Copper earthing shall not be fixed by ferrous fittings. The earthing shall suitably be protected from mechanical injury by galvanized pipe wherever it passes through wall and floor. The portion within ground shall be buried at least 60 cm deep. The earthing lead shall be securely bolted and soldered to plate or pipe as the case may be. In the case of plate earthing the lead shall be connected by means of a cable socket with two bolts and nuts. All washers shall be of the same materials as the plate or pipe. All iron bolts, nuts and washers shall be galvanized.

4.7 TESTING

After installation, the tests as specified in relevant IS code shall be carried out and results recorded.

4.8 SPECIFICATION FORELECTRICAL WIRING

4.9 General Requirements

This specification covers the requirements of wiring in pump house and sub stations for lighting and power point installation work. The lighting installation shall be designed conforming to IS : 3646 and in accordance with the guide lines given in the National Electrical code (EC) and other similar standards.

4.10 Wires & Cables

All wires and cables to be used in electrical wiring shall have ISI marking on it. If the suppliers indicate that ISI marking on wires/cables is not possible because of manufacturing process, the cables/wires shall be accepted with the submission of

test certificate and copy of licence issued by B.I.S. to the manufacturers (Finolex/Havells)

4.11 Conduits

The conduits to be used in wiring shall conform to I.S 9537 (Part-II)-1981 or latest in all respects. The contractors using the particular brand of conduit shall furnish test certificate from N.T.H or any Government Approved Laboratory with each quantity of supply along with supply of conduits.

4.12 Materials

All materials, fittings, appliances, used in electrical installations, shall conform to Indian Standard Specifications wherever these exist. Only approved make of PWD schedule materials shall be used. Materials not included in the list shall be got approved by the Employer / Employer's representative prior to actual use

4 .13 Main Switch Gear

Iron clad switch fuse and isolator units should conform to IS: 13947 & IEC 60947. The quick make and break mechanism shall be self-interlocked with the cover. In "Off" position there must be two breaks per pole.

Main switch gear shall be properly earthed with two numbers conductors if M.V and one number of

L.V.

4.14 Busbar Chamber (B.B.C)

This shall be totally enclosed, metal clad type fabricated from rust proof l6 SWG sheet steel on angle iron frame and provided with sheet steel or cast iron detachable front cover and undrilled detachable end plates, suitable for mounting on wall or angle iron floor stand and painted with high quality enamel paint. G.I. bolts and nuts shall beused for assembly with suitable packing materials to ensure dust proof finish. Meters shall be provided on suitable sheet steel boxes. Switch shall be provided with cable end boxes as required.

The depth of B.B.C. shall be l50 mm (minimum). Minimum clearance of phase bars to earth shall be 25 mm and between bus bars shall be minimum 32 mm.

Copper bus bars conforming to relevant I.S. specification and shall not be more than the current density of 1000 Amps per sq.in./1.5 Amp. Sq.mm.

The cross section of the neutral busbar shall be the same as that of the phase bus bar of capacity upto 200A and for higher capacity neutral busbars are to be rated to carry 60% of phase current. These shall be carried on glazed porcelain/DMC/SMC supports of proper dielectric and mechanical strength and

shall be appropriately colour coded for identification of Phases, Neutral & Earth as per relevant IS Code.

Lettering shall be done for identification of switches as directed. The contractor shall submit fully dimensioned drawing of the board with the physical disposition of the switches and other components to the Employer's representative for their approval before the same is fabricated.

There shall be two nos. of Earth Terminals. Suitable Danger Board shall be provided.

4.15 Interconnection B.B.C, Switch Fuse, Meters, Etc

For ratings above 100 Amps these shall consist of insulated copper strips as per specification of adequate section. For rating below 100 Amps PVC copper cable tails of appropriate size, terminating in tinned copper sockets may be used. The above are to be enclosed either in sheet metal trunking or conduits so that no part is exposed.

4.16 Distribution Boards

These totally enclosed metal clad type Distribution Boards with hinged lids shall be in accordance with I.S. 2147 - 1952 and 2675 - l966 and shall be welded/boltedconstruction and fabricated from rust proof sheet steel and finished with anticorrosivepowder coated paint and have provision for fixing on wall with earthing /terminals as per IS code.

Power Distribution Boards (400 volts TPN) shall be constructed from l6 SWG sheet steel and Branch Distribution Boards (230 volts SPN from l8 SWG sheet steel).

The minimum ratings of phase and neutral bus bars shall be 67% (approx) of the total rating of fuse ways. Above 32 Amps Neutral Bus bars may be half the size of the Phase Bus bars.

The fuses shall be mounted on glazed porcelain DMC/SMC supports of proper dielectric& mechanical strength. TPN units should have phase separation barriers between fuse banks.

Cables shall be connected to a terminal by crimped lugs.

Where two or more B.D.B's feeding low voltage circuits are fed from different phases of a medium voltage supply, these B.D.B's shall be installed at least two meters apart.

All three phases power distribution boards shall be properly earthed with two number l0 S.W.G galvanized iron wires and provided with suitable Danger Board. All SPN B.D.B's shall be properly earthed with one number l0 SWG galvanized iron wire each unless otherwise specified.

4.17 Switches

All switches for lights, fans and plug points shall be either piano key type switches in sheet steel switch board, unless specified otherwise.

4.18 Cables and Conductors

All cables shall conform to relevant Indian Standard. Conductors of all cables except for flexible cables, shall be of aluminium, unless specified otherwise.

4.19 Flexible Cables

Conductors of flexible cables shall be of copper. The minimum size of core acceptable is 0.50 sq. mm (14/0.193 mm). The maximum weight to which the following twin flexible cords may be subjected are as follows:-

Twin 16/0.20 mm : 3.3 lbs (1.5 kgs.)

Twin 23/0.0076 inch : 5.0 lbs (2.3 kgs.)

4.20 Installation of Main Switch Board, BDB's Mains, Sub mains, Distribution

Wiring to Individual Points

The exact positions of all main switch board, BDB's and all runs of mains and submains, and distribution wirings to individual points including the exact position of all light fittings and switch boards shall be first marked on the buildings and shall be approved by the Employer / Employer's representative before actual commencement of the work. The D.Bs shall generally be installed at a height of 2.13 m (7 ft) from floor level.

4.21 Installation of Switch Boards

These shall be installed at a height of 1.5 mtrs (5'-0") and above the floor level.

4.22 Installation of Ceiling Fans

Unless otherwise specified all ceiling fans shall be hung not less than 2.75 M (9 ft) above floor. The suspension and clamp shall be painted with approved paint without involving extra cost.

4.23 Installation of HPSV and Fluorescent Light Fittings

HPSV type light fittings shall be used for pump house indoor and outdoor lighting with suitable suspension arrangement for indoor lights and pipe brackets for outdoor lights. and fluorescent light fittings shall be used for low height areas. The fluorescent light fittings are either suspended from ceiling or mounted directly on wall. The fittings are suspended from ceiling by two down rods, or fixed to ceiling/beam wall directly, shall be made with Mechanical/Metal fasteners. Electrical drill only shall be used while making holes for the fasteners which shall

be capable of sustaining at least 10 kg of dead weight for fluorescent fittings and 25 kg for HPSV lighting fittings.

The down rods and accessories shall be painted with approved paint without involving extra cost.

Unless otherwise specified these should be suspended 2.60 M (8'-6") above the floor.

4.24 Installation Of Exhaust Fans

Exhaust Fans shall be fitted by means of rag bolts embedded in the wall. The required holes in the wall shall be made and finished neatly with cement plaster and brought to the original finish of the wall

4.25 Installation of Socket Outlet

No socket outlet shall be provided in the bath room at the height less than l30 cms (4'-3") from the floor.No switches shall be provided inside the bath rooms.

Socket outlet at locations other than bath rooms shall be either 25 cms (l0") or 1.5 mtrs(5'-0") from the floor as per requirement. All switch sockets out lets shall be provided with one 6A or 16A controlling switch.

4.26 Testing of Installation

Before a completed installation or an addition to an existing installation is put into service, the following tests shall be carried out by the contractor in presence of the Employer / Employer's representative.

a) Polarity of Switches

It must be ensured by test that all single pole switches have been fitted on the live side of the circuits they control.

b) Insulation Test

i) By applying a 500 volt megger between earth and the whole system of conductors or any section thereof, with all fuses in place and all switches closed, all lamps in position or both poles of installation otherwise electrically connected together:- The result in meg ohm shall not be less than 50 divided by the number of points on the circuit, and should not be less than 1 meg-ohm.

ii) Between all conductors connected to one phase and all such conductors connected to the neutral or to the other phase conductors of the supply after removing all metallic connections between the two poles of the installation and switching on all switches. The insulation resistance shall be as in (i) above.

c) Earth Continuity Test

The earth continuity conductor including metal conduits and metal sheaths of cables in all cases shall be tested for electrical continuity. Electrical resistance of the above along with the earthing lead but excluding any resistance of earth leakage circuit breaker, measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

d) Earth Resistance Test

To ensure effectiveness of installation earth, the value of earth resistance shall be within 5 ohm for installation capacity upto 5 KW and one ohm for installation of higher capacity for 415 / 240 V AC supply system. The 11 KV and 6.6 KV supply system shall have minimum value of earth resistance not more than one ohm for individual earth stations and the equivalent (combined) earth resistance shall not be more than 0.50 ohms. The total number of earth stations shall be calculated on the basis of actual value of soil resistively measured at site to obtain the above equivalent earth resistance.

The completed work will be taken over only if the results obtained in above tests are within the limits mentioned above, and in accordance with I.E. Rules.

On completion of the installation work, a certificate shall be furnished by the contractor holding valid Electrical contractor licence, countersigned by the supervisor under whose direct supervision the installation was carried out. The supervisor counter signing the test result shall have valid supervisory licence from the Authority. This certificate shall be in a prescribed form as required by the local Electric Supply Authority. The installation shall not be considered as complete unless the installation is got inspected and passed by the Electrical Inspector, Directorate of Electricity.

The contractor shall have to take all initiatives and follow up the matter at his own cost for early approval of the installation for permanent energisation of the installation from the Directorate of Electrical Safety, Local supply Authority No extra amount will be paid on this account.

4.27 Special Specifications

a) Illumination level for the pump house indoor areas shall be designed on the basis of IS : 3646 with average minimum illumination level of 250 lux within the pump house. The outdoor areas shall be provided with an average illumination level of I5 – 20 lux

b) Before fixing all switches, fittings etc. should be produced before Employer / Employer's representative and get approved.

c) All metal switch boards and switch/regulator boxes to be used in work shall be painted with two coats of anti-rust primer (red lead paint) prior to erection. After

erection they shall be again painted with two coats of enamel paint of approved quality.

d) Before execution of any portion of conduit work for wiring a neat proper layout should be made out by the contractor and got approved from the Employer /Employer's representative. For this purpose contractor is advised to get acquainted with the layout drawings of the Employer's representative.

e) While laying the conduits for concealed wiring in the ceiling or in the beams &columns and before casting the contractor must ensure that all the inlets and both ends of the conduits are plugged by means of dead end socket so that no foreign matter can enter the conduits and choke them.

f) Damage to any fitting during erection and before handing over the installation by contractor shall be set right or replaced by the contractor at his own cost.

g) Caution Board of proper size wherever required, shall be provided, as per I.E.E. regulations for which no extra payment will be admissible.

h) Any damages made on wall shall be repaired and should match with the surrounding surface otherwise same will be got done through Building Contractor at the cost of the Electrical Contractor and the cost thereof shall be recovered from their dues.

i) Earthing Installation shall be done in the presence of Employer's representative.

j) The installations should not be energized without adequate earthing.

k) The I.C. switches and Distribution Boards shall be provided with neat lettering in block letters with paint for identification of the I.C. switches and for the points connected to each fuse way of the D.B's for which no extra payment will be admissible.

4.28 Completion Drawings

The contractor shall be required to submit along with Final bill; the under-noted drawings on CD, along with three copies of Ammonia print each.

1. Plan (as per site layout drawing) of each floor (not less than 1 : 100 metric scale) showing :-

i) Location of Main Switch Board, Distribution boards (with the circuit numbers controlled by them).

ii) The runs of mains and sub mains.

iii) Location of lights, fans, wall brackets/ fittings and, other power consuming devices together with type of fittings and

fixtures including circuit numbers.

iv) Position of Lightning Conductors and route of running conductor.

v) Position of Earthing Stations for light and power and Lightning Conductor Installation.

2. Schematic lines layout diagram of each floor showing (i) Layout and connections of Main and Sub-board, B.D.B. having descriptions of the size, capacity, type and their numbers, the system and the source of supply, (ii) Location, Size, Type, length of main and sub main cables (iii) Loading of each B.D.B. indication of phases,

Departmental mark on each B.D.B and switchgear.

The drawings shall be very neatly drawn and submitted properly without folding them.

4. Cable route should be marked on site plan with measurements from permanent structures.

5.0 Conduit Wiring System

5.1 Type and Size of Conduit

All conduit pipe shall be heavy duty M.S conduit conforming to IS: 9537 wall thickness not less than 14 SWG thickness conforming relevant IS in all respects. The conduits are to be free from burrs and internal roughness. No conduits less than 20 mm in dia shall be used, unless specified.

5.2 Accessories

Only good quality approved accessories are to be used when necessary. All metal accessories shall be painted and the bare thread portion is to be painted with anti-corrosive preservative.

5.3. Fixing of Conduits

Conduit pipes shall be fixed by heavy gauge saddles metal bars, secured to wall/ceiling by screws driven into wood plugs at an interval of not more than 76 cm apart for vertical run and 50 cm apart for horizontal run; buton other side of couplers or bend of similar fittings-saddle shall be fixed at a distance of30 cm from the centre of such fittings. The minimum thickness for saddles shall be 24 SWG, for conduits upto 25 mm dia and 20 SWG for larger sizes.

5.4 Outlets

All outlets for fittings, switches etc. shall be fixed on boxes of suitable metal for either surface mounting system or flush mounting system. In case of cast iron boxes the wall thickness shall be at least 3 mm and in case of welded mild steel sheet box the wall thickness shall not be less than 16 gauge. Except where

otherwise stated 3 mm thick insulated laminated sheets shall be fixed on the front with screws.

Where conduits are terminated special care shall be taken for securely fixing conduits to outlets so as to any possibility of damages to cables / wires when drawn.

5.5 Cables to be Used

Unless stated otherwise only single core PVC insulated cables of approved manufactures shall be used for wiring in conduit system. The number of single core cables drawn in one conduit shall not be greater than maximum set out in Table II of Indian Standard (I.S. 732-1963) Code of Practice (revised) for electrical wiring installation(system voltage not exceeding 650 volts).

5.6 Looping-In-System

Distribution wiring in conduit to light, points etc. shall be done in looping system. In this system no joints or connections shall be made anywhere of the system except at terminating points such as at terminals of switches, ceiling roses, etc.

5.7 Earthing Continuity Wires

For conduits and accessories for distribution wiring should be provided with earthing attachment by number 14 SWG G.I. wire, unless specified otherwise.

For looping earthing G.I.wire shall be run on conduits being fixed with saddles. This wire shall not be normally visible after installation when run with the conduit. Where the wire has to be taken without the conduits this will be fixed with 'U' nails at 2' feet intervals.

5.8 Painting

Conduit and all conduit fittings and accessories shall be painted with two coats matt paint. Painting of conduits shall be done to harmonize with colour bearing surface, i.e. wall, joists, trusses etc. after installation and as approved by the Employer / Employer's representative.

5.9 Cable Installations

5.9.1 General

All PVC / XLPE insulated and unarmoured / armouredcables to be used shall conform to I.S. 1554 part I 1964 and of 1100 volt grade. Old and used cables must not be used for installation. Only one make of cable shall be used. All cables brought to site must be tested and got approved by the Employer / Employer's representative before these can be laid. The cables shall be despatched to site on wooden drums with ends sealed. Exact lengths shall be determined by the Contractor after measurement at site

5.9.2 Laying of Cables

a) Direct in Ground

Trenches shall be 750 mm deep (minimum) for LT Cables and 0.915 M (3'-0") deep minimum) for HT Cables from ground level and trenching work shall include all pumping and bailing out water. These trenches shall be wide enough to accommodate all the cables with brick separations as per the requirements specified in the relevant I.S.

When more than one multi core cable is to be laid in the same trench, a minimum horizontal inter axial spacing between cables will be as per relevant I.S.

After excavation of the trench of proper size, the bottom of the trench shall be dressed and levelled and filled with a 75 mm layer of fine sand. The cable shall then be laid with bricks on both sides of the cable continuously. After having the space within the bricks, filled and packed upto a level of 75 mm (3") above top of cable with fine sand, the top layer of bricks shall be placed side by side in continuous series as protective cover. Total No. of bricks required being 16 per metre run. The remainder of the trench shall be filled with riddled soil, well rammed and watered to a level of 75 mm (3") above surrounding ground level. The ground level surface of the whole trench route shall be restored properly after completion of cable laying.

b) Inside Building

Cables shall be laid on walls/ceiling/structure, unless specified otherwise, with M.S. Brackets and suitable clamps or over claw type aluminum cleats fixed on M.S. Brackets spaced not more than 450 mm apart. G.I Bolts of suitable sizes are to be grouted on the wall properly for fixing the brackets.

c) Minimum bending radius permissible is 12D for PVC Armoured Cables and 15D for HT XLPE Armoured cables. At joints and terminations, the individual core of multicore cables should never be bent so that the radius is less than 12 times the diameter over the insulation for L.T. cables and 15 D for H.T cables.

5.9.3 Cable Jointing

All cable joints shall be carried out by experienced and licensed jointers under strict supervision. Electro plated brass cable glands, aluminium / tinned copper cable sockets and approved jointing materials must be used. The price for cable jointing and finishing the ends of the cable shall include all materials and shall also provide for tools and plants for the work. The cable armouring is to be properly terminated. All cable accessories and other associated materials shall conform to Indian Standard Specification where applicable. Proper earthing of cable glands and armoured shall be included in the job.

5.9.4 Testing of Cables

Immediately after the initial laying and jointing work is completed, a pressure test shall be applied to all cables. Cables of 1.1 KV grade suitable for use on medium voltage should withstand for one minute a test with a 1000 volt constant pressure "Megger" Insulation Tester. If the test is unsatisfactory, the cost of all repairs and replacements and all extra work of removal and relaying will be made good by the contractor.

5.9.5 Testing of Installation

Before the completed installation is put into service or handed over to Employer, the installation is to be subjected to the above tests to the satisfaction of the E.I.C. The completed work will be taken over only if the results are acceptable to the E.I.C..

A. General Specifications:

1. Works to be done by the Contractor Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost.
2. Foundations for equipment and components where required, including foundation bolts.
3. Cutting and making good all damages caused during installation and restoring the same to their original finish.
4. Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
5. Painting at site of all exposed metal surfaces of the installation other than pre-painted items like fittings, fans, switchgear/ distribution gear items, cubicle switchboard etc. Damages to finishedsurfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-charge.
6. Testing and commissioning of complete installation.
7. The openings/sleeves for the cables, Conduits, Pipes, ducts, rising mains etc. shall be marked in the drawing and provided during construction. No core cutting / openings in walls shall be allowed one the slab is cast or wall is constructed.

B. Storage and Custody of Materials:

1. Unless otherwise specified, Suitable space for storage shall be provided by the Department free of cost to the contractor but the required arrangement/set up for storage of materials in the spared space including locking arrangement shall be provided by the agency. Also, the watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over of the installation by the Department.

C. Tools for Handling and Erection:

1. All tools and tackles required for handling of equipment and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

D. Care of Buildings:

1. Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site.

6.0 SAFETY PROCEDURE

a. While the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulation2023 as amended upto date, are to be followed in their entirety, particular attention is drawn to the various clauses. Any installation or portion of installation, which does not comply with this rules, should be got rectified immediately.

b. The detailed instructions on safety procedures given in BIS National Electrical Code of India 2023, part 1 section 22 shall be strictly followed.

c. A comprehensive schematic diagram is prepared starting from the main board up to the final DBs are to be collected and kept in serviceable. All such boards are to be duly marked and numbered.

d. Similarly, for each campus consisting of sub-station/ sub-stations and a number of buildings, a comprehensive power distribution schematic diagram for the entire campus shall be prepared.

e. Based on additions/alterations such diagrams should be up dated from time to time.

f. Premises like sub-stations, switch rooms, pump house, generating rooms etc. shall be kept clean. Such premises should not be used to store broken furniture, dismantled materials, waste material, packing boxes etc.

g. Such shafts should not be used for dumping floor melba etc.

   i. All premises like sub-station, pump house etc. to be maintained as protected area, admission allowed to authorized persons only.

   ii. Also,the front spaces shall be kept free and parking shall not allowed.

   iii. No inflammable materials shall be stored in places other than the rooms specially constructed for this purpose in accordance with the provisions of Indian Explosive Act.

   iv. Rubber or insulating mats as per IS:15652:2006 should be provided in front of the main switchboards or any other control equipment of medium

voltage and above.

v. Protective and safety equipment such as rubber gauntlets or gloves, earthing rods, lineman's belt, portable artificial respiration apparatus etc. should be provided in each sub-station, service centre/ enquiry office and important installations. Where electric welding or such other nature of work is undertaken, goggles also be provided.

vi. Necessary number of caution boards such as "Man on Line, don't switch on" should be readily available in each sub-station, enquiry office and important installations.

vii. Standard first aid boxes containing materials in each sub-station, enquiry office and important installations and should be readily available.

viii. Periodical examination of the first aid facilities and protective and safety equipment provided at the various installations shall be undertaken for their adequacy and effectiveness and a proper record shall be maintained.

ix. Charts (one in English and another in the regional language) displaying methods of giving artificial respiration to a recipient of electrical shock should be prominently displayed at appropriate places.

x. A chart containing the names, addresses and telephone numbers of nearest authorized medical practitioners, hospitals, fire brigade and also of the officers in executive charge shall be displayed prominently along with the First Aid Box.

xi. Executive Engineers should take immediate steps to train supervisory and authorized persons of the Engineering staff viz. AEs, J.Es, Head Electricians, Foremen, Electricians and Wiremen in the First Aid Practices, including various methods of artificial respiration with the help of local authorities such as Fire Brigade, Indian Red Cross or other recognized institutions equipped to impart such training, as prompt rendering of artificial respiration can save life at times of electric shock.

xii. All supervisory and authorized persons of the Engineering staff should be deputed for refresher course in First Aid Training after every two years and that is to be arranged by contractor.

xiii. All preventive maintenance works shall be pre-planned as far as possible and names of persons who are assigned to this work should be entered in a log book.

xiv. Electrical wiring and control switches should be periodically inspected and any defective wiring, broken parts of switches which will expose live parts, should be replaced immediately to make the installations safe for the user.

xv. Reports indicating details of preventive maintenance works done should be kept in a register by each Junior Engineer and should bear signatures of Assistant Engineer and Executive Engineer by way of checks.

xvi. No work shall be undertaken on live installations, or on installations, which could be energized unless another person is present to immediately isolate the electric supply in case o any accident and to render first aid, if necessary.

xvii. No work live L.T. switchboard in the sub-stations should be handled by a person below the rank of a Wireman and such a work should preferably be done in the presence of the Junior Engineer-In-Charge.

When working on near live installations, suitably insulated tools should be used,

and special care should be

h. taken to see that those tools accidentally do not drop on live terminals causing shock or dead short.

i. The electrical switchgears and distribution boards should be clearly marked to indicate the areas being controlled by them.

j. Before starting any work on the existing installation, it should be ensured that the electric supply to that portion in which the work is undertaken is preferably cut off. Precautions like displaying “Men at Work” caution boards on the controlling switches, removing fuse carrier from these switches, and these fuse carriers being kept with the person working on the installation, etc. should be taken against accidental energisation. “Permit to Work” should be obtained from the Junior Engineer-in-charge. No work on H.T. main should be undertaken unless it is made dead and discharged to earth with an earthing lead of appropriate size. The discharge operation shall be repeated several times and the installation connected to earth positively before any work is started.

k. Before energizing on an installation after the work is completed, it should be ensured that all tools have been removed and accounted, no person is present inside any enclosure of the switch board etc., any earthing connection made for doing the work has been removed, “Permit to Work” is received back duly signed by the person to whom it was issued in token of having completed the work and the installation being ready for re-energising and “Men at Work” caution boards removed.

l. In case of electrical accidents and shock, the electrical installation on which the

accident occurred should be switched off immediately and the affected person should be immediately removed from the live installation by pulling him with the help of his coat, shirt, wooden rod, broom, handle or with any other dry cloth or paper. He should be removed from the place of accident to a nearby safe place and artificial respiration continuously given as contained in B.I.S. Code and Standard prescribed by Fire Brigade.

m. While artificial respiration on the affected person is started immediately, help of Fire Brigade and Medical Practitioner should be called for an artificial respiration should be continued uninterrupted until such help arrives.

n. These instructions should be explained in Hindi/ local language to those staff that does not understand English.

o. Executive Engineers should take particular care to ensure that these instructions are imparted to the existing staff and as well as to the new entrants.