GOVERNMENT OF WEST BENGAL
IRRIGATION AND WATERWAYS DIRECTORATE

METROPOLITAN ELECTRICAL DIVISION

TENDER DOCUMENT

e-NIT No. WBIW/EE/MED/e-NIT-23/2025-26, Sl. No. 1 to 3

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)

Irrigation & Waterways Directorate

Office of the Executive Engineer

Metropolitan Electrical Division

Block-DF, Sector-I, 4th Floor, Jalasampad Bhawan,

Salt Lake City, Kolkata -700091

Telephone No-033-23215609, Email Id : eemed.iwd@gmail.com

NOTICE INVITING e-TENDER

e-NIT No - WBIW/EE/MED/e-NIT-23/2025-26

Memo No: 01/7E-16/2025-26 **Dated: 02.01.2026**

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 27.01.2026 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-23/2025-26

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	Rehabilitation of 6 Vent Sluice over Kheyada Khal consisting of 6 Nos Vertical Draw Shutter and 6 Nos Flap Shutter with new hoisting arrangement including Winch System at Kheyada Khal, P.S. Bidhannagar, Dist North 24 Parganas.	24,15,039.6	48,301.00	84 Days	CSDS	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. 7.25 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 7.25 Lakh**). **'Similar nature' work means:** Fabrication, manufacturing and erection of hydraulic gate, winch machine, rubber seal & hoisting arrangement etc.	As per Work Programme prepared and uploaded by the Tender Inviting Authority in the form of Bar Chart
2	Electrical installation for illumination of Bantala Regulator gate campus and office compound of Calcutta Drainage Outfall Sub-Division-II at Bantala, Mouza- Bantala, P.S-Bidhannagar South, Dist-24PGS (North).	46,77,071.57	93,542.00	84 Days	CSDS	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. 14.1 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 14.1 Lakh**). **'Similar nature' work means:** SITC of electrical items like feeder pillar, steel tubular pole, street light, under ground cable, wiring etc. related with outdoor illumination work. **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.

LIST OF WORKS

e-NIT No - WBIW/EE/MED/e-NIT-23/2025-26

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	Complete Outdoor Illumination including distribution wiring of office buildings, and SITC of feeder Panel Board and Glow Signage Boards at Amta Irrigation Colony, Dist : Howrah, Under the jurisdiction of Metropolitan Electrical Division.	41,64,733.8	83,295.00	84 Days	CSDS	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. 12.5 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 12.5 Lakh**). **'Similar nature' work means:** SITC of electrical items like feeder pillar, steel tubular pole, street light, under ground cable, wiring, glow sign board etc. related with outdoor illumination work. **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 cover

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	07.01.2026 at 17.00 Hrs.	To be made available with the e-NIT in the website
2.	Document Download start date	07.01.2026	
3.	Bid submission start date	07.01.2026 at 17.00 Hrs.	
4.	Document Download end date	27.01.2026 at 10.00 Hrs.	
5.	Bid submission end date	27.01.2026 at 10.00 Hrs.	
6.	Technical Bid opening date with preliminary result (TBO Sheet)	27.01.2026 at 11:30 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-23/2025-26

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-23/2025-26 **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-23/2025-26 **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: 01/1(11)/7E-16/2025-26 **Dated: 02.01.2026**

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: 01/1(11)/1(6)/7E-16/2025-26 **Dated: 02.01.2026**

Copy forwarded for favours of kind information to:

1) The Assistant Engineer attached to Metropolitan Electrical Division.
2) The Assistant Engineer, 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

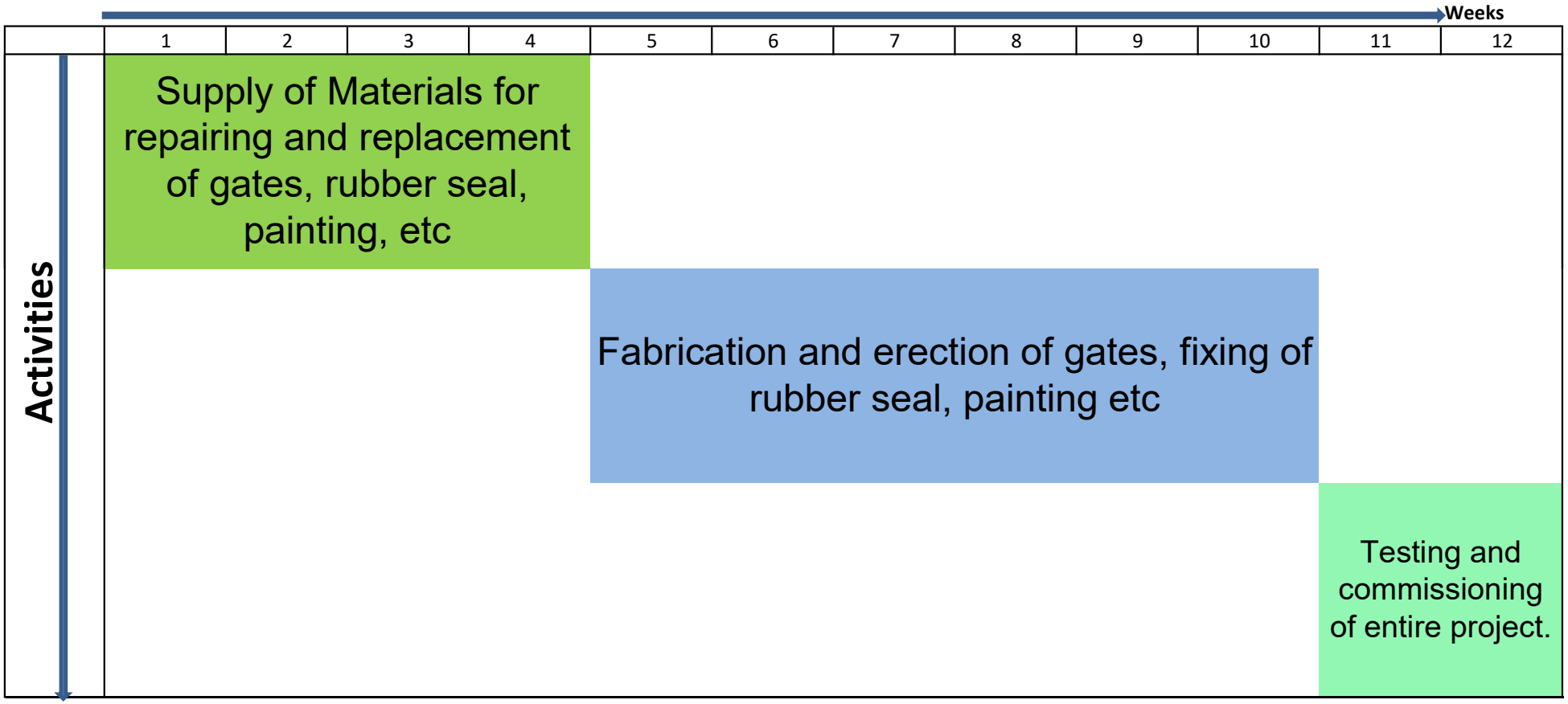
PART-B

"BAR CHART"

Tentative Work Programme for the Work: Rehabilitation of 6 Vent Sluice over Kheyada Khal consisting of 6 Nos Vertical Draw Shutter and 6 Nos Flap Shutter with new hoisting arrangement including Winch System at Kheyada Khal, P.S. Bidhannagar, Dist North 24 Parganas.

e-NIT No.-WBIW/EE/MED/e-NIT-23/2025-26(SL. NO-01)

Total construction Period:- 84 days



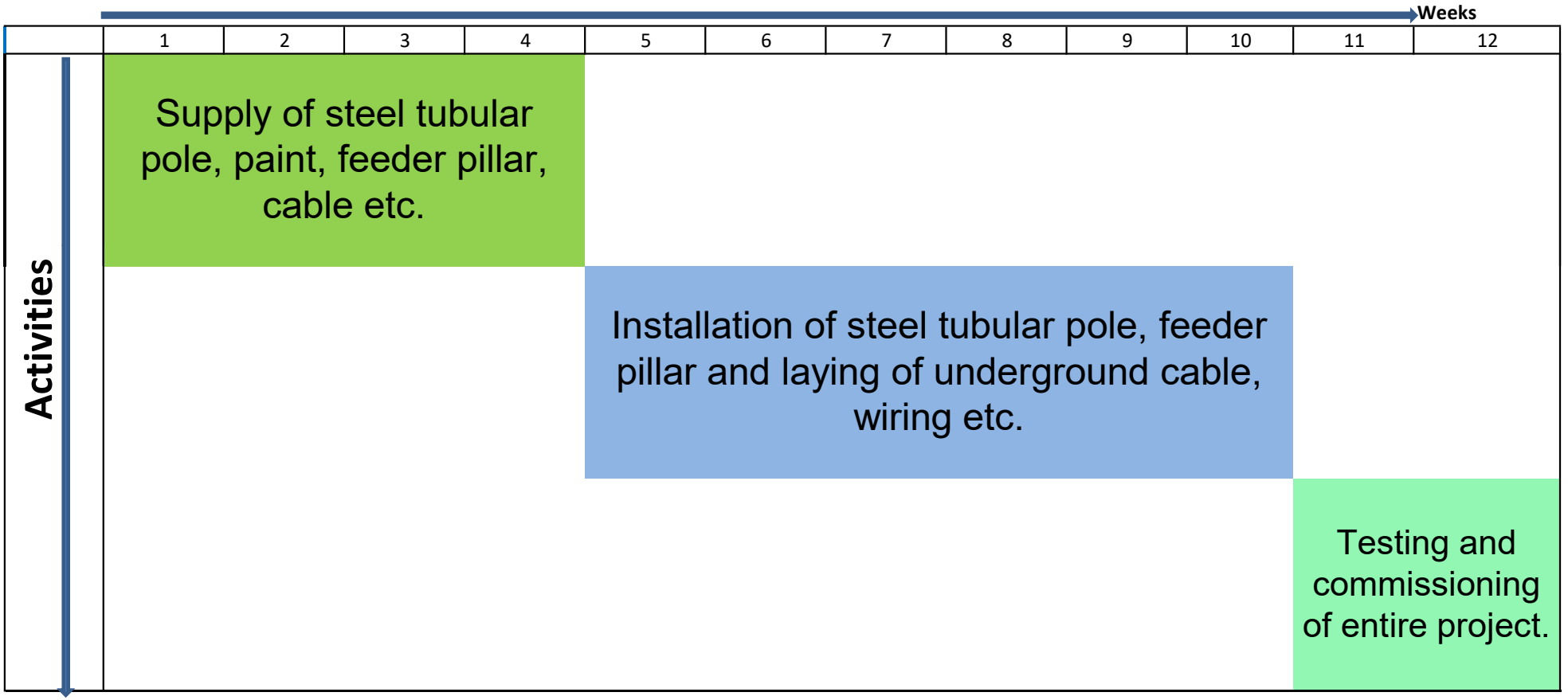
Sd/-
Executive Engineer
Metropolitan Electrical Division
I & W Dte., Govt. of West Bengal

"BAR CHART"

Tentative Work Programme for the Work: Electrical installation for illumination of Bantala Regulator gate campus and office compound of Calcutta Drainage Outfall Sub-Division-II at Bantala, Mouza- Bantala, P.S-Bidhannagar South, Dist-24PGS (North).

e-NIT No.-WBIW/EE/MED/e-NIT-23/2025-26, Sl. No-02

Total construction Period:- 84 days



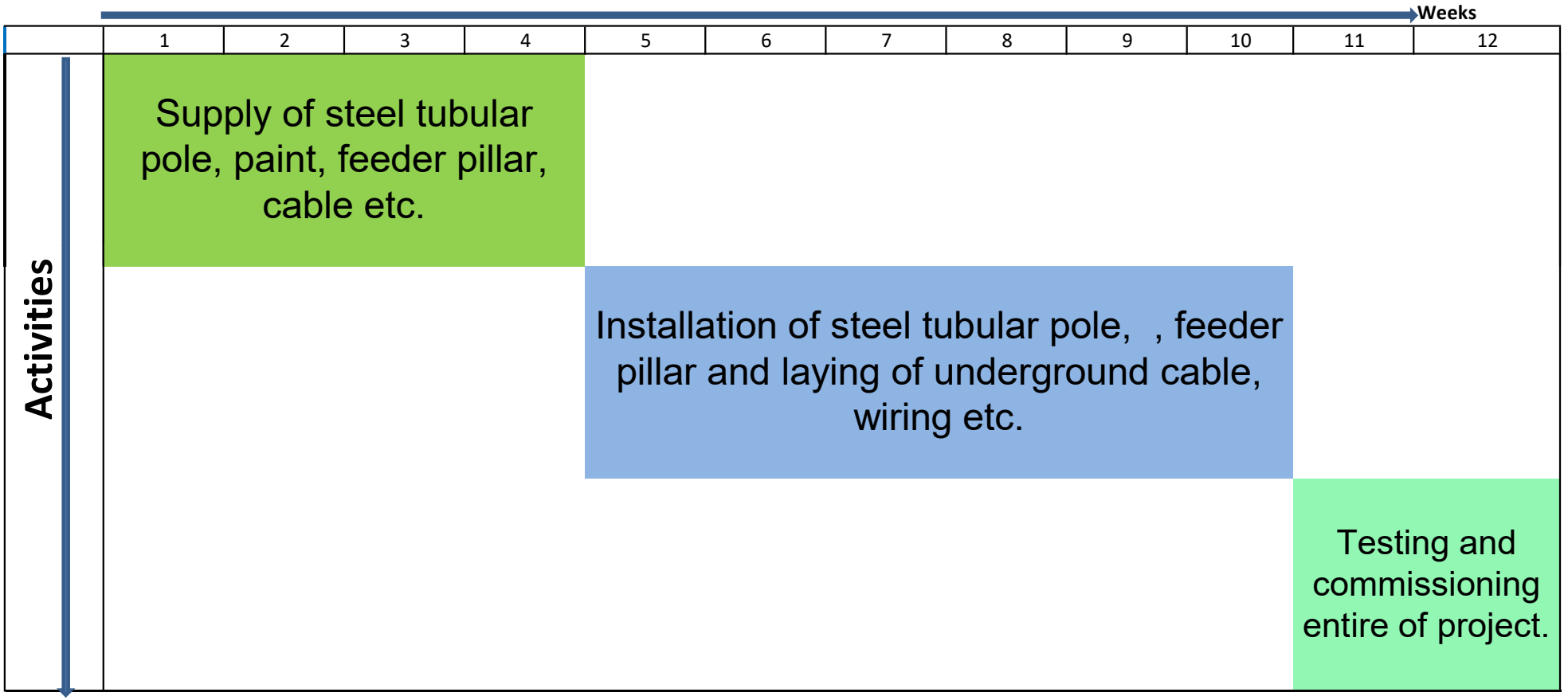
Sd/-
Executive Engineer
Metropolitan Electrical Division
I & W Dte., Govt. of West Bengal

"BAR CHART"

Tentative Work Programme for the Work: Complete Outdoor Illumination including distribution wiring of office buildings, and SITC of feeder Panel Board and Glow Signage Boards at Amta Irrigation Colony, Dist : Howrah, Under the jurisdiction of Metropolitan Electrical Division.

e-NIT No.-WBIW/EE/MED/e-NIT-23/2025-26, Sl. No-03

Total construction Period:- 84 days



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

PART-C

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) 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.

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.

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, RESPONSIBILITIES AND SCHEDULED MAINTENANCE FOR DIFFERENT IRRIGATION COLONIES, OFFICE COMPLEX, INSPECTION BUNGALOWS.

YEAR-2025-26

INDEX

1. INVENTORY & FUNCTIONAL ASSET OF METROPOLITAN ELECTRICAL DIVISION			
SL NO	**NAME OF THE OFFICE/ PREMISES**	**LOCATION/ ADDRESS**	**PARTICULARS**
1	JALASAMPAD BHAWAN	Salt Lake, Dlock : DF, Dist : North 24 PGS, KOL - 700091	**Electrical Portion :**
			i) No of Transformer (s) : 2 Nos 750 KVA each
			ii) No (s) of HT/LT Panel : (I) 1 no 11 KV VCB (1 in 1 out) for reciving supply (II) 1 no 11 KV VCB (1 in 2 out) for Supply to two nos Transformers (IV) 2 nos 440V LT Building Panel (both for West & South Block) (V) 16 Nos 440V Floor Panels (at Each and every floor both blocks)
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building
			iv) No (s) of Diesel Generator Set : 1 no 40 KVA Diesel Generator Set.
			v) Solar Power System : NA
			vi) Water Pumps : 5 Nos 15/20HP centrifugal pumps
2	Baruipur Irrigation colony (under Mograhat Drainage Division)	Baruipur, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
3	Canning Irrigation colony (under Canning Irrigation Division)	Canning, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
4	Basanti Irrigation colony (under Basanti Irrigation Sub-Division)	Basanti, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA

SL NO	NAME OF THE OFFICE/ PREMISES	LOCATION/ ADDRESS	PARTICULARS
5	Gosaba Irrigation colony (under Gosaba Irrigation Sub-Division)	Gosaba, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
6	Kakdwip Irrigation colony (under Kakdwip Irrigation Sub-Division)	kakdwip, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings, including bunglow
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
7	Diamond harbour Irrigation colony (under Kakdwip Irrigation Division)	Diamond Harbour, Dist : South 24 parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire building including bunglow
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
8	Amta Irrigation colony (under Amta Irrigation Division)	Amta, Dist : Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings including bunglow at Amta & Domjur
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
9	Charial Irrigation colony (under Suburban Drainage Sub - Division-III)	Charial, Dist : South 24 Parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings including rest shed
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA

SL NO	NAME OF THE OFFICE/ PREMISES	LOCATION/ ADDRESS	PARTICULARS
10	Kestopur Beautification site (Under Canals Division)	Kestopur, Dist : North 24 Parganas	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Lighting Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every side of kestopur khal.
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
11	Howrah drainage sub-division I, at Fuleswar, Block- Uluberia-I, Dist. Howrah "	11 vent Fuleawar,Dist:- Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings including rest shed controll room.
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
12	Howrah Drainage Sub-Division, at Sejberia, Uluberia Municipality, Dist. Howrah. "	20 vent Sejberia,Dist:- Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings including rest shedand Bunglow controll room.
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
13	Howrah drainage sub-division, at Nazirgunj, Block- Sankril, Dist. Howrah. "	8 vent Nazirgange,Dist:- Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at each and every floors of the entire office buildings including controll room.
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
14	Howrah Drainage Sub-Division, at Sarenga, Block- Sankril, Dist. Howrah.	4 vent Sarenga,Dist:- Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Only controll romm.
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA

SL NO	NAME OF THE OFFICE/ PREMISES	LOCATION/ ADDRESS	PARTICULARS
15	Lower Damodar Sub-Division No-I, at Mahisrekha, Madhavpur Uluberia Dist. Howrah	Mahisrekha Irrigation Colony with in Block - Shyampur II, P.S-Shyamur, Dist. Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries atevery floors of the entire office buildings .
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
16	Sech Abasan (Under Metropolitan Drainage Division-I)	FF Block, Salt Lake, Dist : North 24 PGS, Pin : 700106	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel (at Bunglow) (II) 1 no 440V LT Building panel (feeder panel)
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire bunglow, pump house, distribution wiring system of quarters.
			iv) No (s) of Diesel Generator Set : 1. 200 KVA at Bunglow 2. 63 KVA at Flood Centre under NHP
			v) Solar Power System : NA
17	Commercial Tax Building	Salt Lake, Dlock : DF, Dist : North 24 PGS, KOL - 700091	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries atevery floors of the entire office buildings .
			iv) No (s) of Diesel Generator Set : (I) 650 KVA DG
			v) Solar Power System : NA
18	Howrah Irrigation Division office at Shibpur (near nabanna)	Betiatala, Shib pur, Howrah	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire office buildings and VRF Air conditioning system .
			iv) No (s) of Diesel Generator Set : (I) 125 KVA DG
			v) Solar Power System : NA

SL NO	NAME OF THE OFFICE/ PREMISES	LOCATION/ ADDRESS	PARTICULARS
19	Bantala Irrigation colony (under Mograhat Drainage Division)	Bantala, Kolkata : 700105	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : NA
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire office buildings and distribution wiring system of quarters..
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
20	Raidighi Irrigation colony (under Joynagar Irrigation Division)	Raidighi, Kolkata : 700105	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : NA
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire office buildings and distribution wiring system of quarters..
			iv) No (s) of Diesel Generator Set : NA
			v) Solar Power System : NA
21	Ulughta Irrighation colony	Shyampur-I, GP : Beliari, Ulughta (58 vent)	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 2 nos 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire office buildings and distribution wiring system of quarters..
			iv) No (s) of Diesel Generator Set : (I) 40 KVA DG set
			v) Solar Power System : NA
22	Chitpur Lockgate (Under Canals Division)	Lock gate Road, PS: Shyampur, Dist : Kolkata, PIN : 700002	**Electrical Portion :**
			i) No of Transformer (s) : NA
			ii) No (s) of HT/LT Panel : (I) 1 no 440V LT Building Panel
			iii) No (s) of Luminaries : Outdoor campus area illumination including luminaries at every floors of the entire office buildings and distribution wiring system of quarters, Distribution system of all miter/ flap/ dwarf/ flap gates and valve gates.
			iv) No (s) of Diesel Generator Set : (I) 63 KVA DG set
			v) Solar Power System : NA

2.1 INTERNAL EI INSTALLATION

Maintenance Schedule For EI Installations

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
NAME OF THE OFFICE :				
1	Check for cleanliness of switch board		DAILY	
	Check for tightness of connection points		DAILY	
Checking of system				
1	Check full load current at SPN DB Box		weekly	
2	Check system voltage at SPN DB Box		weekly	
3	Checking of connection points and cables for heating		weekly	
4	Check full load current at TPN DB Box		weekly	
5	Check system voltage at TPN DB Box		weekly	
6	Checking of isolators/ MCBs at SPN DB Box		weekly	
7	Checking of MCCBs/ MCBs at TPN DB Box		weekly	
8	Checking of cable termination points at SPN DB Box		weekly	
9	Checking of cable termination points at TPN DB Box		weekly	
1	Megger Test			
	Megger Test (Phase to Phase Resistance LT panel)		Monthly	Reading at MΩ :
	Megger Test (Phase to Earth Resistance LT Panel)		Monthly	Reading at MΩ :
	Megger Test (Earthpit Resistance)		Monthly	Reading at Ω :
	Megger Test (for transformer for insulation resistance)		Monthly	Reading at MΩ :
	Megger Test (for VCB for insulation resistance)		Monthly	Reading at MΩ :

Maintenance Schedule For Air Conditioning machines

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
Checking of Split Machines				
1	Checking of Indoor unit			
	Check the system voltage		weekly	
	Check for evaporator net and clean dust		monthly	
	Check for functionality of remote		monthly	
	Change the batteries of remote if required		monthly	
	Check for any blockage in drain water pipe line		monthly	
1	Checking of Outdoor unit			
	Check the cable connection ends		weekly	
	Check for Nuts and bolts and stand		monthly	
	Check for Compressor current		monthly	
Checking of Window Machines				
1	Check the system voltage		weekly	
	Check for evaporator net and clean dust		monthly	
	Check for functionality of remote		monthly	
	Change the batteries of remote if required		monthly	
	Check for any blockage in drain water pipe line		monthly	

Maintenance Schedule For Air Conditioning machines

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
Checking of Cassette Machines				
1	Checking of Indoor unit			
	Check the system voltage		weekly	
	Check for evaporator net and clean dust		monthly	
	Check for functionality of remote		monthly	
	Change the batteries of remote if required		monthly	
	Check for any blockage in drain water pipe line		monthly	
1	Checking of Outdoor unit			
	Check the cable connection ends		weekly	
	Check for Nuts and bolts and stand		monthly	
	Check for Compressor current		monthly	

Maintenance Schedule For UPS Back up system

1a	**Description of UPS system**	:		VA	**Office Name :**	
1b	**Nos of Batteries**	:		Nos		
1c	**Capacity of each Batteries**	:		Ah		
2a	**Description of UPS system**	:		VA	**Office Name :**	
2b	**Nos of Batteries**	:		Nos		
2c	**Capacity of each Batteries**	:		Ah		

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
Daily Checking				
1	**Checking of UPS**			
	Check for Power issues		**Weekly**	
	Check for terminal connection points		**Weekly**	
Checking of Batteries				
1	**Clean and check the battery connections.**		**Fortnight**	
2	**Check the electrolyte level and topup with distilled water if required.**		**Fortnight**	
3	**Check the Specific Gravity of the electrolyte. If it is less than 1210gm/l, recharge the battery.**		**Fortnight**	
Routine checkup for Backup				
1	**Check the loads runs in UPS Mode by shutting down the power, whether runs on backup power without any interruption**		**Weekly**	
2	**If the system shuts down during power shut down then check the UPS & batteries**		**Weekly**	
3	**Clean the machine from dust and dirt**		**DAILY**	

Maintenance Schedule For EPABX SYSTEM

1	Description of EPABX System	:		Office Name :	
2	Description of EPABX System	:		Office Name :	
3	Description of EPABX System	:		Office Name :	
4	Description of EPABX System	:		Office Name :	
5	Description of EPABX System	:		Office Name :	

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
Daily Checking				
1	Checking of EPABX machines			
	Check for Power issues		Weekly	
	Check for terminal connection points		Weekly	
Checking of Telephone Lines and Intercom DB box				
1	Check for Rossette box		weekly	
2	Check for Cleanliness of Telephone set		weekly	
3	Check condition of Microphone of hand set		weekly	
4	Checking of speaker volume of hand set		weekly	
5	Removal of dirt and dust from DB Boxes		weekly	
6	Check for tightness of Connection points		weekly	

Maintenance Schedule For EPABX SYSTEM

1	Description of EPABX System	:		Office Name :		
2	Description of EPABX System	:		Office Name :		
3	Description of EPABX System	:		Office Name :		
4	Description of EPABX System	:		Office Name :		
5	Description of EPABX System	:		Office Name :		

	Routine checkup for HIPATH (Siemens machine)				
1	Check for System input Voltage		DAILY	Voltage	
2	Check the system runs in UPS Mode by shutting down the power, whether runs on backup power without any interruption		Weekly		
3	If the system shuts down during power shut down then check the UPS		Weekly		
4	Check Connection of cards		Weekly		
5	Clean the machine from dust and dirt		DAILY		

2.2 Maintenance Schedule For Substation/ panels/ rising mains

1	Rating of Transformer 1	:		KVA
2	Rating of Transformer 2	:		KVA
3	Rating of 11 KV VCB (1 in 1 out)	:		Amp
4	Rating of 11 KV VCB (1 in 2 out)	:		Amp

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
Daily Checking				
1	Checking of VCB Panel			
	Current (in A) in peak Hours		DAILY	
	Check for Heating or any other faults at VCB		DAILY	
Checking of Transformers				
1	Check for oil level		weekly	
2	Check for any oil leakage		weekly	
3	Check condition of silica gel in breather		weekly	
4	Checking of outgoing cables if heated		weekly	
5	Removal of vegetation such as trees, grass etc., which might reduce the natural airflow of the ventilation louvers.		weekly	
6	Check for ingress of surface or ground water.		weekly	

2.2 Maintenance Schedule For Substation/ panels/ rising mains

1	Rating of Transformer 1	:		KVA						
2	Rating of Transformer 2	:		KVA						
3	Rating of 11 KV VCB (1 in 1 out)	:		Amp						
4	Rating of 11 KV VCB (1 in 2 out)	:		Amp						

Routine checkup for West block Building LT panel (Daily)							
1	VOLTAGE (RY, RB, BR)		DAILY	RY(v)	YB(v)	BR(v)	
2	Functioning of Voltmeter		DAILY				
3	Load AMPERE (R Phase, Y Phase, B Phase)		DAILY	R(A)	Y(A)	B(A)	
4	Functioning of Ammeter		DAILY				
5	Frequency		DAILY				
6	Cleaning of bus connections, relays, lug connections, and other part of the distribution system.		Weekly				
7	Check enclosure of complete unit for rustiness & cracks.		Monthly				
8	It is essential that electrical connections be made properly to prevent and reduce overheating.		Monthly				
Routine checkup for South block Building LT panel (Daily)							
1	VOLTAGE (RY, RB, BR)		DAILY	RY(v)	YB(v)	BR(v)	
2	Functioning of Voltmeter		DAILY				
3	Load AMPERE (R Phase, Y Phase, B Phase)		DAILY	R(A)	Y(A)	B(A)	
4	Functioning of Ammeter		DAILY				
5	Frequency		DAILY				
6	Cleaning of bus connections, relays, lug connections, and other part of the distribution system.		Weekly				
7	Check enclosure of complete unit for rustiness & cracks.		Monthly				
8	It is essential that electrical connections be made properly to prevent and reduce overheating.		Monthly				

2.2 Maintenance Schedule For Substation/ panels/ rising mains

1	Rating of Transformer 1	:		KVA						
2	Rating of Transformer 2	:		KVA						
3	Rating of 11 KV VCB (1 in 1 out)	:		Amp						
4	Rating of 11 KV VCB (1 in 2 out)	:		Amp						

Additional Routine checkup (Monthly)				
1	Dielectric test for Transformer oil (Change if required)		Monthly	
2	Check foundation nuts & bolts (check Tightness)		Monthly	
3	Check Silica Gel in breather (Change if required)		Monthly	
4	**Megger Test**			
	Megger Test (Phase to Phase Resistance LT panel)		Monthly	Reading at MΩ :
	Megger Test (Phase to Earth Resistance LT Panel)		Monthly	Reading at MΩ :
	Megger Test (Earthpit Resistance)		Monthly	Reading at Ω :
	Megger Test (for transformer for insulation resistance)		Monthly	Reading at MΩ :
	Megger Test (for VCB for insulation resistance)		Monthly	Reading at MΩ :
Additional Items Routine checkup (Monthly)				
1	Fire extinguishing sand buckets (filled or not if not filled with fine dry sand)		Weekly	
2	CO2/Foam base Fire extinguisher (check refilling date of cartridges)		Monthly	
3	Checking of protective gears of VCB (by manual tripping)		Monthly	
4	Checking for water seepage in rising main duct (ensure complete dry condition of ducts) if any water seepage found immediately convey the message to higher officers		Monthly	
5	Switching over between rising main and bus bar system		Monthly	

2.3 Maintenance Schedule For Diesel Generator Set

1	Capacity of DG Set	:		KVA		Diesel At stock	:		Lts
2	Engine Sl No	:				Mobile oil at stock	:		Lts
3	Alternator Sl No	:							
4	Engine Make	:							
5	Alternator Make	:							

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS		
Before Starting the Engine (Daily)						
	Checking of Change over Panel Board					
1	Check for Tightness of connections of all MCCBs		DAILY			
	Check for Heating at connection ends of all MCCBs and other electrical apparatus		DAILY			
After Starting the Engine (Daily)						
1	Check lube oil pressure.		DAILY			
2	Check and attend leakages, if any.		DAILY			
3	Check all meters, engine noise etc. and correct abnormalities, if any.		DAILY			
4	Check engine protection systems.		DAILY			
Routine checkup (Daily)						
1	VOLTAGE (RY, RB, BR)		DAILY	RY(v)	YB(v)	BR(v)
2	Functioning of Voltmeter		DAILY			
3	Load AMPERE (R Phase, Y Phase, B Phase)		DAILY	R(A)	Y(A)	B(A)
4	Functioning of Ammeter		DAILY			
5	Frequency		DAILY			

2.3 Maintenance Schedule For Diesel Generator Set

1	Capacity of DG Set	:		KVA		Diesel At stock	:		Lts
2	Engine Sl No	:				Mobile oil at stock	:		Lts
3	Alternator Sl No	:							
4	Engine Make	:							
5	Alternator Make	:							

Routine checkup (Weekly)				
1	Check belt tensions. (The V-belt tension can be checked by pressing with thumb it shall be 1-2 cm. If it is not correct, readjustment shall be done.)		Weekly	
2	Clean radiator fins by blowing air in the opposite direction.		Weekly	
3	Check lube oil level, top up if required with same brand and grade of oil. (Recommended lube oil API CF-4 or equivalent (SAE15W40) Castrol RX super plus 15W-		Weekly	
4	Check oil level of oil bath filter and clean air cleaner as required.		Weekly	
5	Check clamping, tighten if required		Weekly	
6	Drain once 200 ml. of diesel from bottom of fuel tank to remove sediments.		Weekly	
7	Check and ensure sufficient quantity of fuel in tank.		Weekly	
8	Check battery terminals and connections for proper tightness – top up electrolyte, if required.		Weekly	
9	Clean engine and premises.		Weekly	
Additional Routine checkup (Fortnight)				
1	Check tightness of all nuts and bolts.		Fortnight	
2	Clean and check the battery connections.		Fortnight	
3	Check the electrolyte level and topup with distilled water if required.		Fortnight	
4	Check the Specific Gravity of the electrolyte. If it is less than 1210gm/l, recharge the battery.		Fortnight	
5	Check functioning of engine safety devices. (Emergency stop push)		Fortnight	

2.3 Maintenance Schedule For Diesel Generator Set

1	Capacity of DG Set	:		KVA		Diesel At stock	:		Lts
2	Engine Sl No	:				Mobile oil at stock	:		Lts
3	Alternator Sl No	:							
4	Engine Make	:							
5	Alternator Make	:							

Additional Routine checkup (Monthly)						
1	Clean Lube oil filter (Change if required)		Monthly			
2	Clean Diesel oil filter (Change if required)		Monthly			
3	Check Battery Charger (Change if required)		Monthly			
4	Fill the recommended new engine oil to 'H' mark on dipstick.		Monthly			
5	Check exhaust manifold bolts tightness.		Monthly			
6	Check foundation nuts & bolts (check Tightness)		Monthly			
7	LOP (Lube oil pressure)		Monthly			
8	LOT (Lube oil temperature)		Monthly			
Additional Routine checkup No Load Run (Monthly)						
1	No Load Voltage		Monthly	RY(v)	YB(v)	BR(v)
2	Load AMPERE (R Phase, Y Phase, B Phase)		Monthly	R(A)	Y(A)	B(A)
3	**Megger Test**					
	Megger Test (Phase to Phase Resistance)		Monthly	Reading at MΩ :		
	Megger Test (Phase to Earth Resistance)		Monthly	Reading at MΩ :		
	Megger Test (Earthpit Resistance)		Monthly	Reading at Ω :		

2.4 Maintenance Schedule For Elevator/ passanger Lift

Details of ..... Maintenance

Sl. No	Items to be Inspected	Inspection	Periodicity	Action required
A	B	C	D	E
1	**Daily Checks for Lift**			
i	Visual inspection of the lift car operating Panel.		Daily	
ii	Check that all the indicators are working correctly.		Daily	
iii	Ensure that alarm/ communication system functioning		Daily	
iv	Check that the lift doors open when the 'door open' button is depressed.		Daily	
v	Check thsat all position indicators on the landing are working correctly.		Daily	
vi	Check all lighting is in working order.		Daily	
vii	Check any mechanical/ eletronic door protection device (safety) such that when the safety edge is operated the door re- opens and after operation and removal of any obstruction the door closes.		Daily	
viii	Check that the floor in immediate vicinity of the landing door is in a clean and safe condition. Check that the lift stops level at each floor.		Daily	
ix	Check the landing doors/ gates and architraves ensuring there is nothing which can snag a passanger's clothing.		Daily	
x	Clean door bottom tracks.		Daily	
xi	rtake a full ascent and descent to assess for any unusual noise.		Daily	
2	**Weekly Maintenance**			
i	Top up lift machine gearbox and lubricate bearing		Weekly	
ii	Check brake for correct mechanical action, ensure linings and drums ares are free from oil or grease.		Weekly	
iii	Clean overspeed governor and lubricate.		Weekly	
iv	Inspect bearing s of drums , sheaves and pulleys, lubricate		Weekly	
v	Inspect motor/excitor commutators and sliprings operating under working conditions and stationary, Lubricate bearing.		Weekly	
vi	Clean, inspect and adjust controller contacts, interlocks and dashpots, lubricate. [Observe and adjust operation sequence and timing of contract.		Weekly	
vii	Clean floor selector, check action and adjust, lubricate drive gear.		Weekly	
viii	Top up counter weight guide shoes lubricators.		Weekly	

2.4 Maintenance Schedule For Elevator/ passanger Lift				
ix	Clean up lift well as necessary. Clean pit, inspect condition of lift well enclosure.		Weekly	
x	Clean guide s and lubricate where applicable.		Weekly	
xi	Check limit switches, direction switches and their operating devices. Ensure rollers and spindles are free to rotate.		Weekly	
xii	Inspect car exterior and clean car top. Top up car guide shoe lubricators. Inspect tensioning devices for correct adjustment, Clean and inspect door operating gear and check for oil leaks.		Weekly	
xiii	Check door locks for safe operation. Ensure rollers and spindles are free to rotate.		Weekly	
xiv	Check car and landing doors operate freely and bottom tracks are clear to debries.		Weekly	
xv	Ride in car, observe and record irregularities in starting , stoping and general running.		Weekly	
xvi	Check for correct operation: Car controls, Car Door switches, door re- opening devices, Emergency stop, alarm bell and itercom system, inspect condition of car interior and floor covering, Observe levelling accuracy.		Weekly	
xvii	Test operation of landing buttons, indicators and fireman switch.		Weekly	
xviii	Checking of lift cabin lights, fan & Hoist lights.		Weekly	
2	Monthly Service			
i	Inspect lift machine gearing and bearing . Ensure keys and fixing bolts are sequire.		Monthly	
ii	Inspect brake coupling and linings for wear. See that keys and fixing bolts are ensure. Check that brake release gear and hand winding wheel are readly available.		Monthly	
iii	Check drums, sheaves and pullys for visible cracks, ensure keys and fixing bolts are secure. Inspect bearings and sheave grooves.		Monthly	
iv	Check condition of wire ropes. Ensure suspension ropes are evenly Tensioned.		Monthly	
v	Inspect over speed governor for wear. Ensure keys and fixing bolts are secure.		Monthly	
vi	Extract dust from interiors of motors and generators. Inspect bearing s, ensure fixing bolts are secure.		Monthly	
vii	Inspect floor selector bearings. Check connections and flexes. Inspect driving rope, tape or chain for wear and correct tension.		Monthly	
viii	Inspect and operate by hand the slack rope switch, safety gear switch, broken tape or rope switch and over speed governor switch.		Monthly	
ix	Inspect guides for wear and ensure fixings are secure.		Monthly	

2.4 Maintenance Schedule For Elevator/ passanger Lift				
x	Check counterweight clearance for rope stretch, Inspect rope equalizer. Ensure main tie bolts are secure. Inspect guide shoes for weare and "float", Ensure filler weights are properly positioned and secure.Check safety- gear for guide clearance and free movement.		Monthly	
xi	Open. Clean and inspect limit switches, direction switches. Inspect fixed ramps and inductor plates.		Monthly	
xi	Ensure spring buffers are escure. Clean oil buffers and top up, Check for oil leaks.		Monthly	
xii	Inspect conditions of landing and car sill nosings, and check car clearence, Inspect lock beaks, door rollers and spindles for wear. Inspect door inter- connecting wires or chains for wear and correct tension.		Monthly	
xiii	Ensure car frame bolts are secure. Check guide shoes for minimum" float" . Ensurecar body is secure in frame. Chech safety- gear for guide clearence and free movement. Check tension of safety rope. Inspect door operating mechanism for wear and ensure driving sprockets, keys and fixing boltsare secure. Ensure that the "pick-up" between car and landing doors is correctly aligned.		Monthly	
xiv	Open, clean and inspect car controls, flooor switches, door switches. Check action of emergency opening and movable floor, inspect car lighting.		Monthly	
xv	Inspect travellng cables and their anchorages.		Monthly	
xvi	Open, clean and inspect landing button boxes and ensure that any indicator boxes are securely fixed.		Monthly	
xvii	Checking and replacing of ELCB providing in the DB.		Monthly	
xviii	Checking, maintenance, Servicing and refiling of Fire extingusers & the safety devices.		Monthly	
3	**Three- Month maintenance Service**			
i	Open,cleaning and inspect landing door locks		Three Monthly Intervently	
ii	Carry out electrical load test on emergency lighting, Batteries and battery charger for a period of 1 hour.		Three Monthly Intervently	
4	**Other maintenance services**			
i	Renew wire roap		After major repair & Every Year	
ii	Test safety gear on no load		After major repair & Every Year	
iii	Test overspeed governors and safety gear on full load.		After major repair & Every Year	

2.5 EPABX SYSTEMS

A. **COMPREHENSIVE AMC of EPABX SYSTEMS:**

Under comprehensive Annual Maintenance Contract of EPABX systems, following are the activities to be carried out by the maintenance contractor:

1. The rates shall be quoted for the comprehensive maintenance of the EPABX system including repair, maintenance of all extension lines installed at the concerned office.

2. During the period of AMC, preventive maintenance will be done at least once in month. This includes checking of all machines, hardware, software, keeping the inner parts of the equipment dust free, checking the configuration, checking the supply voltage, ground etc.

3. New configuration, modification, if any, shall have to be done as per direction of Engineer in charge.

4. Supply of required software and hardware for preventive and corrective maintenance shall be under contractor's scope, without any additional cost.

5. Repair/Replacement of faulty electronic modules, if any, without charging extra.

6. All the items related to EPABX replaced will be of standard quality with ISI/BIS mark.

7. In case of emergency breakdown, system to be attended and restored within 48 hours from the time of fault intimation. In case of the breakdown period exceeds beyond 48 hours, contractor has to make an alternate temporary arrangement for restoring the essential services as decided by Engineer-In-Charge.

8. During preventive and breakdown maintenance lodging, boarding and conveyance has to be arranged by vendor without charging extra cost.

9. **During emergency breakdown, contractor will provide services 24 X 7 irrespective of holidays and weekends**.

10. The contractor shall bring its own tools, laptop, interface cables for carrying out maintenance work at site.

11. No additional material will be issued by the Department during maintenance. The contractor has to arrange all material required for execution and satisfactory completions of the work at their own cost.

12. **Upgradation of system version/software, if so desired for better functioning of the system, shall be carried out by the contractor without charging extra cost.**

13. The contractor will have sufficient spare parts to avoid the downtime.

14. Maintenance window:

Sl.No.	Fault Level	Service Description/Fault Description	Users Affected	Rectification required	Maintenance Time Frame Ideal	Maintenance Time Frame - Maximum
1	Minor	Configuration Related issues	Single	Configuration correction	Immediate	Same day
2	Medium	Cable/Equipment Fault	Single	Cable/Equipment repair with minor engineering	Immediate	Same day
3	Major	Cable/Equipment Fault	Multiple	Cable/Equipment repair with major engineering or requires factory repair for parts like cards etc.	Immediate	48 hrs.

Note: w.r.t to fault as mentioned in Sl. No. 3, Contractor/agency has to restore the service with a replacement card within time frame of 48 hrs from his own hand spare units as a temporary solution. Upon receipt of the repaired card/ parts or new ones' vendor shall take back its own card. The service will be restored with the permanent card again by the vendor.

2.6 MAINTENANCE SCHEDULE FOR WATER SUPPLY PUMP & MOTOR (EXCLUDING PLUMBING)

1	Capacity of Pump	:		HP
2	Pump Sl Nos	:		
	Pump 1	:		
	Pump 2	:		
	Pump 3	:		
	Pump 4	:		
	Pump 5	:		
3	Capacity of Motor(s)	:		KW

SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT					PERIODICITY	RECORD IF ANY DEFECT DETECTS
		P1	P2	P3	P4	P5		
Before Starting the Pump (Daily)								
1	The shaft rotates freely.						Daily	
2	The pump is primed.						Daily	
3	If there is any valve in delivery branch, it is open.						Daily	
4	The stuffing box (gland) is properly tightened (in case of gland packed pump)						Daily	
5	Checking of Coupling Nut and Bolts						Daily	
6	Checking of Rubber Bushes						Daily	

2.6 MAINTENANCE SCHEDULE FOR WATER SUPPLY PUMP & MOTOR (EXCLUDING PLUMBING)

1	Capacity of Pump	:		HP
2	Pump Sl Nos	:		
	Pump 1	:		
	Pump 2	:		
	Pump 3	:		
	Pump 4	:		
	Pump 5	:		
3	Capacity of Motor(s)	:		KW

	After Starting the Pump (Daily)								
1	Start Time of the Pump							Daily	
	Stop Time of the Pump							Daily	
2	Start Time of the Pump							Daily	
	Stop Time of the Pump							Daily	
3	Start Time of the Pump							Daily	
	Stop Time of the Pump							Daily	
4	Start Time of the Pump							Daily	
	Stop Time of the Pump							Daily	
5	Start Time of the Pump							Daily	
	Stop Time of the Pump							Daily	
6	Ampere of Pump							Daily	
7	Ampere of Pump							Daily	
1	VOLTAGE (RY, RB, BR)	RY(v)		YB(v)		BR(v)			

2.6 MAINTENANCE SCHEDULE FOR WATER SUPPLY PUMP & MOTOR (EXCLUDING PLUMBING)

1	Capacity of Pump	:		HP
2	Pump Sl Nos	:		
	Pump 1	:		
	Pump 2	:		
	Pump 3	:		
	Pump 4	:		
	Pump 5	:		
3	Capacity of Motor(s)	:		KW

2	Functioning of Voltmeter							
3	Load AMPERE (R Phase, Y Phase, B Phase)	R: Y: B:	R: Y: B:	R: Y: B:	R: Y: B:	R: Y: B:	R: Y: B:	
4	Functioning of Ammeter							
5	Frequency							

2.7 HVAC AND VRV/VRF SYSTEM

Each comprehensive service will include the following:

i) Preventive & Breakdown maintenance including Daily, Weekly, Monthly, Quarterly and Yearly maintenance of the HVAC and VRV/VRF system.

ii) The Contractor shall submit the Defect Checklist within 15 days.

iii) Maintenance of complete HVAC and VRV/VRF system so that performance of the plant is satisfactory.

iv) Indoor Units (IDUs) of various type/size complete with display, electronic/PCB cards, cordless /corded remote control, internal control/power wiring, regular cleaning of filters, fan motor & any other associated work for proper & specified functioning of indoor units.

v) Outdoor Units (ODUs) of various capacities with associated compressor, supply/ filling of compressor oil, etc., Inverters, Digital Scroll system, electronic/PCB cards, MCB/MCCB, IGBT, control /power wiring, oil recovery system, heat exchanger, condenser motor fan, internal refrigeration circuit & any other associated work for proper & specified functioning of outdoor units. The enclosure made for outdoor unit should be kept in locked or complete watch and ward in the scope of contractor.

vi) Refrigerant piping along with all joints etc. including detection/repairing of leakage, pressure testing, vacuum purging, gas recharging/ topping including supply of refrigerant.

vii) The repair work shall be carried out in a professional manner. This shall also include restoration of insulation after repair. Any other associated work for proper & specified functioning of air conditioning system. The scope also includes supply & charging of refrigerant due to any unforeseen circumstances.

viii) Condensate drain water pipe cleaning, detection/repairing of pipes for any leakages, insulation etc. Any other associated work for proper functioning of drain water disposal system.

ix) All control & power wiring between indoor & outdoor units. Any other associated work for proper & specified functioning of air conditioning system.

x) Maintenance & upkeep of sub-AC panels on the roof including switchgear, cabling from sub-AC panel up to outdoor units, consumables etc. (excluding incoming cables to sub-AC panels)

xi) Any other item/activities associated with proper functioning of comprehensive maintenance complete air conditioning system deemed to have been included in the scope of work.

xii) In order to attend breakdowns of the AC system, the engineering works (e.g. False ceiling, any kind of structural/masonry work, opening and closing) required if any, shall be in the scope of work.

xiii) While replacement of MCB at ODU; all incoming and outgoing connections shall be in the scope of work.

2.8 FIRE PROTECTION & DETECTION SYSTEM

1.0 SCHEDULE MAINTENANCE OF WET RISER & SPRINKLER SYSTEM

The scope of work includes minor components and materials and those required for testing, Mock drill and smooth functioning of system however exclude replacement of Major items like panel etc.

1. Routine checking of installations and there cleaning as per maintenance manual of original equipment manufacturer (OEM).
2. Mock drill of down comer /FA system has to be done in presence of site in- charge/engineer in –charge once in a month. He will keep records of all such mock drill/ testing.
3. The work also involves routine running of pump set manually and operation of hose reel/ hose pipe / MCP /Hooter physically and through fire alarm system and checking the display / sounder activation once month and entry shall be made in the register and periodical cleaning of these system per direction of engineer –in –charge for healthiness & functionality of system.

Fortnightly check (2nd&4th week of every month)

1. Cleaning of pumps , Motor panel Board Pump room landing valves and Hose reel etc
2. Weather the pump develops required pressure of 7 kg/sq.cm to be checked.
3. Automatic operation to be checked by opening any one valve (system to run for about 5 minutes and regarding to be recorded in the log book).
4. Routine checking of the followings :
   a) Healty conditions of battery voltage, Acid Level Terminals etc.
   b) Working Conditions of all the switches Contractors instruments in the control panel and rectify the same if required.
5. Checking all pipes and valves and arrest minor leakages if any
6. All safety visual and audio alarm.

Monthly Check

1. Check conditions of motor-pump set and smooth functioning of down comer system.

Quarterly check

1. Strengthening of hose pipe and powdering the same and repacking (quantity of 25% in every quarter and 100% in a year should be completed.
2. Lubricate all Bearings of pumps and motors
3. Check Air release valve for proper functioning
4. Check all valves for proper functioning and apply grease in their stems wherever required.

2. SCHEDULE MAINTENANCE OF FIRE ALARM SYSTEM

The scope of includes minor components and material and those required tfor testing. Mock drill and smooth functioning of system however exclude replacement of Major item like panel and detectors etc.

1. **Weekly inspection of FAS**
   a) Clean all the control panels, sounders and call boxes.
   b) While cleaning each Panel, verify whether any fault indication lamp is on .If it is with or without an alarm investigate and rectify the fault.

c) Check weather all panel lamps are healthy by the panel" panel lamp test button" in each panel.
d) Check that the system operates under mains failure conditions by switching of the main supply to the C&I panel and testing any zone for fault/fire condition from the zonal panel. Conform also that the audio visual alarm comes up the C&I panel. Restore mains supply after the test
e) Log all the panel instruments in C&I Panel.
f) If lead Acid type battery is used for FAS system ,Check the electrolyte level (and top up with distilled water as required)and specific gravity.

2. Check on Control Panel Operation

a) All Zonal (sector) Panels and C&I panel should be checked once a month.
b) Repeater panels if nay should also be checked once a month.
c) The check to confirm operation of the system in each zone through the rest button in zonal (sector) panel. The check should confirminitiation of audio visual indication in the zonal(sector) panel concernedand in the C&I Panel and also relevant sounders.
d) Check the talk back system from both ends and also PA system of C&I panel.
e) Check that the air conditioning/ventilation blowers are automatically switched off when fire condition is simulated by test button in the zonal (sector) panel.
f) Cheak the battery condition from this log book reading of voltage. Check the charger, if these any problem. Check battery terminal and f replace old grease with fresh grease to prevent corrosion.

3. Six Monthly Checks on FAS

a) All fire detectors should be cleaned. Do not blow in heavily in to the detector, use a proper suction device. Never leave detector base without replacement of the detector. Restore the zone panel if it was switched off for this operation.
b) Check the satisfactory operation of the system by an artificial fire in a bucket; keep necessary extinguishers, before this test as abundant precaution.
c) Megger test the wiring of FAS.

2.9 BIOMETRIC ATTENDANCE SYSTEM (BAS) & VIDEO CONFERENCING SYSTEM (VC)								
1	Hp Rack Server	:				Video Conference System	:	
2	Dell Rack Server	:				Mic	:	
3	Suprema Device	:				TachPad		
4	Network Manage Switch	:				Display Unit		
5	Bosch Controller	:				CCTV System		

	SL NO	ITEMS TO BE INSPECTED	Whether INSPECTED or NOT	PERIODICITY	RECORD PARAMETERS
	Daily Report				
	BIOMETRIC ATTENDANCE SYSTEM				
	1	Cleaning the sensor area with a soft, lint-free cloth		DAILY	
		Checking for any visible damage to the device		DAILY	
		Testing a few sample scans to ensure accurate recognition		DAILY	
		Daily New User Registration & Finger Enrolment		DAILY	
		Verifying device connectivity and power supply		DAILY	
		Photo Session with Smart Card Printing		DAILY	
	DATABASE SERVER APPLICATION SERVER				
	2	Monitor server performance metrics like CPU usage, memory utilization, network bandwidth.		DAILY	
		Review server logs for errors or unusual activity.		DAILY	
		Check for critical system updates and apply if necessary.		DAILY	
		Verify backup processes are running smoothly.		DAILY	
	VIDEO CONFERENCE SYSTEM				
	3	Verify that all video conferencing components (cameras, microphones, speakers, displays) are functioning properly.		DAILY	
		Monitor network bandwidth and stability to identify potential issues.		DAILY	
		Check for any available software updates for the video conferencing platform and apply them as needed.		DAILY	
		Everyday Zoom Link Create With Share		DAILY	
	NETWORK MANAGE SWITCH & FIREWALL SYSTEM				
	4	Check for visible damage, proper cable connections, and LED status on the switch.		DAILY	
		Apply security patches and updates released by the vendor.		DAILY	
		Check firewall status and connectivity.		DAILY	
		Monitor firewall logs for suspicious activity.		DAILY	
		Review switch port status, including link aggregation and traffic levels.		DAILY	
	CCTV SYSTEM				
	5	Verify camera images are clear and free of distortion.		DAILY	
		Check for any physical damage to cameras or housings.		DAILY	

2.9 BIOMETRIC ATTENDANCE SYSTEM (BAS) & VIDEO CONFERENCING SYSTEM (VC)								
1	Hp Rack Server	:				Video Conference System	:	
2	Dell Rack Server	:				Mic	:	
3	Suprema Device	:				TachPad		
4	Network Manage Switch	:				Display Unit		
5	Bosch Controller	:				CCTV System		

	Routine checkup (Weekly)				
	BIOMETRIC ATTENDANCE SYSTEM				
	1	Thorough cleaning of the device exterior		Weekly	
		Checking for software updates and applying if necessary		Weekly	
		Backup of biometric data (if applicable)		Weekly	
		Reviewing system logs for any error messages		Weekly	
	DATABASE SERVER APPLICATION SERVER				
	2	Install security patches and updates for operating systems and applications.		Weekly	
		Run virus scans on the server		Weekly	
		Check disk space usage and clean up unnecessary files		Weekly	
		Review system configurations for potential security risks		Weekly	
	VIDEO CONFERENCE SYSTEM				
	3	Perform basic adjustments to ensure clear video and audio quality		Weekly	
		Inspect the physical setup of the conference room, including lighting and seating arrangements.		Weekly	
		Assess network connectivity and bandwidth.		Weekly	
		Conduct short training sessions for users on best practices for video conferencing.		Weekly	
	NETWORK MANAGE SWITCH & FIREWALL SYSTEM				
	4	Track network traffic patterns, latency, and bandwidth usage to identify potential bottlenecks.		Weekly	
		Analyze system logs for error messages or abnormal behavior.		Weekly	
		Review firewall rules for accuracy and compliance.		Weekly	
		Analyze firewall logs for potential security breaches.		Weekly	
		Perform configuration audits to ensure proper settings.		Weekly	
	CCTV SYSTEM				
	5	Ensure cameras are securely mounted.		Weekly	
		Clean camera lenses with a soft, specialized cleaning cloth.		Weekly	

2.9 BIOMETRIC ATTENDANCE SYSTEM (BAS) & VIDEO CONFERENCING SYSTEM (VC)								
1	Hp Rack Server	:				Video Conference System	:	
2	Dell Rack Server	:				Mic	:	
3	Suprema Device	:				TachPad		
4	Network Manage Switch	:				Display Unit		
5	Bosch Controller	:				CCTV System		

	Additional Routine checkup (Monthly)				
	BIOMETRIC ATTENDANCE SYSTEM				
	1	Performing a full system scan to identify potential issues		Monthly	
		Checking for any firmware updates and applying as needed		Monthly	
		Calibrating the device (if required by manufacturer)		Monthly	
		Reviewing user access logs		Monthly	
	DATABASE SERVER APPLICATION SERVER				
	2	Perform a more thorough disk space analysis and data deduplication		Monthly	
		Review user access permissions and revoke outdated ones		Monthly	
		Check for outdated software and update where necessary		Monthly	
		Test data backups by restoring a sample file		Monthly	
	VIDEO CONFERENCE SYSTEM				
	3	Thoroughly examine all video conferencing hardware for signs of wear and tear, including cables and connection		Monthly	
		Ensure that system backups are functioning correctly and data is regularly being backed up		Monthly	
		Dust and clean ventilation components.		Monthly	
		Review usage reports to identify potential bottlenecks or areas for improvement.		Monthly	
	NETWORK MANAGE SWITCH & FIREWALL SYSTEM				
	4	Apply latest firmware updates to the switch to address security vulnerabilities and bug fixes.		Monthly	
		Regularly test the backup process and ability to restore configurations.		Monthly	
		Verify switch configurations, including VLANs, security settings, and QoS policies.		Monthly	
		Perform full system backups of firewall configurations.		Monthly	
		Conduct performance testing to identify potential bottlenecks.		Monthly	
		Review and update access control lists (ACLs) as needed.		Monthly	
	CCTV SYSTEM				
	5	Check cable connections for wear and tear.		Monthly	
		Test recording functionality and storage space.		Monthly	
		Verify night vision capabilities (if applicable)		Monthly	
		Review motion detection settings		Monthly	
	Quarterly maintenance				
	BIOMETRIC ATTENDANCE SYSTEM				

2.9 BIOMETRIC ATTENDANCE SYSTEM (BAS) & VIDEO CONFERENCING SYSTEM (VC)									
1	Hp Rack Server	:				Video Conference System	:		
2	Dell Rack Server	:				Mic	:		
3	Suprema Device	:				TachPad			
4	Network Manage Switch	:				Display Unit			
5	Bosch Controller	:				CCTV System			
	1	Detailed inspection of the device, including cables and connections			QUARTERLY				
		Testing the device with a wider range of users to ensure accuracy			QUARTERLY				
		Checking for any environmental factors that may affect performance (temperature, humidity)			QUARTERLY				
	DATABASE SERVER APPLICATION SERVER								
	2	Conduct a comprehensive system health check, including hardware diagnostics			QUARTERLY				
		Perform a full system backup to an offsite location			QUARTERLY				
		Review network configurations and firewall rules			QUARTERLY				
		Update critical system passwords			QUARTERLY				
	VIDEO CONFERENCE SYSTEM								
	3	Conduct a full system test with multiple users to evaluate overall performance and identify any issues.			QUARTERLY				
		Apply necessary firmware updates to video conferencing hardware.			QUARTERLY				
		Schedule regular meetings with your video conferencing service provider to discuss maintenance needs and address any concerns.			QUARTERLY				
	NETWORK MANAGE SWITCH & FIREWALL SYSTEM								
	4	Conduct vulnerability scans to identify potential security risks and implement necessary mitigation strategies.			QUARTERLY				
		Analyze network growth trends and plan for potential hardware upgrades.			QUARTERLY				
		Conduct a comprehensive security assessment of the firewall system.			QUARTERLY				
		Review user access and permissions.			QUARTERLY				
		Update firewall documentation.			QUARTERLY				
	CCTV SYSTEM								
	5	Check power supply and voltage stability			QUARTERLY				
		Inspect weatherproof seals on outdoor cameras			QUARTERLY				
		Test network connectivity if using IP cameras			QUARTERLY				
	Annual maintenance:								
	BIOMETRIC ATTENDANCE SYSTEM								
	1	Comprehensive cleaning and servicing by a qualified technician			ANNUAL				
		Reviewing user enrollment data for potential issues			ANNUAL				
		Updating device settings based on organizational needs			ANNUAL				
	DATABASE SERVER APPLICATION SERVER								
	2	Conduct a thorough security audit by a third-party vendor			ANNUAL				
		Review server capacity and plan for potential upgrades			ANNUAL				
		Evaluate server hardware for potential replacement needs			ANNUAL				
	VIDEO CONFERENCE SYSTEM								

2.9 BIOMETRIC ATTENDANCE SYSTEM (BAS) & VIDEO CONFERENCING SYSTEM (VC)								
1	Hp Rack Server	:				Video Conference System	:	
2	Dell Rack Server	:				Mic	:	
3	Suprema Device	:				TachPad		
4	Network Manage Switch	:				Display Unit		
5	Bosch Controller	:				CCTV System		

	3	Comprehensive system inspection including hardware and software components.		ANNUAL	
		Performance testing of all video conferencing features.		ANNUAL	
		Check for potential wear and tear issues.		ANNUAL	
		Calibration of camera and audio settings.		ANNUAL	
		Review system documentation and user training.		ANNUAL	
		Address any identified problems and perform necessary repairs.		ANNUAL	
	NETWORK MANAGE SWITCH				
	4	Thoroughly examine the switch for signs of wear and tear, including cooling fans and power supplies		ANNUAL	
		Perform network stress tests to evaluate switch performance under heavy traffic conditions.		ANNUAL	
		Review and update network documentation, including switch configurations and topology maps.		ANNUAL	
	CCTV SYSTEM				
	5	Thorough cleaning of all cameras and components		ANNUAL	
		Firmware updates for cameras and recording devices		ANNUAL	
		Check for potential issues with wiring and connections		ANNUAL	
		Assess system performance and identify potential vulnerabilities		ANNUAL	
		Backup system configurations and recordings		ANNUAL	

2.10 VARIABLE MESSAGE SIGNAGE SYSTEM					
1	Cabinet			RCD tester make and model:	
2	Display			Surge protector make and model:	
3	Controller			Date on battery label or proof of purchase	
4	Network Manage Switch			Cat 6 Cable	
	SL NO	**ITEMS TO BE INSPECTED**	**Whether INSPECTED or NOT**	**PERIODICITY**	**RECORD PARAMETERS**
		Daily Report			
	1	Clean Cabinet and check for moisture ingress. Repair as necessary.		DAILY	
		Check all labels and replace as necessary		DAILY	
		Check Communication and Power pits for water and other damage, clean as necessary		DAILY	
		Check exterior for damage or graffiti. Repair damage or remove graffiti. Report date or damage to RMS		DAILY	
		Check condition, replace and lubricate door locks, hinges & seals as required		DAILY	
		Check that log sheet and WEA drawings are complete and intact.		DAILY	
		If WAE drawings missing or damaged, prepare hand sketches at site and forward to RMS to reproduce.		DAILY	
		Physically check switchboard and RCD items.		DAILY	
		Reset circuit breakers. Measure RCD tripping current		DAILY	
		Locate MEN connection inside the cabinet		DAILY	

Routine checkup (Weekly)					
		Visually/physically check wiring/terminations/earthing items, tighten		Weekly	
		Check and secure Earth connection. Measure Earth insulation reading using insulation tester		Weekly	
		Check if surge protector is installed		Weekly	
		Inspect electronics of Sign controller and communication equipment for symptoms of electrical or thermal fatigue		Weekly	
		Remove mains power; verify uninterrupted controller operation. Check existing battery voltage and charger operation.		Weekly	
		Replace and label battery as specified, if date reached / 400 recharge cycles to 80% depth of charge.		Weekly	
	2	Check communication equipment jumper settings Use Maintenance software to check for data corruptions over the complete communications link (ISDN, Ethernet, 3G, etc). Comment findings.		Weekly	
		Retrieve Sign fault log. Repair or report as necessary		Weekly	
		Inspect sign display for symptoms of electrical or thermal fatigue. Repair or replace as necessary		Weekly	
		Check Sign support post and walkway platform structure including ladder and safety system for damage / corrosion / peeling galvanisation or paint.		Weekly	
		Check sign view from target distance; Clear tree branches if interfering with display		Weekly	
		Check maintenance walkway for bridging plates security.		Weekly	

Additional Routine checkup (Monthly)					
	3	Clean/vacuum gantry walk way/bridging plates of leaves etc.		Monthly	
		Check outside of sign enclosure for any peeling of paint, damage, graffiti or corrosion. Remove defect as necessary		Monthly	
		Check inside of sign enclosure for water leakage or presence of moisture damage. Locate leakage point, report and repair as necessary		Monthly	
		Clean light sensor cover. Reseal if needed or replace if damaged		Monthly	
		Check conspicuity doors or access points for rusted screws, replace if necessary		Monthly	
		Check cooling fan operation. Repair or replace as necessary		Monthly	
		Check thermoelectric cooling modules (e.g. Peltier), for evidence of condensation on the cold side. Repair or replace as necessary.		Monthly	
		Remove any weeds or grass near cabinet and equipment		Monthly	
		Inspect for damaged or missing covers, doors or hatches and replace as necessary.		Monthly	
Quarterly maintenance					
	4	Establish communication via sign controller's maintenance port (default 38400 baud)		QUARTERLY	
		Display frame with all pixels ON and all conspicuity devices flashing; visually check if all pixels are ON and verify with Sign status reply		QUARTERLY	
		Blank display; visually monitor sign response and verify with sign status reply		QUARTERLY	
		Turn facility switch to OFF; visually verify that display is blanked; verify that sign status reply reflects display status before facility switch override		QUARTERLY	
		Turn facility switch to MSG1; visually verify that Message 1 is displayed; verify that sign status reply reflects display status before facility switch		QUARTERLY	
Annual maintenance:					

		Turn facility switch to MSG2; visually verify that Message 2 is displayed; verify that sign status reply reflects display status before facility switch override		ANNUAL	
		Turn facility switch back to AUTO; visually verify that display resumes if Plan was active or blanks if no Plan was active; verify that sign status reply reflects display status before facility switch override		ANNUAL	
		Retrieve sign fault log; verify fault log is reporting sign and controller errors		ANNUAL	
		Non-destructively raise temperature of sign temperature sensor to designed temperature maximum in TSI-SP-008; verify that the fans turn ON and display blanks; let the temperature reduce below the designed upper limit; verify that the fans turn OFF		ANNUAL	
	5	Inspect for any obstructions to light sensor and clean or repair in compliance with TSI-SP-008		ANNUAL	
		Cover light sensor completely and visually monitor luminance level adjustments of display for at most five (5) minutes; verify that sign status reply reflects display luminance level		ANNUAL	
		Uncover light sensor completely and visually monitor luminance level adjustments of display, for at most five (5) minutes; verify that sign status reply reflects display luminance level		ANNUAL	
		Turn all switches OFF & ON.		ANNUAL	
		Turn all circuit-breakers OFF and reset; sign should report a fault log entry and clearance indicating the related power failure		ANNUAL	
		Inspect condition of controller		ANNUAL	
		Check for high resistance joints		ANNUAL	
		Check for damaged cables		ANNUAL	
		Clean and lubricate all mechanical components then cover to test functionality		ANNUAL	

3.0 GENERAL TERMS & CONDITIONS FOR WORK

1. The contractors are advised to visit the site of work to have an idea of the scope of execution of the work, failure to do so will not absolve their responsibility to do the work as specified in agreement.

2. All maintenance as well as repair/addition alteration /modification work will be strictly carried out & followed as per USOR (M&E)-2022 and amendment up to date for all relevant E&M service.

3. All the work shall be carried out as per Indian Electricity rules 1965(as amendment upto date) for all electrical services wherever applicable as standard safety procedure are to be followed.

4. No T&P shall be issued to the contractor.

5. The scope of work comprises of all the electrical & mechanical installations under inventory & functional asset of **Metropolitan Electrical Division.**

6. The scope of work consists of:-

6.1 Non-Comprehensive maintenance and operation of all E&M installations comprising of Electrical fittings, fixtures, equipments, gadgets etc. installed as per inventory, at sites considered. The works includes men and materials required for repair, replacement and normal working of these E&M installations. Nothing extra shall be paid on this account. Some specialized works are to be done through OEM or authorized dealer under comprehensive maintenance.

6.2 Minor E&M repairs and replacements required in the existing sites.

6.3 Upgradation, additions and alterations of E&M services are to be taken as per direction of Engineer-in-charge.

7. **Attendance register/record of Biometric attendance of staff** deputed shall be maintained and kept at site office and duty chart of workers shall be displayed at site **office/service centre**. The Biometric Machine for attendance will be provided by Department

8. All the material to be used on this work by the contractor shall be got approved from the Engineer-in-Charge before supplying at site.

9. The bad workmanship will not be accepted and defects shall be rectified at contractor's cost to the satisfaction of the Engineer-in-Charge. The electrical works are to be executed in coordination with the building work and no claim for idle labour will be entertained.

10. All the debris of the works should be removed and the site should be cleared by the contractor immediately after accumulating of debris. Similarly, any rejected material should be immediately cleared off from the site by the contractor and will be dumped at places as per direction of JE-in-Charge.

11. The contractor shall make his own arrangement at his own cost for all tools and plants required for smooth and prompt functioning of work.

12. The contractor will store, at any point of time, **at least 10% of stock of material required for comprehensive maintenance** /ARMO/ Minor work/ up gradation & Watch and ward of same will be responsibility of contractor. Suitable storing place shall be provided by Department.

13. The work shall be carried out in such a manner so as not to interfere or effect or disturb other works, being executed by other agencies, if any. He shall arrange his work with that of the other in an acceptable and coordinated manner and shall perform it, in proper sequence to the complete satisfaction of the Engineer-in-Charge. Any damage done by the contractor to any existing work shall be made good by him at his own cost. Otherwise the same shall be got done at his risk and cost.

14. The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to Govt. employees and Colony incumbents to prevent any damage to such properties and any pollution of smoke, streams and waterways. He shall make good at his cost and to the satisfaction of the Engineer-in-Charge, any damage to roads, paths, cross drainage works or public or private property whatsoever caused by the execution of the work or by traffic brought thereon by the contractor. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the employee & colony incumbents.

15. Any damage to the Govt. Property shall be made good by the Contractor and nothing extra shall be paid on this account.

16. The main/associated contractor shall have **registration with Employee Provident Fund Commissioner and Employee's Estate Insurance Corporation** for safe guarding the interest of his workmen. The contractor shall obtain all necessary approval from state/Local Body as per law in vogue.

17. All staff employed by the contractor should be issued **uniform, name badges. and identity cards by the contractor**. The staff deployed by the contractor should wear neat and clean uniform daily.

18. The character and antecedents of staff employed by the contractor shall be got verified from the police by the contractor.

19. The staff engaged by the contractor should be well behaved, polite and courteous. Any complaints against staff misbehavior should be taken very seriously and such staff should be removed by the contractor immediately from the site and arrange replacement for the same failing which the Engineer-in-charge has the power to cancel the contract and the contractor shall have no right to claim of loss/compensation.

20. Safety of the staff employed will be the responsibility of the contractor. Irrigation & Waterways Directorate, Govt. of West Bengal will not be responsible for any mishap, injury/accident or death of the staff. No claim in this regard shall be entertained/accepted by the Department.

21. The work may be assign in restricted area and time due to security reasons. The contractor shall be bound by the instructions of security staff and Engineer-in-Charge in this respect.

22. The contractor shall provide details of Staff to be engaged containing information's like name, father's name, residential address and Date of Birth of staff along with recent passport size photograph, residential address and identity proof etc. as may be required.

23. All the **complaint registers, log books, Stock Registers, dismantle material registers, Task Registers, workers diary, test result registers or any other record pertaining to work shall be supplied by the contractor** and will be maintained by the staff of the contractor which will be handed over to the department on the completion/termination of the contract.

24. The contractor shall monitor the complaints lodged by the occupants of Govt. colony & office staff, by any mode such as verbally, telephonically etc., by receiving, attending and closing the case with suitable remarks, after duly attending the complaints.

25. The scope of work for E&M services as stipulated in NIT may vary or deviated which is deemed in scope of work at the time of execution. The Contractor has to arrange required material and men power accordingly without any additional cost to maintain all the services.

26. The contractor shall conduct a survey every month covering at least 25% of the complaints received during the month and will collect the feedback, of compliance of same and will submit the same to the Engineer-in-charge.

27. No running bill will be paid to the contractor/agency unless they produce the proof of paid receipt of ESI/EPF contribution to concerned authority.

28. Safety of staff will be the responsibility of the contractor as per labour law. The department will not be a party in such litigation in any situation/condition.

29. The staff deployed by the contractor for providing services shall be their employees. The department will not be responsible for their regularization.

30. The Electrical items of supply shall be ISI marked wherever applicable and as per the approved list enclosed in NIT. If any of the accessories available in the market is not ISI marked then decision of Engineer-in-charge will be final and binding to the contractor.

31. The contractor or his representative is bound to **sign the site order book** as and when required by the Engineer-in-Charge and to **comply with the remarks therein**.

32. The contractor shall make his own arrangement for transportation of men & material from one site to another. He will also make necessary arrangements for delivery of material, transportation of dismantled material from site to designated store i/c packing and forwarding and nothing extra shall be paid on this account.

33. After the expiry of the contract, the firm shall have **to hand over complete installation to the department in healthy & proper working /functional order**. All defects and deficiencies shall have to be rectified by the firm to the entire satisfaction of Engineer-in-charge failing which, the work shall be got done at the risk and cost of the firm.

34. The Contractor shall provide all necessary tools and plants to his workmen nothing extra will be paid on this account.

35. In case any accidents during the Operation/maintenance of the equipment leading to injuries/ damages to human beings / equipments and/or loss of life, the contractor shall be fully responsible for settling all claims and indemnify the department against any claim arising out of such accidents.

36. The contractor shall arrange to render efficient services as outlined above. However in case he **fails to maintain the services to the satisfaction of the Engineer-in-charge** and the department has to incur any expenditure to maintain the installations by alternative arrangement the expenditure thus incurred will be recovered from the contractor, for which decision of the Engineer-in-Charge shall be final and binding.

37. Terms of payment and other facilities for workers.

    a) The contractor shall pay wages to the workers not less than the rates as per minimum wages act notified by Labour Department, Govt. of West Bengal time to time. The contractor shall maintain all the paid wages records duly verified by the JE/AE The payment of the contractor will be made only after production of wages paid records.
    b) The payment to the workers shall be made through NEFT/RTGS/ECS mode etc.
    c) The payment to the workers shall be made upto 7th day of next month positively otherwise penalty of Rs. 500/- per worker per day shall be recovered from the bill of the contractor.
    d) The contractor shall deduct worker subscription towards Provident Fund and ESI, as per rules and he shall deposit the same along with his contribution into the respective accounts of the worker latest by 10th of each month and submit the detail to this office for verification.
    e) Copy of relevant period physical attendance sheet/register

f) Fortnightly labour report.

38. The contractor shall submit the valid proof of qualification of respective work man to department & will get permission of Engineer- in- charge before deploying at site. The man power to be engaged for above work should fulfill below mentioned minimum qualifications.

    i) Skilled Worker: Matriculation along with Wireman license/ 2Yrs. ITI from Govt. approved institutions with suitable experience in respective trade

    ii) Unskilled Worker: Literate.

    Note: All the staff to be deployed shall be physically and mentally fit.

39. If any staff is found unfit for duty due to any circumstances, the contractor shall replace such staff immediately (within 24 Hrs) of reporting by Engineer-in-Charge or his authorized representative.

40. The contractor shall not remove any of his staff deployed at site without the permission of Engineer-in-Charge or his authorized representative. **The contractor shall clear all pending dues of all such workman under intimation of which to Engineer-in-Charge or his authorized representative before his removal from work.**

41. **The multidiscipline skilled labour (Ie. Wireman/Pump Operator/DG Operator /Lift Operator/Fire Technician/AC Plant operator) to be deployed shall have minimum basic knowledge of all above E&M equipments and will be well familiar with the running and operation of all above E&M Services and having 5 years experience**. In case of major breakdowns he will report the same to Engineer-in-charge and he will also assist to the specialized agencies engaged for attending of all such breakdowns.

42. All the cleaning material Ie soap, duster, PVC tape roll etc. shall be arranged by the contractor at his own cost, for cleaning of Electrical Installations & fans, switch gears, DBs, Panels, Water supply pumps, Fire Alarm Systems, Wet Riser Systems, DG Sets, Sub Station equipments, Air-conditioners, UPS, Water Coolers and all other equipments/ accessories/pipe lines etc. associated with above E&M Services. The contractor shall also be responsible for cleaning of substation rooms, AC Plant rooms, Lift machine rooms, Pump rooms, AHU Rooms etc. If cleaning of installation is not found satisfactory at any time, a recovery of Rs. 500/- per occasion per site shall be made from the bill of contractor.

43. The contractor shall prepare a site wise **"fortnightly/Monthly duty chart"** with name and duty hours stated therein. The same shall be submitted to the JE / AE concern at least seven days in advance for approval.

44. It shall be entirely the responsibility of the contractor to ensure that no unlawful act is conducted by his persons while on duty. In case any theft loss of departmental property takes place due to the negligence or carelessness of his personnel, the contractor will be held responsible to compensate for all such losses.The aforesaid terms and conditions shall be read in conjunction with the general rules and directions for the guidance of Contract Agreement (West Bengal Form No-2911)

45. The contractor shall provide **one valid mobile number** at each site & same will be displayed at enquiry office/JE office/Pump Room and Lift and will also be informed. Contractor shall not change the mobile nos. during the stipulated period of agreement. **If mobile is found switched off for more than One hour, recovery shall be made Rs 100/- per occasion per day**.

46. The contractor has to take over the site from JE-in-charge as per the inventory. After completion of work contractor has to hand over the site to J.E. in charge of site. In case the contractor does not sign the inventory within 7 (Seven) days of taking over of site, it will be presumed that the site has been handed over to him as per inventory of site available with concerned JE and no claim for shortage of material/item at the time of handing over back to department will be entertained.

47. The contractor shall make his own arrangement of tools for maintenance of Sub Station/Electrical Installations equipments& one set of minimum following T&P shall always be available at each site of work by the contractor-

i. Test lamp
ii. Multi Meter
iii. Lux Meter
iv. Line tester
v. Tongue tester
vi. Vernier calipers
vii. Screw Gauge
viii. Wire gauge
ix. Measurement tape (3 Mtr/5 Mtr& 15 Mtr.)
x. Rubber Gloves of 11 KV
xi. First Aid box
xii. Crimping tool kit with die
xiii. Megger (5 kV HT and 500 V LT)
xiv. Digital insulation tester
xv. Digital earth tester
xvi. Spanner set
xvii. Screw driver set
xviii. L-N Key set
xix. Blower
xx. Hammer Drill Machine
xxi. Pipe wrench
xxii. Different size of aluminum ladders for maintenance of street lights, ceiling fans at different heights.
xxiii. Plier (Both Normal & nose plier)
xxiv. Table alongwith 2 set of Chair-4 set
xxv. Computer 1 No. alongwith A4 size paper, Cartridge& Printer.

The above T&P items will be stored by the contractor under his watch and ward. The contractor shall issue one set of above items to each skilled worker. In case the above items are not available at site then **a recovery of Rs. 100/- per day per person shall be made from the contractor bill.**

48. **The quantity & item stipulated in schedule of quantity of each work is tentative and indicative hence subjected to variation. Payment of only those quantities will be made which is actually executed at site.**

49. The labour deployed at one site can be shifted to other site in same city as per requirement and nothing extra shall be paid on this account.

50. The contractor will keep the account of all the works executed at site/material or spares replaced at site duly verified by the representative of Department officer not below the rank of JE(E). Payment of all the works/jobs/replacements carried out by the contractor will be made only on the basis of production of record as above.

51. The contractor will execute the work in office residential areas as per the convenience of occupants of building and nothing extra shall be paid on account of **wastage /idle labour for any reasons**.

52. The contractor shall maintain separate records of all periodic, breakdown & preventive maintenance work carried out by him in various E&M equipments like DG Set, Lift, Sub Station, Electrical Installation, Fire Alarm System, Fire Fighting System, UPS, RO & Water purifier etc., as enclosed schedules.

53. The contractor shall maintain the readings of various measuring instruments in prescribed format. The contractor shall also **maintain separate Log Book** for each service like Pump Set, DG Set, Lift, Sub Station, Electrical Installation.

54. The comprehensive and break down maintenance work of specialized services like DG Set, Lift, Sub Station etc. shall be carried out through the OEM of respective equipments or their authorized service agents / channel partners/service vendors only. **The contractor shall produce authorization certificate of OEM at each occasion in case of service agents/channel partners/service vendors of respective equipment engaged for attending of complaint/maintenance work.** A service memo containing the details of works carried out by them during attending of complaint/maintenance work shall be issued by all such OEM of respective equipments or their authorized service agents /channel partners/service vendors whenever visited at site.

55. The contractor shall ensure that any spare part replaced from any E&M equipment shall be of same make which is installed at site or as per the recommendations of OEM/approval of Engineer in charge.

56. The contractor shall also maintain the record of dismantle material at site and dismantle material shall be handed over to JE(E).

57. **In case of major break down the staff deployed by contractor at site may be asked to stay beyond their duty hours** whenever required and nothing extra shall be paid on account of this.

58. The contractor shall ensure that no water logging take place at site due to the scope of his own work. In case any fine is imposed by local authorities for breeding of dengue etc. will be borne by the contractor.

59. The contractor shall supply the material only as per the attached list of approved makes. For items not covered in this list will be provided only after the approval of Engineer in charge.

60. In case the site of some work may not be available at any stage, the contractor shall make necessary arrangements of labour & material etc. of those sites in accordance to the availability of site in consultation with Engineer in charge only.

61. The complaints lodged shall be attended within one (01) Hrs. of lodging Emergency complaints like leakage of Electric currents, sparking, short circuiting, Fire and No electricity shall be given priority and will be attended within 1 Hr. of lodging Failure of which shall attract a penalty of Rs. 500/- per complaint per day. The complaint can be lodged through writing /telephonically text message/orally shall be treated as registered complaint at the time of communication of same to contractor staff.

62. The sundry material like hole fasteners, dash fasteners, nuts bolt, screws, washers, fan rubber reel/Fan cotter pin, PVC tape, saddles, tie, clip for wire/cables, mobil oil, grease, gland dori, PVC Seals, Rubber bushes, old dhoti, detergent, cement and sand for minor repairs etc should be made available by contractor free of cost & nothing extra shall be paid by department on this account.

4.1 TERMS AND CONDITIONS (SERVICES OF SUPERVISOR)

1. The work shall be carried out as per the direction of Engineer-in-charge.

2. Any loss to the Govt. property/building due to negligence of the supervisor shall be borne by the contractor.

3. Payment to the supervisor engaged by the contractor shall be made through e-payment by the contractor. The contractor have to pay salary towards employee on monthly basis upto 7th day of each month and ESI & EPF contribution of every month upto 15th day of following month and submit the documentary proof/ receipt to Engineer-in-charge for payment of the bill. If contractor fails to pay the salary upto 7th day of every month, then recovery shall be imposed @Rs. 100/- per day per employee (for maximum of 15 days per month for delayed payment). No running account bill shall be paid/entertained without submitting the above documents.

4. The contractor is bound to pay the increased minimum wages, to their staff deployed, as fixed by Deputy Commissioner, Chandigarh from time to time and extend facility of applicable ESI, EPF etc. as per prevailing labour bye laws.

5. Contractor has to submit the **Identity details** of skilled staff/unskilled staff with qualification, ESIC/EPF Number and Bank details before start of work.

6. Payment will be made to contractor on quarterly basis as per available of fund. However, contractor has to make payment on monthly basis to the deputed staff as per labour laws through e-payment only.

7 In case supervisor absents from duty, a suitable replacement shall be provided by the contractor, failing which the recovery @ 1000/- per day per supervisor shall be made from the bill.

8. Supervisor shall be qualified & should have passed Diploma or equivalent qualification in trade. having minimum 03 years of experience.

9. Supervisor will instruct and guide Electricians, Wiremen and all electrical staff on installations maintenance and operation of Elect. Works including lift power house, sub-station etc. He shall attend to complicated nature of work viz. setting and adjusting of controls for different types of LT. & H.T. switch gear lift. Generating sets etc. He shall have to assess the materials and spare parts required for different types of elect. Installations and their repairs and the time required for different jobs\

10 The department shall have liberty to foreclose the contract at any time, if performance of the supervisor is found unsatisfactory in the opinion of E.I.C..

11 The rates of the contractor shall be inclusive of all taxes and GST. Nothing extra shall be paid on any account.

12 If Supervisor deployed by the contractor files any case in any court/consultative office/labour court or any other legal authority etc. at any place within West Bengal under this contract, then Department shall not be made party in that case in any way by the employee of the contractor. This fact should be clearly and legally brought to the notice of supervisor deployed by the contractor and contractor should be fully responsible for all the consequences arises in this matter.

4.2 TERMS AND CONDITIONS (SERVICES OF SYSTEM SUPERVISOR)

1. The work shall be carried out as per the direction of Engineer-in-charge.

2. Any loss to the Govt. property/building due to negligence of the system supervisor shall be borne by the contractor.

3. Payment to the system supervisor engaged by the contractor shall be made through e-payment by the contractor. The contractor have to pay salary towards employee on monthly basis upto 7th day of each month and ESI & EPF contribution of every month upto 15th day of following month and submit the documentary proof/ receipt to Engineer-in-charge for payment of the bill. If contractor fails to pay the salary upto 7th day of every month, then recovery shall be imposed @Rs. 100/- per day per employee (for maximum of 15 days per month for delayed payment). No running account bill shall be paid / entertained without submitting the above documents.

4. The contractor is bound to pay the increased minimum wages, to their staff deployed, as fixed by Deputy Commissioner, Chandigarh from time to time and extend facility of applicable ESI, EPF etc. as per prevailing labour bye laws.

5. Contractor has to submit the Identity details of skilled staff/unskilled staff with qualification, ESIC/EPF Number and Bank details before start of work.

6. Payment will be made to contractor on quarterly basis as per budget available. However, contractor has to make payment on monthly basis to the deputed staff as per labour laws through e-payment only.

7. In case system supervisor absents from duty, a suitable replacement shall be provided by the contractor, failing which the recovery @ 1000/- per day per system supervisor shall be made from the bill.

8. System Supervisor shall be qualified & should be Graduate in Computer Science/ IT or equivalent qualification, having minimum 03 years of experience.

9. System Supervisor will maintain Networking system on Zoom and various portals in building i/c attending day to day complaints of Internet /BAS Connectivity, enabling of computers to work on networks and carrying out preventive maintenance of the Internet. Network switch & access points.

10. The department shall have liberty to foreclose the contract at any time, if performance of the system supervisor is found unsatisfactory in the opinion of E.I.C.

11. The rates of the contractor shall be inclusive of all taxes and GST. Nothing extra shall be paid on any account.

12. If System Supervisor deployed by the contractor files any case in any court/consultative office labour court or any other legal authority etc. at anywhere within West Bengal under this contract, then Department shall not be made party in that case in any way by the employee of the contractor. This fact should be clearly and legally brought to the notice of system supervisor deployed by the contractor and contractor should be fully responsible for all the consequences arise in this matter.

4.3 TERMS AND CONDITIONS (SERVICES OF ELECTRICIAN CUM WIREMAN/ OPERATOR)

1. The work shall be carried out as per the direction of Engineer-in-charge.

2. Any loss to the Govt. property/building due to negligence of the wireman/operator shall be borne by the contractor.

3. Payment to the wireman/operator engaged by the contractor shall be made through e-payment by the contractor. The contractor have to pay salary towards employee on monthly basis upto 7th day of each month and ESI & EPF contribution of every month upto 15th day of following month and submit the documentary proof receipt to Engineer-in-charge for payment of the bill. If contractor fails to pay the salary upto 7th day of every month, then recovery shall be imposed Rs. 100/- per day per employee (for maximum of 15 days per month for delayed payment). No running account bill shall be paid/entertained without submitting the above documents.

4. The contractor is bound to pay the increased minimum wages, to their staff deployed, as fixed by Deputy Commissioner, Chandigarh from time to time and extend facility of applicable ESI, EPF etc. as per prevailing labour bye laws.

5. Contractor has to submit the Identity details of skilled staff/unskilled staff with qualification, ESIC/EPF Number and Bank details before start of work.

6. Payment will be made to contractor on quarterly basis as per budget available. However, contractor has to make payment on monthly basis to the deputed staff as per labour laws through e-payment only.

7. In case wireman/operator absents from duty, a suitable replacement shall be provided by the contractor, failing which the recovery @700/- per day per wireman /operator shall be made from the bill

8. Wireman Operator should have passed ITI or equivalent qualification in trade and should possess valid wireman license / electrical wireman permit/electrician license or any other equivalent certificate with at least three years' experience.

9. General supervision and guidance to the work of electrical including carrying out complicated maintenance works on HT and LT Electrical installations.

10. Wiring and maintenance of important installations like Electric Motor, Lift etc. with wiring diagrams and instructions supplied he should install, maintain and test wiring in lift installations also where required.

11. Installation, repairs, maintenance and testing of ceiling, tables and exhaust fans and heaters, give must first aid (Resuscitation)at site where necessary.

12. Persons engaged in maintenance work should be competent for the type of work involved and should possess necessary license.

13. Safety procedure are to be followed as indicated in Separate Chapter.

14. It is necessary that those responsible for the site maintenance should have a clear knowledge about the distribution system.

15. The number of items to be maintained in a building residence may be many like fittings, fans, DBs, earth sets etc. In order to achieve compliance to **the prescribed periodicities** for the various numbers to carry out the respective activities in sub periods, **in a cycling (sequential) order**. For example if DB's are to be checked every month in a sequential order (programmed in advanced) so that all DBs are checked in a month.

16. Maintenance activities carried out as per this schedule should be noted in the maintenance register also. When tests are carried out, the test results should be recorded with appropriate identification references.

17. Inspection of electrical installation is intended primarily from fire safety considerations.

18. The department shall have liberty to foreclose the contract at any time, if performance of the wireman operator is found unsatisfactory in the opinion of E.I.C.

19. The rates of the contractor shall be inclusive of all taxes and GST. Nothing extra shall be paid on any account.

20. If wireman/operator deployed by the contractor files any case in any court/consultative office/labour court or any other legal authority etc. at anywhere within West Bengal under this contract, then Department shall not be made party in that case in any way by the employee of the contractor. This fact should be clearly and legally brought to the notice of wireman/operator deployed by the contractor and contractor should be fully responsible for all the consequences arises in this matter.

4.4 TERMS AND CONDITIONS (SERVICES OF LIFT ATTENDANT)

1. The work shall be carried out as per the direction of Engineer-in-charge.

2. Any loss to the Govt. property/building due to negligence of the lift attendent shall be borne by the contractor.

3. Payment to the lift attendent engaged by the contractor shall be made through e-payment by the contractor. The contractor have to pay salary towards employee on monthly basis upto 7th day of each month and ESI & EPF contribution of every month upto 15th day of following month and submit the documentary proof/ receipt to Engineer-in-charge for payment of the bill. If contractor fails to pay the salary upto 7th day of every month, then recovery shall be imposed @Rs. 100/- per day per employee (for maximum of 15 days per month for delayed payment). No running account bill shall be paid/entertained without submitting the above documents.

4. The contractor is bound to pay the increased minimum wages, to their staff deployed, as fixed by Deputy Commissioner, Chandigarh from time to time and extend facility of applicable ESI, EPF etc. as per prevailing labour bye laws.

5. Contractor has to submit the Identity details of skilled staff/unskilled staff with qualification, ESIC/EPF Number and Bank details before start of work.

6. Payment will be made to contractor on quarterly basis as per budget available. However, contractor has to make payment on monthly basis to the deputed staff as per labour laws through e-payment only.

7. In case lift attendent absents from duty, a suitable replacement shall be provided by the contractor, failing which the recovery @ 1000/- per day per lift attendant shall be made from the bill.

8. Lift Attendant should have minimum 12th Standard Pass having Certificate of Vocational training/license (for technical job) wherever applicable with at least three years' experience.

9. In case of breakdown, lift attendant should inform JE/AE in charge of the work and maintenance authorities.

10. To keep the lift car & doors and lift room neat & clean.

11. To rescue the passengers in case of breakdown of lift.

12. Operation of lift on manual mode in case of any VIP visit/as per direction of Engineer-in-charge.

13. To help the differently abled person/ person on wheel chair in boarding & deboarding the lift.

14. Lodge the complaint to OEM of lifts in case of any breakdown/ failure of lift.

15. The service of lift serving various floors will be provided as per the pattern decided by Engineer-in-charge from time to time.

16. All local safety security regulations shall be observed strictly.

17. The department shall have liberty to foreclose the contract at any time, if performance of the lift attendent is found unsatisfactory in the opinion of controlling officer and performance guarantee shall be forfeited.

18. The rates of the contractor shall be inclusive of all taxes and GST. Nothing extra shall be paid on any account.

19. If lift attendant deployed by the contractor files any case in any court/consultative office/labour court or any other legal authority etc. at anywhere within West Bengal under this contract, then Department shall not be made party in that case in any way by the employee of the contractor. This fact should be clearly and legally brought to the notice of lift attendant deployed by the contractor and contractor should be fully responsible for all the consequences arises in this matter.

4.5 TERMS AND CONDITIONS (SERVICES OF KHALASI/ HELPER)

1. The work shall be carried out as per the direction of Engineer-in-charge.

2. Any loss to the Govt. property/building due to negligence of the Khallasi/helper shall be borne by the contractor.

3. Payment to the Khallasi/helper engaged by the contractor shall be made through e-payment by the contractor. The contractor have to pay salary towards employee on monthly basis upto 7th day of each month and ESI & EPF contribution of every month upto 15th day of following month and submit the documentary proof/ receipt to Engineer-in-charge for payment of the bill. If contractor fails to pay the salary upto 7th day of every month, then recovery shall be imposed @Rs. 100/- per day per employee (for maximum of 15 days per month for delayed payment). No running account bill shall be paid/entertained without submitting the above documents.

4. The contractor is bound to pay the increased minimum wages, to their staff deployed, as fixed by Deputy Commissioner, Chandigarh from time to time and extend facility of applicable ESI, EPF etc, as per prevailing labour bye laws.

5. Contractor has to submit the Identity details of skilled staff/unskilled staff with qualification, ESIC/EPF Number and Bank details before start of work.

6. Payment will be made to contractor on quarterly basis as per budget available. However, contractor has to make payment on monthly basis to the deputed staff as per labour laws through e-payment only.

7. In case Khallasi/helper absents from duty, a suitable replacement shall be provided by the contractor, failing which the recovery @ 1650/- per day per Khallasi/helper shall be made from the bill.

8. Khallasi should be physically & mentally fit and shall be able to read & write English & Hindi.

9. Unskilled work and general assistance to workmen on the electrical side.

10. The department shall have liberty to foreclose the contract at any time, if performance of the Khallasi/helper is found unsatisfactory in the opinion of controlling officer and performance guarantee shall be forfeited.

11. The rates of the contractor shall be inclusive of all taxes and GST. Nothing extra shall be paid on any account.

12. If Khallasi/helper deployed by the contractor files any case in any court/consultative office / labour court or any other legal authority etc. at Chandigarh or anywhere else in India at any time under this contract, then Department shall not be made party in that case in any way by the employee of the contractor. This fact should be clearly and legally brought to the notice of Khalasi deployed by the contractor and contractor should be fully responsible for all the consequences arise in this matter.

5.1 ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE OF INTERNAL E.I. WORK

Scope of Work:-

(A) Internal E.I.& Fans

1. The agency has to carry out preventative maintenance as per Chapter UNIFIED SCHEDULE OF RATES (USOR M&E)

2. To attend day to day complaints of Internal and external E.I.& Fans, compound/street/High Mast lights, main boards, DB's etc. at site of work maintenance, i/c logging of same in complaint register and worker diaries.

3. Taking following necessary steps for preventive maintenance:-

   i) Checking of Main Boards, DBs, SDBs, Switch Boards, Rising main etc. and ensure that there is no loose connection at any instance. Also ensure that neutral and earth connections are well terminated at any instance

   ii) Checking and cleaning of fans and fittings when and as required for their performance and safety.

   iii) Insulation test before monsoon & preparation of record of same.

   iv) Earth test before monsoon i.e., during peak summer season & preparation of record of same.

   v) Providing Ladder arrangement/Tower wagon for preventive maintenance of Street/Campus/High Mast lighting as and when reqd.

   vi) Lowering and raising of lantern carriage of all High Masts for cleaning and replacement of defective lamps as and when reqd.

   vii) Checking of phase wise load at each DB, Panel & Balancing thereof to avoid any overloading on the system and to avoid unwanted shutdown etc.

   viii) Removal of temporary connections/joints and remedial measures thereof.Ensure no wires are in open and hanging. Cables are well terminated on switchgears.

   ix) Lids of DBs, Panel Boards and Street light pole box are property closed all the time.

x) No screws/ nuts & bolts are missing from switch boards/DBs/Panel Boards.

xi) Ensure no dust accumulation in from switch boards/DBs/ Panel Boards. Ensure periodic cleaning of same by blower.

xii) Ensure all the switches are well placed and cleaned by CTC Spray/ cleaning agent.

xiii) No switch gears are over loaded/heated, remedial measures thereof.

xiv) All the switchgears and MCBs are well identified for their respective circuits.

xv) Circuit diagrams are prepared and available.

xvi) Emergency contact numbers are property displayed and available with staff.

xvii) All the fans electrical fixtures and street light fittings are in proper working conditions.

xviii) Fans are properly oiled or greased at regular interval. Safety of ceiling fans, exhaust fans and electrical fittings to be ensure and remedial measures to betaken so that the same may not fall.

4. Watch and ward of all electrical fixtures.

5. Checking and setting of timer switches and ensure no wastage of electricity in street lighting.

6. Checking and immediate remedial measures if there is any sparking/ heating/fire at any place in building.

7. Logging of all the complaints received and material/ spare part replaced and dismantled material received.

8. Providing Ladder arrangement/Tower wagon for preventive maintenance of Street/Campus/High Mast lighting as and when reqd.

9. Lowering and raising of lantern carriage of all High Masts for cleaning and replacement of defective lamps as and when reqd.

5.2 ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE OF SUBSTATION

1.	Operation, testing and routine maintenance of sub-station equipment comprising of transformers, H.T. Panel, LT Panel, emergency/ DG supply/ Panel/ AMF Panel/APFC Panel/ Bye pass panel etc.		
	Operation, testing & routine maintenance of D.G. Sets with AMF Panels etc.		
2.	**Periodic Checking:**		
	No.	Item	Frequency
	a.	Checking of working of instruments	Daily
	b.	Checking of working of instruments	Daily
	c.	Physical inspection	Daily
2.1	The maintenance work shall be done as per Rules & specifications of CPWD and as per I.E. Rules and acts as amended up to date		
2.2	The Contractor's personnel will be required to maintain the log books and other records as prescribed by the department		
2.3	All installations and Sub Station rooms shall be kept neat & clean and safe from risk of fire/theft/accidents and damage etc.		
3.	**Additional Conditions for Servicing of 11/0.433 KV Dry type Transformer.**		
	1.	Work shall include monthly checking and cleaning of transformer with blower	
	2.	Checking of all connection tightening etc.	
	3.	Checking of controls and operation.	
4.	Additional Conditions for L.T. Panel (ACB).		
	1.	Work shall include cleaning of panel checking of connections once a month.	
	2.	Work shall be carried as per CPWD specification Part-1 (internal) 2005 and in addition to specified in schedule of work.	
6.	**General servicing of HT Panel & LT Panel before summer. (Annually or as required)** All LT panels and HT panels will be opened after getting shut down, cleaned, all joints checked physically, all jointing tightened and cleaned thoroughly. All nut & bolts of LT & HT panel, bus trunking shall be tightened. Proper insulating tape to be used where the PVC insulation is worn out.		

7.	Diesel & Engine oil etc. for operation of D.G. Sets will be issued by the department. Contractor will maintain diesel consumption record and consumption of diesel shall be checked by JE (E) monthly. If diesel issued to the contractor does not tally with the consumption statement. Necessary recovery shall be made from the bill of contractor for balance diesel. The contractor shall intimate at least in one week advance in case of requirement of fuel for operation of D.G. Set.	
8.	a.	The operator shall test the D.G. Set on no load on alternate days in the morning for 5 minutes run and D.G. Set shall operate in case of failure of normal electric supply from Supply Company.
	b.	Cleaning of D.G. Set i/c checking of battery connection, level of water in radiator & battery, Oil etc.

Inventory of Equipments:-

GPRA

a) 11 / .415 KV 1600 KVA Dry type transformer (Kirloskar)-2 Nos.
b) HT Panel with 3 Nos. VCB (Kirloskar) - 5 Nos.
c) LT Panels with 2500 Amp- 3Nos., 800 Amp - 8 Nos., 630 Amp-2 Nos. ACB and associated accessories and equipments.
d) APFC Panel-2 Nos.
e) 200 KVA DG sets with AMF Panel (Kirloskar) – 2 Nos.

Note: - Cost of Major Equipments or items damaged due to accident or fire will be borne by the department.

5.3 ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE OF DG SYSTEM

1. The contractor shall have to depute trained and qualified staff for adjustment, repair replacement and periodical maintenance of all equipment within quoted rates.

2. The Engineer shall visit at least once a month for preventive Maintenance and as and when required on call basis, for attending any complaint.

3. In emergency odd hours servicing shall also be provided but noting extra shall be paid.

4. Sundry material such as soap, duster, broom, old dhoti, cotton waste fuse wire. PVC tape, Grease. Test Lamp. Torch etc. required for the work shall be arranged by the contractor within their quoted rates.

5. The scope of work includes: -

   a. AMC of all DG Sets with AMF Panel, defective/burnt out parts to keep them in proper working condition.
   b. Preventive maintenance of each DG Set at least once a month.
   c. Servicing & replacement of spare parts & Check of DG Set as per the schedule of OEM standards including replacement of lube oil.
   d. Tapping up of HSD oil, as and when required.

6. All the installation/equipments shall always be maintained by the contractor in proper working condition i/c cleaning.

7. Any damage caused due to negligence of contractor during the routine maintenance shall be of firm responsibility. The firm will made good the same within quoted rate.

8. The contractor has to carry out the routine/ preventative maintenance as per USOR specification & maintenance manual.

9. The Engineer-in-charge reserves the right to ask the contractor to remove any of the staff without assigning any reasons what so ever. The decision of the Engineer-in-charges shall be final and binding on the part of the contractor.

10. Nothing shall be paid extra on account of cartage of material.
11. The contractor shall use following material within the scope of maintenance of D.G. set for which nothing extra shall be paid.
    a. Indication lamps.
    b. White Petroleum Jelly.

c. Battery Water/ Acid & battery lead and terminals.
d. CRC for cleaning of relays, contractors, alternators carbon brushes etc.
e. Proper grade of grease oil for greasing lubricating bearings etc.
f. Protection metering fuses, control wiring etc.

12. All installation shall be kept clean and safe from risk of fire/theft/accidents and damages etc.

13. The DG set are to be AMC maintained by respective OEM or their authorized representative.

14. The make of materials used for servicing/repair shall only be as per OEM or their authorized vendors.

15. All DG Sets are to be checked, every alternate day, with running of DG Set, on test mode, for at least 5 minutes, to check healthiness of all system. The DG Set should be tested ON-Load, at least once a month.

5.4 ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE OF LIFTS

1. The OEM will employ trained and appropriately skilled staff. They will be qualified to keep the equipment property adjusted and they will take proper care to maintain the equipment in reliable efficient and safe operation condition.

2. The Technician/ lift mechanic of the firm shall make entries in the logbook of the service and other works carried out by firm. The lift mechanic of the company shall certify in the logbook that the lift "is fit for use" and that all the safety devices are working. He shall also mention his name with dates and time in the logbook.

3. The Contractor shall regularly examine lubricate and adjust the equipment and generally carryout planned maintenance in the systematic and controlled manner.

4. The contractor shall repair or replace any parts as detailed below throughout the duration of this Agreement, the contractor shall replace or repair, free of charge the following range of components for reasons related to normal wear and tear Coverage shall be inclusive of repair or replacement of machines, motors, generators, ropes, inverter systems, and controller parts to be inclusive of printed circuit boards, sub components inclusive of belts. rollers, gears, bearings, solenoids, coils, chocks brake shoes, liners, contacts, contactors, relays, coils, push buttons, door operator WWF drive, car door safety device limit switches, governor, hoist way door locks, indicators, ARD (excluding battery) and other minormechanical parts shall also be included except as excluded elsewhere.

5. The equipment covered in the contract for maintenance include:-
   a) Renew all wire, ropes, belts and chains as often as required to maintain an adequate factor of safety, to equalize the tension on all hoisting ropes, repair or replace cables and hoist way and machine room elevator wiring.
   b) Furnish Lubricants.
   c) Examine periodically all safety devices and governors and make all customary safety tests.
   d) Systematically examine and adjust the following components:-

   MACHINE: - Worm gears, thrust bearings, Drive sheave. Drive sheaves bearings, Break Contact Lining and components.

   MOTOR: -Motor generator, Motor Winding Rotating Element. Computer Brushes. Brush Holders bearings, coils. Resistance for operating and motor circuits, magnet frames and other mechanical parts.

   CONTROLLER: - Selector, leveling devices cams, relays, solid state components e.g. P.C.B's Transducers, Resistors condenser, Power Amplifiers, Transformers. Contacts Leads. Dashpots, Timing devices, Steel selector, tapes mechanical and Electrical driving equipments.

GOVERNOR:- Governor sheaves, shaft Assembly, Bearings. Contacts and Governor Jaws, Car and Hall Mechanical Buttons, Car and Hall Position Indicators, Hall lanterns. Car Direction Indicators and all other Car and Landing Signal Fixtures, as installed by OTIS.

CAR: -CAR and all mechanical buttons, car and all position indicators, all Lanterns, Cardirection indicators and all other Car and handling signal fixtures.

DEFLECTOR or secondary sheave, bearing's, car and counterweight guide rails and buffers. Tap and bottom limit switches, Governor, tension sheave assembly, compensating sheaves assembly, car counter weight and counter weight guide shoes including Rollers or Gibs.

INTERLOCKS on hoisting doors, hoist way door hangers guides, Automatic power operated Door, Car Door hanger, Car Door Contact, safety shoe, load weighing equipment, Car frames, Car safety mechanism and platform.

6. The firm will give priority in its service, repair and other facility to restoring the equipment to normal services.

7. All parts mentioned in clause 4 will be furnished by the firm on an exchange basis under which replaced parts will become the property of the firm.

8. All works and services provided for in this Agreement are to be performed during normal working hours on normal working days.

9. The Contract does not include replacement of car enclosure, hung ceilings, light diffusers. light bulbs, LED fittings, hand rails, starters, chokes, mirror, floor coverings, carpets, other architectural features, hoist way enclosure, hoist way gates, door frames, doors sills, batteries, security system, external wiring to elevators.

10. The Contractor will assign a representative who will periodically visit the site and will be available for consultation in any matter relating to the maintenance of the Elevators.

11. The Contractor will provide minor adjustment CALL BACK Service at No Extra Charge This CALL BACK Service will be extended round the clock on all Working Days.

12. The work shall be carried out as General Specifications for lifts Part-III, 2003 amended up to date and the entire satisfaction of the Engineer-In-Charge.

13. In a month minimum one service should be carried out and duly certified by the Engineer-in-charge if monthly servicing will not be done then the recovery of Rs.500/- per lift per month shall be made from your bill.

14. Any accident occurred due to negligence will be the entire responsibility of the Contractor.

5.5 AUDIO-VISUAL SYSTEM

1. **The Cleaning of projector filter**
   Each projector filter is to be removed if possible and cleaned. Any filters that cannot be removed are to be cleaned with compressed air and the use of the vacuum cleaner. The filter slots are to be cleaned of any dust before replacing the projector filters. This will ensure that the correct air circulation and prevent the lamp from overheating.
2. **Re-alignment of the projector**
   The projector image is to be re-aligned to suit the interactive white board the image is being projected on to, allowing the best possible image for presentation.
3. **Re-focusing and key stoning of the projector image**

   The projected image is to be re-focused and the key stone of the image shall be corrected as necessary.
   Again ensuring the best possible image for presentation.

4. **Check and re-tighten all fixings and mounting brackets**

   Over time the projector mounting brackets and fixing may come loose. All bolts on the mounting brakets are to be check and tightened, this includes the security bolts if applicable. The Brackets fixings are also to be tightened if needed. This will ensure the satiability of the brakets and projector and will prevent the image from dropping.

5. **Re-calibrate the interactive whiteboard**

   Through re- aligning, re-focussing and key stoning the projector ensures that the clarity of the image is of a satisfactory standard. The interactive whiteboard is to be re-calibrated ensuring full interactivity.

6. **Cleaning the interactive white board**

   The interactive white board is to be wiped down with the provided white board cleaner and soft cloth.

7. **Re-calibrate the interactive touch screen**

   The interactive touch screen is to be re-calibrated ensuring full interactivity .Cleaning the interactive Touch screen. The touch screen devices are to be cleaned with manufacturer approved products.

8. **Document the projector lamp hours**

   The projector lamp hours are to be checked and documented. This will provide the school with an indication of when the lamp is to be nearing its end of life.

9. **Document the condition of the projector**
   The general condition of the projector is to be documented allowing the monitoring recording of any warranty issues.

5.6 ADDITIONAL TERMS & CONDITIONS FOR MAINTENANCE OF WATER SUPPLY SYSTEM

1.	I.	Operation and maintenance of installation as specified in BOQ or as directed by the Engineer-in-charge or his authorized representative.
	II.	Performing the daily/ weekly/ six monthly checks as detailed in remedial action for proper maintenance & smooth functioning of Pump sets.
	III.	Cleaning of all equipments.
	IV.	Watch and ward of all equipments (Internal and external both).
2.	The contractor shall take over the site as per inventory before starting the work and will return the same in working conditions after completion of work.	
3.	Checking of leakages of water from pump set/ pipeline/ control valves and remedial measures of same within 50 meter radius from pump house.	
4.	Monitoring of ammeter & voltmeter reading and remedial measures in case of abnormal reading.	
5.	Checking of all electric connections and tightening of loose connections.	
6.	Checking of earth connections.	
7.	Security & safety of all electric equipments associated with above water supply system.	
8.	Oiling & greasing of all moving parts of motors & pumps time to time i/c providing gland dori/ rubber seal gaskets/ tyre coupling etc.	

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.

h. When working on near live installations, suitably insulated tools should be used, and special care should be

i. taken to see that those tools accidentally do not drop on live terminals causing shock or dead short.

j. The electrical switchgears and distribution boards should be clearly marked to indicate the areas being controlled by them.

k. 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.

l. 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.

m. 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.

n. 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.

o. These instructions should be explained in Hindi/ local language to those staff that does not understand English.

p. 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.

7. SERVICE CENTRE/ SITE OFFICE-SERVICE PERFORMANCE LEVEL

1. SERVICE CENTRE:-

For receipt and disposal of maintenance complaints service centre will be established having intercom number and mobile whatsapp no.

2. SERVICE PERFORMANCE LEVEL

Following is the rate of recovery w.r.t. performance below marked level. The performance shall be evaluated by Assistant Engineer for each calendar month. In case of more than one service the percentage shall be arithmetic mean of the percentages of all service centre under one sub division. The bill value shall be considered separately for each sub division for making recovery, if any.

Sl. No.	Description	Recovery
A	For Percentage less than 94 % and upto 90%	0.2% of bill value corresponding to the month
B	For Percentage less than 90% and upto 85%	0.5% of bill value corresponding to the month
C	For Percentage less than 85% and upto 80%	1% of bill vaue corresponding to the month
D	For Percentage below (80% or % of All over India whichever is lower.)	2% of bill value corresponding to the month.

3. COMPLAINT AND REDRESSAL

It is advisable to have the internet-based recording of complaints by the public or through regular manual channels but that is to be recorded to avoid future such circumstances. It will be good to also publish on the web the actions to solve them. A sample of complaint format is given in table 1.1

Table 1.1- Complaint Format

Name and Address of complaint	Nature of complaint	Location of complaint	Action taken by the Authority

4. TARGET TIME FRAME FOR ATTENDING ELECTRICALS COMPLAITS

S. No.	Complaint Type	Time
1.	Emergency Complaints(No electricity, leakage current etc.)	1 Hours
2.	Minor complaints (Rewinding of fans and motors etc.)	2 Days
3.	Major Complaints (Replacement of MCCBs, repairing of APFC Panel & Fire Panel etc.)	7 Days
4.	Periodical Complaints (Preventive maintenance of electrical installation etc.)	10 Days

- If the individual emergent electrical complaint is not attended within Benchmark time schedule then recovery of Rs 500/- (Rupees Five Hundred Only) per complaint per day of delay shall be made from the contractor's bill.

8. MINIMUM MANPOWER PROVISION FOR DIFFERENT ALLIED SERVICES

SL NO	Staff	El Installation of entire building including operation of DG & Night shift		El Istallations at 1st floor West Block VIP enclosure including AC machines maintenance		Operation of Pump		Operation of Front Lift		Operation of Back Lift		Fire fighting detection and protection system		Biometric Attendance system and VC conducting		Audio & PA system at G Floor NIC meeting and conference roomroom		Internal telephone circuit including EPABX system		House keeping staff	
		Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total	Each shift	Total
1	System Supervisor	1 no for all working days in six days working system (this person will supervise all the works listed above)																			
2	Electrician cum DG operator	2 nosx 2 shift 1 No x 1 shift	5 Nos	1 No x 1 shift 1 No x 1 shift	2 Nos	--	--	--	--	--	--	NIL	NIL	--	--	1 No x 1 shift	1 No	2 Nos x 1 shift	2 Nos	--	--
3	Helper for Electrician	2 nosx 1 shift 3 Nos x 1 shift 1 No x 1	6 Nos	2 nosx 1 shift 1 No x 1 shift	3 Nos	--	--	--	--	--	--	NIL	NIL	--	--	1 No x 1 shift	1 No	1 No x 1 shift	1 No	--	--
3	Pump Operator	--	--	--	--	1 No x 2 shift	2 Nos	--	--	--	--	NIL	NIL	--	--	--	--	--	--	--	--
4	Helper for Pump Operator	--	--	--	--	1 No x 2 shift	2 Nos	--	--	--	--	NIL	NIL	--	--	--	--	--	--	--	--
5	Lift Operator	--	--	--	--	--	--	2 Nos x 2 shift	4 Nos	2 Nos x 2 shift	4 Nos	NIL	NIL	--	--	--	--	--	--	--	--
6	System Administrator	--	--	--	--	--	--	--	--	--	--	--	--	1 No x 1 shift	1 No	--	--	--	--	--	--
7	SSP	--	--	--	--	--	--	--	--	--	--	--	--	1 No x 1 shift	1 No	--	--	--	--	--	--
8	Mazdoor	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3 nos x 1 shift	3 Nos

9. MAINTENANCE OF RECORD

1. **Maintenance Records**

   Maintenance records are of utmost importance. Records are kept of all maintenance activities, both immediate and preventive maintenance works. Essential information to be recorded in maintenance register which includes the following:

   - Date and time of maintenance,
   - Weather conditions,
   - Type of maintenance,
   - Name of person, title and / or contractor performing maintenance,
   - Description of work performed,
   - Length of time it took to complete the work with dates,
   - Equipment and materials used, and
   - Before and after dated photographs.

   The data is recorded by the person responsible for maintenance

2. **Format of maintenance register:**

Sl No	Date & time	Detail description of breakdown /complaint	Detail description of maintenance carried out	Initials of person/ contractor performing maintenance	Remarks
1					
2					
3					
4					

10.1 ANNEXURE-I

COMPLAINT REGISTER for ELECTRICAL/ TELEPHONE/ AIR CONDITIONING MACHINES

Date	Nature of Complaint	Office Name	Location of Office		Details of complaint	Signature of personnel who is complaining	Designation	Ph/ Mob No	Status of rectification	Date of rectification	Signature of El Person
	Electrical/ AC/ Telephone		Floor :	Block :							
	Electrical/ AC/ Telephone		Floor :	Block :							
	Electrical/ AC/ Telephone		Floor :	Block :							

10.2 ANNEXURE-11

LOG BOOK OF DIESEL GENRATOR SET

YEAR	MONTH	DATE	START TIME	STOP TIME	TOTAL RUNNING HOURS	Purpose of run 1. Power Shut down/ 2. internal checking or fault	Signature of Operator
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			
			am/pm	am/pm			

10.3 ANNEXURE-III

SITE ACCOUNT REGISTER

1. Section ……..

2. Name of work ……..…

3. Name of article ……..

4. Estimate requirements ……..

5. Issue rate ……..

Sl. No	Date of receipts/issues	Received from/Issued to	Receipts/Issues	Balance	Remarks
1	2	3	4	5	6

10.4 ANNEXURE-IV

DISMANTLED MATERIAL REGISTER

1. Name of Work :

2. Name of Division : METROPOLITAN ELECTRICAL DIVISION

Sl. No	Date of receipt	Ref. to no. & page of MB	Full particulars of material giving size, etc. if any	Opening balance	Qnty recd.	Total	Ref. to its disposal, whether by write off, sale, or transfer to other works	Qnty issued or disposed off	Closing balance	Dated initial of the AE	Date of verification of balance & by whom verified	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13

10.5 ANNEXURE-V

SITE ORDERS BOOK

Name of work …… Date of commencement/period for completion ……

Sl. No	Remarks of the Inspecting Officer or Contractor	Action taken and by whom	Remarks
1	2	3	4

10.6 ANNEXURE-VI

WORKER'S DIARY

S. NO.	S. NO. OF COMPLAINT	Flat/ Quarter no. and colony	Nature of complaint	Details of work done	Balance, work, if any	Sign of worker	Sign. Of occupant	Remarks
1	2	3	4	5	6	7	8	9

10.7 ANNEXURE-VII

ANY OTHER RECORD PARTING TO WORK (MISC REGISTER)

CLEANING, TIGHTNING, AND OILING OF FITTINGS & FANS

SITE: NAME OF AGENCY:

SL.NO.	DATE	LOCATION PREFERENCE	FITTINGS	FANS	SL.NO.	DATE	LOCATION PREFERENCE	FITTINGS	FANS
01.									
02.									
03.									
04.									
05.									
06.									
07.									
08.									
09.									
10.									
11.									
12.									
	REMARKS					REMARKS			
	INITIALS J.E./ A.E.					INITIALS J.E./ A.E.			

10.8 ANNEXURE-VIII

` Inspection of Equipment rooms and other equipment

12.9. Inspection of Equipment rooms and other equipment											
(Weekly)											
S.No.	Date									Remarks & Action taken if any	Initials	
			7.1	7.2	7.3	7.4	7.5				
	Programme	Actual	Room Cleaning	Sw. boards cleaning	abnormalities	Oil seepage	Battery			JE(E)	AE(E)
							LEVEL	SP. GR.			

10.9 ANNEXURE-IX

ELECTRICAL INSTALLATION CONDITION REPORT

SITE: NAME OF AGENCY:

SL.NO.	D.B.INCOMER, UPSTREAM SW.GEARS REFERENCES	R	Y	B	TOTAL LOAD IN K.W.	SL.NO.	D.B. INCOMER, UPSTREAM SW. GEARS REFERENCES	R	Y	B	TOTAL LOAD IN K.W.
01.											
02.											
03.											
04.											
05.											
06.											
07.											
08.											
09.											
10.											
11.											
12.											
	REMARKS						REMARKS				
	INITIALS J.E./ A.E.						INITIALS J.E./ A.E.				