Office of the Burdwan Municipality

G.T. Road, Burdwan, West Bengal, India – 713101
Phone: +91 0342 2662518 / 2664121 / 2662777 | Fax: +91 0342 2560717
Email: info@burdwanmunicipality.gov.in | Website: www. burdwanmunicipality.gov.in

Memo No. 44/III(AMRUT)/1/Ph-II(W)/3/2020/IG/NIT-4/2020-21/V1 **Dated: 30/01/2021**

NOTICE INVITING ELECTRONIC TENDER No. 4
Tender Ref: No. WBMAD/BM/AMRUT/4/20-21 2nd Call

The Executive Officer, Burdwan Municipality on behalf of Administrator,Burdwan Municipality invites sealed competitive Bid on Turnkey Basis (Two part System) from reliable and resourceful Companies/Firms/Contractors having experience and acumen in construction work as noted below the eligibility and depicted hereunder for participating in the e-Bid.

1.	Name of Work:		Geo-Technical & Hydro- geological Sub Surface Investigation, Surveying, Planning, Designing, Construction & commissioning for enabling 2 nos. of 18.5 MLD Capacity each of minimum 6.0 meter diameter Infiltration Gallery Collector wells with laying of stainless steel strainer pipes with 20 hours designing operation along with Pump House, Access & Pipe carrying Bridge at Damodar along with HT substation at vicinity of High Bank at Damodar River in between Belkash & Zuzuty village, protection work at river bank, including construction of Pipe carrying Bridge on Banka & DVC Canal & laying of Rising main from Zuzuti to JalkalMath at Lakuddi for Conveying water with Permanent Road restoration works from Intake to CWR with necessary Civil, Electrical (according to I.E. rules), Mechanical & all other allied works related for pump house with necessary approval from respective Competent Authority including lighting within yard, pump house, walkway and internal illumination complete in all respect on turnkey basis as per satisfaction of the department. After satisfactory completion and commissioning, 3 (three) months trial run, necessary training of maintenance staff & thereafter (subsequently) 5 (five) years operation and maintenance with security /guarding arrangement under AMRUT Project.
2.	Scope of Work		As stated in Sl No- 1 & scope of Work details in Sl No- 3 of **Section – A**, Description of the Project All design, drawing , survey and investigation work(Hydro- geological Sub Surface Investigation, Geo-Technical investigation, hydraulic survey) submitted by bidder shall be duly vetted by reputed Engineering institute so as to be accepted by authorities of M.E.Dte. **Note :** Bidder is responsible to extract water(total 37.00 MLD) from river Damodar and deliver to CWR/ WTP site Jalkal Building considering 20hrs. Necessary soil test & Hydro geological investigation and study of sub surface water flow/storage characteristics of river Damodar should be done by the Bidder. **Note: If the assessment of yield is found greater than the required capacity (i.e.37.00 MLD) during investigation,** the agency may furnish a propsal for vailibility of excess water to be extract in addition to the aforesaid capacity with additional financial involment ,if any, with proper analysis which, if necessary, may be considered after due approval from the competent Authority.
3.	Location of Work:		On river Damodar and its bank in between Belkash & Zuzuty village (as shown in sketch map), Burdwan, District Purba Bardhaman and laying of rising main up to CWR at Lakuddi Jalkal, Burdwan Municipality, District Purba Bardhaman
4.	Eligibility to participate in the Bid		Having experience and technical acumen in Surveying ,design, and execution / Construction and Completion of work in a single contract having capacity of at least 11MLD as stated below on turnkey basis during last five financial years in any Govt. / Board / Semi Govt. /

			Municipal Corporation / Statutory Authority /Govt. undertaking etc. organization including Civil & Electro Mechanical works **OR** Intending tenderers should produce credentials of one single running work of similar nature as stated below which has been completed to the extent of 75% or more and capacity of which is not less than the desired capacity (11 MLD), as stated above . Note: for running work, capacity will be considered as 75% of the allotted work which is due to be completed in future. Intending tenderers should produce credentials of 2(two) similar nature of completed work as stated below, each of the minimum capacity of 9 MLD capacity during 5(five) years prior to the date of issue of the tender notice for : • Infiltration Gallery and Construction of Substation and allied works including Civil & Electro Mechanical works. • Radial Collector well with Construction of Substation and allied works including Civil & Electro Mechanical works Note: 1) if sub-station work is not covered by the bidder for above noted work in requisite credential, the bidder may submit separate supplementary credential certificate along with BOQ, work order of the Sub station work. **Note: 2)** If the bidder does not possess requisite credential of Sub-Station, the bidder may go for MOU with the agency who have sufficient credential of Sub-Station work in requisite stamp paper maintaining formalities and it should be in compliance with the concerned eligibility criteria as depicted in the NIeT. Please note the credential of Sub Station is not applicable for running work. AND Having sufficient qualified technical personnel (to be employed under the firm for at least 3 consecutive years) with sound knowledge and experience in execution of similar nature of works. AND *Having annual turnover of at least Rs. 7.00 Crore or above in any one year of last five Financial years.* *AND* Bank solvency Certificate not less than Rs. 3.00 Crore issued on or after 01.01.2021 by the banker. AND Having valid electrical HT license, GST, P. Tax clearance Certificates, PAN Card and Electrical supervisory license, ESI and PF registration certificates etc station work.
			Note: a) The credential certificate for completed works / running work should contain (a) Name of work (b) Estimated Amount / Tendered amount, (c)Value of executed work (d)Date of Completion of project along with telephone number & detail address for communication of client must be indicated in the Credential Certificate.
5.	Documents to be produced in support of Credential for Bid Part-I (Prequalification Documents)		A successful performance and completion /running work certificate as applicable together with work order along with BOQ issued by the competent authority shall have to be furnished in support of credibility in terms with eligibility criteria depicted in this Notice (**Ref: Sl. No. 4 :Eligibility to participate in the Bid**). Besides this, following documents shall have to be furnished:
		a.	Particulars of ownership/partnership or Board of Directors pertaining to the Organization/Company/Firm

<table>
<tr><td></td><td></td><td>b.</td><td>Copies of valid PAN Card, Sales Tax clearance, Electrical Supervisory license Certificate, Professional Tax clearance Certificate, Valid Electrical Licence (HT & LT).</td></tr>
<tr><td></td><td></td><td>c.</td><td>Bank solvency Certificate not less than Rs. 3.00 cores issued on or after 01.01.2021 by the Banker</td></tr>
<tr><td></td><td></td><td>d.</td><td>Valid documents in support of annual Turnover.</td></tr>
<tr><td></td><td></td><td>e.</td><td>List of machines and equipment's necessary for field as well as laboratory test for all materials.</td></tr>
<tr><td></td><td></td><td>f.</td><td>Experience and address, fax & telephone nos. , mobile no., & E-mail ID nos. of the firm.</td></tr>
<tr><td></td><td></td><td></td><td>All documents in original to be produced in due course of time as & when asked by the Bid inviting authority.</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>6.</td><td>Earnest Money</td><td></td><td>2% of the Quoted Bid price in two parts, vize.</td></tr>
<tr><td></td><td></td><td>a.</td><td>Rs. 5,00,000.00 (Rupees Five Lakh only) as an initial Earnest Money Deposit shall accompany with Bid Proposal, in favour of the "The Administrator, Burdwan Municipality,"</td></tr>
<tr><td></td><td></td><td>b.</td><td>Balance Earnest Money Deposit i.e. 2% of bid amount beyond Rs. 5,00,000.00 (if any) shall have to be deposited after acceptance of Bid Proposal in the form of Bank Draft from any nationalized/scheduled Bank in favour of "Burdwan Municipality ", Payable at Burdwan.</td></tr>
<tr><td></td><td></td><td></td><td>Note:- The Earnest Money, as specified in this NIeB shall be paid by online internet bank transfer or NEFT or RTGS (as per GO No. 3975-F(Y) dt. 28.07.2016 of Finance Deptt., Govt. Of West Bengal). Every such Transfer shall be done on or after the date of publish of NIeB. Any Bid without such Transfer of EM (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.</td></tr>
<tr><td>7.

8.</td><td>Cost price of Bid documents

Date and Time Schedule :-</td><td></td><td>NIL
<table>
<tr><th>Sl. No.</th><th>Particulars</th><th>Date and Time</th></tr>
<tr><td>a)</td><td>Date of uploading of NIeB. and Bid Documents online) (Publishing Date)</td><td>01/02/2021 at 10:00 A.M</td></tr>
<tr><td>b)</td><td>Documents download/sell start date (Online)</td><td>01/02/2021 at 11:00 A.M</td></tr>
<tr><td>c)</td><td>Date of Pre Bid Meeting with the intending bidders In the office of the Superintending Engineer, West Circle, Municipal Engineering Directorate, 3rd floor, Patal Bazar Market, Purba Burdwan.</td><td>10/02/2021 at 1:00 P.M</td></tr>
<tr><td>d)</td><td>Bid submission start date (On line)</td><td>01/02/2021 at 03:00 P.M</td></tr>
<tr><td>e)</td><td>Bid Submission closing (On line)</td><td>22/02/2021 at 06:00 P.M</td></tr>
<tr><td>f)</td><td>Bid opening date for Technical Proposals (Online)</td><td>25/02/2021 at 11:00 A.M</td></tr>
<tr><td>g)</td><td>Date of uploading list for Technically Qualified Bidders (online)</td><td>To be notified later</td></tr>
<tr><td>h)</td><td>Date and Place for opening of Financial Proposal (Online)</td><td>To be notified during uploading of Technical Evaluation Sheet of Bidders</td></tr>
<tr><td>i)</td><td>Date of uploading of list of qualified bidders along with the offer rates through (on line),</td><td>To be notified later.</td></tr>
<tr><td>j)</td><td>Also if necessary for further negotiation Through offline for final rate.</td><td>To be notified later.</td></tr>
</table></td></tr>
</table>

9.	Time of completion		Time of completion of the Contract is 16(sixteen) months from the date of issue of Work Order.
10.	Site inspection & general information		Intending Bidders are required to inspect the site of the Project with particular reference to location and infrastructure facilities available. They are also to make a careful study with regard to availability of materials and their sources and all relevant factors as might be affected their rates and prices along with approach to the site. They are also acquainted with relevant IS specifications with latest amendments, IE Rules, CPHEEO manuals, Clauses & Sub Clauses of the Bid documents and to have fully acquainted with all details of work front, communications, underground utility services, seasonal weather and its variation, labours, water supply, existing & proposed site levels, Highest Flood Level(HFL), Finished Ground Level(FGL) position and diversion of transportation and barricading , if required, electricity and any other general information including topological condition & existing level and level pertaining to and needed for the work to be completed in time properly.
11.	Bid documents		A full set of Bid documents consists of 2 Parts. These are **PART I** :-Containing all documents in relation to the name of the firm applied for and credential possessed along with all documents as depicted in Sl. No. 4 along with this NIeB and its all corrigenda's. **And** Section A: Description of the Project. Section B: Conditions & requirements for-Bidding. Section C: General conditions of the Contract. Section D: Special Provisions Section E: General Specification of workmanship and material for civil works Section F: Technical Specification for Electrical motor works Section G: Technical Specification for Pumps. Section H: Mechanical Works Section I: Motor Control Panel and Power Distribution Panel Section J: Detailed Technical Specification for Substation Panels & Section K: ANNEXURES i) Soil Investigation Report (not enclosed to be done by bidder) ii) Tentative Layout of Drawings iii) List of Vendors iv) Construction Materials **PART II** :- Containing the Following Document. Bid Price / Price Schedule.(.xls format)
12.	Validity of Bid		A Bid submitted shall remain valid for a period of 120 calendar days from the date set for opening of Bids. Any extension of this validity period if required will be subject to concurrence of the Bidders.
13.	Withdrawal of Bid		A Bid once submitted shall not be withdrawn within the validity period. If any Bidder/Bidders withdraw his/their Bid(s) within the validity period then Earnest Money as deposited by him/them will be forfeited and even a legal action may be taken by Directorate.
14.	Acceptance of Bid		The "Administrator, Burdwan Municipality" will accept the Bid as per the recommendation of Competent authority. She/he does not bind himself/herself to accept otherwise the lowest Bid and reserves to himself/herself the right to reject any or all of the Bids received without assigning any reason thereof.
15.	Intimation		The successful Bidder will be notified in writing of the acceptance of his Bid. The Bidder then becomes the "Contractor" and he shall forthwith take steps to execute Formal Contract Agreement with The Chairman/ Administrator, Burdwan Municipality in 4 (four) copies after depositing requisite cost of Formal Contract Agreement and fulfil all his obligations as

			required by the Contract. After the Bid is provisionally accepted, the Bidder shall submit detail Design, Drawing and working specifications phase wise based on existing site condition & proposed levels at site. It will be approved by the Superintending Engineer (West Circle) if it is found technically correct and acceptable with proper examination by the Superintending Engineer (West Circle), M.E. Dte. & the Chief Engineer / Superintending Engineer, (E/M), K.M.D.A. Provisional approval of the submitted drawings will be accorded phase wise for execution. Even after approval from the competent Authority, if it is necessary to rectify anything at site, it is the sole responsibility of the contractor to reconstruct the same at his own cost at site after necessary approval from competent Authority. Eventually, all the parts, Design, Drawings etc. of the successful Bidder shall be taken as a part of the agreement.
16.	Escalation of Cost		There will be no escalation in cost for materials or labour and the contract price mentioned in the contract stands valid till completion of the O&M of the contract, and other obligation, if any.
17.	Name & address of Engineer-In-Charge (EIC) of the Work		For Civil Work, Executive Engineer, Burdwan Division, M.E.Dte. Dist: Purba Burdwan e mail: eemedbwd@gamil.com and for Electro Mechanical Work Executive Engineer (E/M) K.M.D.A.
18.	Execution of Work		The Contractor is liable to execute the whole work as per direction and instruction of the Executive Engineer, Burdwan Division, M.E.Dte. and for Electro Mechanical Work Executive Engineer (E/M) K.M.D.A. up to the satisfaction of E-I-C or his/her representative.
19.	Payment		Payment will be made to the successful Bidder by The Chairman/Administrator, Burdwan Municipality periodically only on receipt of PAY ORDER from O/o the Executive Engineer, MED as per recommendation of the Executive Engineer, Burdwan Division, M.E.Dte. for civil work and Executive Engineer (E/M) K.M.D.A. or his/her representative for Electro-Mechanical Work.
20.	Influence		Any attempt to exercise undue influence in the matter of acceptance of Bid is strictly prohibited and any Bidder who resorts to this will render his Bid liable to rejection.

Following clauses are to be adhering to by the concerned Bidder during the process of Bidding.

21.	In case office faces sudden closure owing to reason beyond the scope and control of "The Administrator, Burdwan Municipality", any of last date/dates as schedule in Sl. No 8 may be extended up-to/to next and following working day without issuing further and separate notice should the "The Administrator, Burdwan Municipality", feels it to be necessary and exigent.
22.	Persons having authenticated and having registered Power of Attorney may be considered lawfully becoming to be acting on and for behalf of the Bidder.
20.	Sufficient care has been taken to avoid variance in between the contents of the listed. Documents in the Bid document. However, if there is any variance between the contents of different documents, the provision of documents appearing earlier in the list shall prevail over the same provided in the contents coming later.
24.	Imposition of any duty/tax/rule etc. owing to change /application in legislations/enactment shall be considered as a part of the contract and to be adhering to by the Bidder/Contractor strictly.
25.	Bid Acceptance Authority is the "The Administrator, Burdwan Municipality".
26.	In case of any dispute arising from any clauses of similar nature between bid documents and municipal Form "K", IS Specifications, CPHEEO Manual & WBF 2911(ii), the decision of the Superintending Engineer, West Circle, M.E. Directorate, will be final and binding.
27.	All usual deductions for taxes as applicable i.e. GST, IT, and Labour welfare cess etc. as applicable will be made from the bills from time to time (please refer cl.57 of section C).
28.	No conditional Bid shall be entertained.
29.	The requisite cost of Earnest Money, as specified in this NIeB shall be paid by online internet bank transfer or NEFT or RTGS (as per GO No. 3975-F(Y) dt. 28.07.2016 of Finance Deptt., Govt. Of West Bengal). Every such Transfer shall be

	done on or after the date of publish of NIeB. Any Bid without such Transfer of EM (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.
30.	The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the site of works and its Surroundings and obtain all information that may be necessary for participating in the Bid and entering into a contract for the work as mentioned in the Notice inviting Bid, the cost of visiting the site shall be at the Bidder's own expense. Traffic management and execution shall be the responsibility of the Agency at his/her/their risk and cost.
31.	Prospective applicants are advised to note carefully the minimum qualification criteria as Mentioned in 'Instructions to Bidders' before bidding.
32.	During scrutiny, if it is come to the notice to Bid inviting authority that the credential or any other papers found incorrect/manufactured/fabricated, that Bidder will not be allowed to participate in the Bid and that application will be out rightly rejected without any prejudice.
33.	Before issuance of the work order, the Bid inviting authority may verify the Credential & other documents with the original of the lowest bidder if found necessary. After verification, if it is found that such documents submitted by the lowest bidder is either manufacture or false, in that case, L.O.A./ work order will not be issued in favour of the bidder under any circumstances.
34.	If any discrepancy arises between two similar clauses of Bid document or on different notifications, the decision of "Superintending Engineer, West Circle, M.E. Dte." is final & binding.
35.	The Bidders quoting rate in BOQ will be treated as the "Quoted rate inclusive of all type of taxes for Central Govt., State Govt., and any other Statutory body as admissible by rules and regulation of the Government (Central/State) time to time. Therefore all usual deductions for taxes as applicable i.e., GST, IT, Labour welfare cess etc. will be deducted from the bills submitted by contractor time to time for their works. No extra claim in any circumstances beyond the quoted rate will be entertained by Burdwan Municipality.
36.	Where an individual person holds a digital certificate in his own name duly issued to him against the company or the firm of which he happens to be a director or partner, such individual person shall, while uploading any Bid for and on behalf of such company or firm, invariably upload a copy of registered power of attorney showing clear authorization in his favour, by the rest of the directors of such company or the partners of such firm, to upload such Bid. The power of attorney shall have to be registered in accordance with the provisions of the Registration Act, 1908.
37.	Any legal matter will be settled within the jurisdiction of Hon'ble District Judges Court at Purba Burdwan, Dist.-Purba Burdwan, West Bengal.
38.	Bidder would be at liberty to point out any ambiguities, contradictions, omissions etc. seeking clarifications thereof or interpretation of any of the conditions of the Bid documents before the Bid Inviting Authority in writing 48 hours prior to Pre Bid Meeting, beyond such period no representation in that behalf will be entertained by the Bid Inviting Authority.
39.	The successful Bidder will remain liable for following with West Bengal Contract Labour (Regulation & Abolition) Act 1970 and necessary certificates from appropriate authority to be submitted within 07 (seven) days from the date of issue of work order, otherwise the work order may be cancelled. Contractor shall have to comply with the provisions of (a) the contract labour (Regulation Abolition) Act. 1970(b) Apprentice Act. 1961 and (c) minimum wages Act.1948 of the notification thereof or any other laws relating thereto and the rules made and order issued there under from time to time.
40.	Additional Security Deposit @ 8% (eight percent) will be deducted from each and every running bill. The entire amount of such 10% (ten percent) of Security Deposit (Initial 2% EM + additional 8%) excluding for operation and maintenance will be refunded without any interest only after successful completion of the whole work as per PWD order No. 5784-PW/L&A/2M-175/2017 Dated: 12.09.2017, wherein, Construction of new building / new bridge / new culvert, the Defect Liability Period of the work shall be five years from the date of completion of the work; For work with five years Defect Liability Period: i) No security deposit shall be refunded to the contractor for 1st 3 years from the date of completion of the work; ii) 30% of the security deposit shall be refunded to the contractor on expiry of four years from the actual date of completion of the work; iii) The balance 70% of the security deposit shall be refunded to the contractor on expiry of five years from the actual date of completion of the work. Note : In case any latest Government Order is published regading Additinal Security Deposit , if necessary that may be consired ,if applicable.
41.	The successful bidder has to provide detailed estimate along with rate analysis (if any) for all civil and electro mechanical works including planning and drawings as per the clause 57 of Section C with all necessary break up elaborately for comparison of rate with departmental estimate if asked by the concerned authority in respect of Clause 57 of Section C before acceptance of bid which will be treated as part of the bid document.

42.	Clause 57 of Section C has been prepared on the basis of major items of the work so that contractor may get payment after completion of major items. If any item the contractor feels as major item but not reflected in the clause will be pointed out during pre-bid meeting. All the items not shown in the payment schedule (clause 57 of Section C) or in bid document but required for successful completion and commissioning of the project will be in the scope of Bidder.
43.	Successful Bidder will have to submit the break-up supported with analysis of the cost of Civil Works (viz. Foundations, Sub Structures, Super structures, Finishing etc.), Electrical work, Mechanical work and Testing/commissioning work as %wise in reference of clause 57 of Section C, Clause 41 of this section and other provisions of the Bid documents in order to assess the value of Work done and make payment thereof after acceptance of bid against each item of work. In case of any dispute arising in the breakup and analysis thereof, decision of Superintending Engineer, West Circle, M.E. Dte. Will be binding and final.
44	**Impotant Note: All the parameters stated in the bid are tentative. It is the full responsibility of the successful bidder to determine the parameters on the basis of investigation carried out by him to get the desired level of output as per relevant manual, schedule and IS code as applicable.**

Executive Officer
Burdwan Municipality

INSTRUCTION TO BIDDERS/BIDDERS
SECTION – A-I

1. ***General guidance for e-Biding***
Instructions/ Guidelines for bidders for electronic submission of the Bids have been annexed for assisting them to participate in e-Biding.

2. ***Registration of Bidder***
Any Bidder willing to take part in the process of e-Biding will have to be enrolled and registered with the Government e-procurement system, through logging on to **https://wb.tender.gov.in** The Bidder is to click on the link for e-Biding site as given on the web portal.

3. ***Digital Signature certificate (DSC)***
Each Bidder is required to obtain a class-II or Class-III Digital Signature Certificate (DSC) for submission of Bids, from the service provider of the National Information's Centre (NIC) or any other bonafide service provider on payment of requisite amount. Details are available at the Web Site stated in Clause 2 of Guideline to Bidder. DSC is given as a USB e-Token.

4. The contractor can search and download NIeB and Bid Documents
Electronically from computer once he logs on to the website mentioned in Clause 2 using the Digital Signature Certificate. This is the only mode of collection of Bid Documents.

5. ***Submission of Bids.***
General process of submission, Bids are to be submitted through online to the website stated in Cl. 2 in two folders at a time for each work, one in Technical Proposal and the other is Financial Proposal before the prescribed date and time using the Digital Signature Certificate (DSC) the documents are to be uploaded virus scanned copy duly Digitally Signed. The documents will get encrypted (transformed into non readable formats).

A. Technical proposal
The Technical proposal should contain scanned copies of the following further two covers (folders).

A-1. Statutory Cover Containing

1. Prequalification Document
i. As per Sl. No. 4
ii. Prequalification Application (Sec-B, Form – I)
iii. Online transfer of Earnest Money receipt.(Scanned copy)

2. NIeB(download and upload the same Digitally Signed)

3. Technical Document (*To be filled, scanned & digitally signed*)
i. Financial Statement (Section – B, Form – II).
ii. Affidavits (Ref:-Declaration Of The Bidder)
iii. Bank Solvency Certificate.
iv. Form III & IV Of Section B.
v. Declaration by the Bidder.

A-2. Non statutory Cover Containing/My Documents

i. Professional Tax (PT) deposit receipt Challan (up to date), PAN Card, IT, IT Return for the Current Assessment year, VAT Registration Certificate (up to date).

ii. Registration Certificate under Company Act. (if any).

iii. Registered Deed of partnership Firm/ Article of Association and Memorandum

iv. Power of Attorney (For Partnership Firm/ Private Limited Company, if any)

v. Tax Audit Report along with Balance Sheet and Profit and Loss A/c for the last five years(year just preceding the current Financial Year will be considered as year – I)

vi. Clearance Certificate for the Current Year issued by the Assistant Registrar of Co-Op(S) (ARCS) bye laws are to be submitted by the Registered labour Co-Op(S) Engineers' Co.-Opt.(S)

vii. List of machineries possessed by own/arranged through lease deed along with authenticated documents of lease / sub-lease / hire basis etc.

viii. List of laboratory Instrument.

ix. List of technical staff along with structure and organization (Section – B, Form – III).

x. Credential :Scanned copy of Original Credential Certificate as stated in NIeB (under sl. no -3).

Note: - Failure of submission of any of the above mentioned documents (as stated in A1 and A2) will render the Bid liable to be summarily rejected for both statutory and non-statutory cover.

Intending Bidders should upload Non-Statutory documents as per following folders in My Document:

E-Bidding system of Government of West Bengal			
Bidder Document Sub Category Master			
Sl. No.	**Category Name**	**Sub Category Name**	**Sub Category Description**
A	CERTIFICATES		
		A1. CERTIFICATES	1. West Bengal VAT Registration / ST/GST Registration/ P.F/PAN / P. Tax 2. Income Tax Acknowledgement Receipt

			(Latest) 3.Valid Electrical License 4. E.S.I Registration Certificate.
B	COMPANY DETAILS		
		B1. COMPANY DETAILS 1	1. Proprietorship Firm (Trade License). 2. Registered Deed of partnership Firm 3. Registration Certificate under Company Act. (if any). Ltd. Company (Incorporation Certificate , Trade License) 4. Power of Attorney (For Partnership Firm/ Private Limited Company, if any) 5. Society (Society Registration copy, Trade License)
C	CREDENTIAL		
		C1. CREDENTIAL1	Similar nature Work &Completion Certificates along with work order and payment certificate issued by competent authority (as per Sl No. 4 of NIeB)
D	EQUIPMENT		
		D1.LABOURTARY	1. List of Machineries and equipment necessary for field as well as laboratory test of all materials as per NIeB
		D2. CIVIL MACHINERIES	
		D2. ELECTRICAL MACHINERIES	
		D2. MECHNANICAL MACHINERIES	
		D2. MISCELLENEOUS MACHINERIES	
E	FINANCIAL INFO		
		E1. P/L & BALANCE SHEET 2011-2012	P/L & BALANCE SHEET (As per NIeB)
		E2. PAYMENT CERTIFICATE 1	Payment Certificate in support of valid credential only to be submitted(as per NIeB)
		E3 PAYMENT CERTIFICATE 2	
F	MANPOWER		
		F1. TECHNICAL PERSONNEL	1. List of sufficiently qualified technical person (as per Sl No 4 of NIeB)
		F2. TECHNICAL PERSONNEL ON CONTRACT	1. List of technical personnel employed under the organisation (or on

			contact basis) in details with name, qualification, experience and, Address with contact number.
G	DECLARATION	DECLARATION 1	1. Bank Solvency Certificate (As per NIeB)
		DECLARATION 2	2. Valid Document in support of annual (As per NIeB)
		DECLARATION 3	3. Corrigendum and additional document (if any).

Note:- Failure of submission of any of the above mentioned documents (as stated in A1 & A2) will render the Bid liable to summarily rejected for both statutory & non statutory cover. All Corrigendum & Addendum Notices, if any, have to be digitally signed &uploaded by the contractor in the Declaration Folder of My Documents.

B. Bid Evaluation

i. Opening and evaluation of Bid: - If any Bidder is exempted from payment of EMD, copy of relevant Government order needs to be furnished (applicable in case of Registered Labour Co-Operative Society).

ii. Opening of Technical proposal: - Technical proposals will be opened by the Bid Inviting Authority electronically from the website using his/ her Digital signature Certificate.

iii. Cover (folder) of statutory documents (vide Cl. No. 5.A-1) should be opened first and if found in order, cover (Folder) for non-statutory documents (vide. No. – 5.A-2) will be opened. If there is any deficiency in the statutory documents the Bid will summarily be rejected.

iv. Decrypted (transformed in to readable formats) documents of the non-statutory
Cover will be downloaded and handed over to the Bid Evolution Committee. Scrutiny of technical proposal and recommendation thereafter and processing of comparative statement for acceptance etc. will be made by the Municipal Engineering Directorate, under the Deptt. of Municipal Affairs, Govt. of West Bengal. Comparative Statement may be forwarded to appropriate authority depending on the value of the work as applicable as per existing norms and guidelines under State Grant.
v. Uploading of summary list of technically qualified bidders.

vi. Pursuant to scrutiny and decision of the screening committee the summary list of eligible Bidder and for which their proposal will be considered and uploaded in the web portals.

vii. While evaluation, the committee may summon the bidders and seek clarification / information or additional documents or original hard copy of any of the documents already submitted and if these are not produced within the stipulated time frame, their proposals will be liable for rejection.

C. Financial proposal

As per Sl. 11, Bid Price / Price Schedule are to be uploaded digitally signed by the Bidder.

6. Financial capacity of a Bidder will be judged on the basis of working capital and available bid capacity as mentioned in the NIeB to be derived from the information furnished in **FORM-I and II** (Section-B) i.e., Application (for Pre-qualification) and Financial Statement. If an applicant feels that his/their Working Capital beyond own resource may be insufficient, he/they may include with the application a letter of guarantee issued by a first class Bank to supplement the applicant. This letter of guarantee should be addressed to the Bid Inviting/ Accepting Authority and should guarantee duly specifying the name of the project that in case of contract is awarded to the Bidder, the Bidder will be provided with a revolving line of credit Such revolving line of credit should be maintained until the works are taken over by the Authority.

The audited Balance sheet for the last five years**,** net worth bid capacity etc. are to be submitted which must demonstrate the soundness of Bidder financial position, showing long term profitability including an estimated financial projection of the next two years.

7. Penalty for suppression / distortion of facts

Submission of false document by Bidder is strictly prohibited and in case of such act by the Bidder the same may be referred to the appropriate authority for prosecution as per relevant IT Act with forfeiture of earnest money forthwith.

8. REJECTION OF BID

The Employer (Bid accepting authority) reserves the right to accept or reject any Bid and to cancel the Bidding processes and reject all Bids at any time prior to the award of Contract without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the ground for Employer's (Bid accepting authority) action.

The Bidder whose Bid has been accepted will be notified by the Bid Inviting and Accepting Authority through acceptance letter/ Letter of Acceptance. The Letter of Acceptance will constitute the formation of the Contract.

The Agreement in Printed Bid Form will incorporate all necessary documents e.g. NIeB, all addenda-corrigendum, different filled-up forms (Section –B), Price schedule and the same will be executed between the Bid Accepting Authority and the successful Bidder.

Executive Officer
Burdwan Municipality

SECTION – B

FORM –I

PRE-QUALIFICATION APPLICATION

To
The Administrator,
Burdwan Municipality,
PO:-Burdwan, Dist:-Purba Burdwan,
West Bengal,

Ref: - Bid for_____

_____ (Name of work) _____
_____**NIeB No.:**

Dear Sir,

Having examined the Statutory, Non statutory and NIeB documents, I /we hereby submit all the necessary information and relevant documents for evaluation. The application is made by me / us on behalf of_____ In the capacity _____duly authorized to submit the order.

The necessary evidence admissible by law in respect of authority assigned to us on behalf of the group of firms for Application and for completion of the contract documents is attached herewith.

We are interested in bidding for the work(s) given in Enclosure to this letter.

We understand that:

(a) Bid Inviting and Accepting Authority can amend the scope and value of the contract bid under this project.

(b) Bid Inviting and Accepting Authority reserves the right to reject any application without assigning any reason.

Enclo:- e-Filling:-

1. Statutory Documents
2. Non Statutory Documents

Date: - **Signature of applicant including title**

And capacity in which application is made.

SECTION – B

Form - II

FINANCIAL STATEMENT

B.1 Name of Applicant:

B.2 Summary of assets and liabilities on the basis of the audited financial statement of the last five financial years

(Attach copies of the audited financial statement of the last five financial years)

	1st Year (Rs. In lakh)	2nd Year (Rs. In lakh)	3rd Year (Rs. In lakh)	4th Year (Rs. In lakh)	5th Year (Rs. In lakh)
a) Current Assets : (It should not include investment in any other firm)					
b) Current liabilities : (It should include bank overdraft)					
c) Working capital : (a) – (b)					
d) Net worth : (Proprietors Capital or Partners Capital or Paid up Capital + Reserve and surplus)					
e) Bank loan/ Guarantee : (As per clause G.2. with all sub clauses)					

B.3 Annual value of construction works undertaken :

Work in hand i.e. Work order issued	As on 31.03.2020	As on 31.03.2019	As on 31.03.2018	As on 31.03.2017	As on 31.3.2016	As on 31.03.2015

Signed by an authorized officer of the firm

_____

Title of the officer

_____

Name of the Firm with Seal

Date_____

Declaration of the Bidder

(Affidavit to be affirmed on a Non Judicial Stamp Paper of Rs. 10/- and enclosed with the Bid documents which is required to be submitted in time duly)

I ……, son of ……. ……., aged about …… years by occupation …….. do hereby solemnly affirm and confirm as follow:

1. That, I am the …….. Of …… have duly authorized by and competent to affirm this affidavit on behalf of the said Bidder.

2. That, I have inspected the site of work covered under NIeB (NIeB No) circulated through Office memo bearing No ----------dated ---------- and have made myself fully acquainted with the site conditions existing level/proposed level and local conditions in and around the site of work. I have also carefully and meticulously gone through the Bid documents. Bid of the above named Bidder is offered and submitted upon due consideration of all factors and if the same is accepted, I on and for behalf of the aforesaid Bidder, being lawfully and duly authorized, promise to abide by all the covenants, conditions and stipulations of the Contractual documents and to carry out, complete the works to the satisfaction of the Bid accepting Authority of the Work and abide by all instructions as may given by the Engineer in Charge of the work time to time. I also hereby undertake to abide by the provisions of Law including the provisions of Contract Labour (Regulation & Abolition) Act, Apprentice Act 1961, West Bengal Sales Tax Act, VAT Act, Income Tax Act as would be applicable to the Contractor upon entering into formal Contract / agreement with the Bid Inviting/Accepting authority.

3. That I declare that, no relevant information as required to be furnished by the Bidder has been suppressed in the Bid documents.

4. That the statement above made by me is true to my knowledge.

Deponent
Solemnly affirmed by the said
……

before me.

……..
(1st class Judicial Magistrate / Notary Public)

SECTION - B

FORM- III

STRUCTURE AND ORGANISATION

A.1 Name of applicant:

A.2 Office Address:

Telephone No. and Cell Phone No. :

Fax No. :

E mail:

A.3 Attach an organization chart showing the structure of the company with names of

Key personnel and technical staff with Bio-data. :

Note: Application covers Proprietary Firm, Partnership, Limited Company or Corporation,

Signature of applicant including title

and capacity in which application is made.

SECTION - B

FORM – IV

C. DEPLOYMENT OF MACHINERIES (in favour of owner / lessee):-

(Original document of own possession arranged through lease deed to be annexed)

(If engaged before Certificate from E.I.C. to be annexed in respect of anticipated dated of release of Machineries.)

Name of Machine / Instrument	Make	Type	Capacity	Motor / Engine No.	Machine No.	Possession Status		Date of release If Engaged
						Idle	Engaged	

For each item of equipment the application should attach copies of

(i) Document showing proof of full payment, (ii) Receipt of Delivery,

(iii) Road Challan from Factory to delivery spot, is to be furnished.

Signature of applicant including title

And capacity in which application is made.

Memo No. 44/1 ( )/III(AMRUT)/1/Ph-II(W)/3/2020/IG/NIT-4/2020-21/V1 **Dated: 30/01/2021**

Copy Forwarded for information and for favour of wide circulation to:

1. The Mission Director, AMRUT, IlgusBhavan, Kol-700106, Sec-IV
2. The Secretary, M.E.Dte., BikashBhawan, Salt Lake, Kol-91
3. The Chief Engineer, M.E.Dte., BikashBhawan, Salt Lake, Kol-91.
4. The Chief Engineer KMDA (E/M), Salt Lake Kolkata,
5. The Additional Chief Engineer, M.E.Dte., BikashBhawan, Salt Lake, Kol-91.
6. The Superintendent Engineer, (Western Circle), M.E.Dte., PurbaBardhaman.
7. The Superintendent Engineer KMDA (E/M), Salt lake Kolkata
8. The Executive Engineer, Burdwan Division, M.E.Dte.
9. The Executive Engineer, KMDA (E/M), Salt lake, Kolkata.
10. The Finance officer, Burdwan Municipality.
11. Secretary,Burdwan Municipality & Nodal Officer ,AMRUT
12. UP,AMRUT,Burdwan Municipality
13. UIS,AMRUT,Burdwan Municipality
14. CA to Administrator,Burdwan Municipality & SDO (SADAR) North to his appraisal to authority.
15. I.T Coordinator ----------for Publication at Burdwan Municipality Website
16. The Guard File.

The Executive Officer

Burdwan Municipality

SECTION – A

DESCRIPTION OF THE PROJECT

1.0 GENERAL

Geo-Technical & Hydro- geological Sub Surface Investigation, Surveying, Planning, Designing, Construction & commissioning for enabling 2 nos. of 18.5 MLD Capacity each of minimum 6.0 meter diameter Collector wells with laying of stainless steel strainer pipes with 20 hours designing operation. along with Pump House, Access & Pipe carrying Bridge at Damodar along with HT substation at vicinity of High Bank at Damodar River in between Belkash & Zuzuty village, protection work at river bank, including construction of Pipe carrying Bridge on Banka & DVC Canal & laying of Rising main from Zuzuti to JalkalMath at Lakuddi for Conveying water & Permanent Road restoration works from Intake to CWR with necessary Civil, Electrical (according to I.E. rules), Mechanical with all other allied works related for pump house with necessary approval from respective Competent Authority including lightening within yard, pump house, walkway and internal illumination complete in all respect on turnkey basis as per satisfaction of the department. After satisfactory completion and commissioning, 3 (three) months trial run, necessary training of maintenance staff & thereafter (subsequently) 5 (five) years operation and maintenance with security /guarding arrangement under AMRUT Project.
During design additional 10% quantum of water to be considered for drawl to compensate the lose in conveyances in compliance with PHE Schedule.

The High Flood Level of River Stream: - Clear safe distance from HFL i.e. 37.36m GST in 1978 is desirable in all structures (as per Irrigation Deptt,)

The High Flood Level of High Bank side Premises: - Clear safe distance from HFL i.e. 37.36m GST in 1978 is desirable in all structures.

Finished Ground Level of the Substation Premises: - 1m above HFL

Floor of the Pump House & Access Bridge:- 2m above HFL.

2.0 LOCATION

2 NOS. collector wells in between Belkash & Zuzuty village, Damodar River, Burdwan, District Purba Bardhaman and location of CWR at Lakuddi Jalkal, Burdwan Municipality, District Purba Bardhaman

3.0 SCOPE OF WORK.

The Inlet well / CWR of Water Treatment Plant is approximately 9.0 Km away from the proposed site of infiltration gallery and laying of 600mm & 750 mm diameter DI Pipes for rising main. These are tentative data and calculation of head for the pumps to be done on the basis of actual survey done by the agency with respect to actual length & Dia. of Pipe, Level Difference etc.
Note: All the parameters and data given a tentative the exact value has to be arrived by successful bidder by field investigation, surveying & corresponding design as per standard norms and guide line and relevant manuals, codes & schedule to deliver the desire level output of water.

Sl. No.	Name of the work	Approx quantity
01	**Geo-Technical & Hydro- geological Sub Surface Investigation, Surveying, of bed deposit & Planning of the Project : This include surveying the river Damodar up-to a desired length and full width of river course, Geo-physical investigation of river bed deposits for assessment of hydraulic parameters of sub surface deposits and soil investigation at Damodar, Banka & DVC & planning the location of Infiltration Gallery, Intake Well and Pipe carrying access Bridge with a view of best utilization of sub surface water resources for gallery, hard strata for safe and stable construction of Well and Pipe carrying access Bridge at a reasonable cost** . **(Suitable design and hydro** geological **survey submitted by bidder shall be duly approved by Central Mechanical Engineer Research Institute (Govt. of India) or similar reputed Engineering institute so as to be accepted by authorities of M.E.Dte.)**	**1 item**
1.01	Survey and investigation of bed deposit up-to a minimum distance of 1.00 Km upstream and	**As per requirement**

	1.0 Km downstream from the proposed site respectively at an interval of 250 meter longitudinally and of 50.0 meter transversely at river bed of Damodar, Carry out VES Test to assess quality of bed deposits and drilling of wells up-to the full sand deposits on the river bed comprising 2 Nos. Pumping wells (PW) having minimum diameter of 150 mm and 6 Nos. Test wells (TW) of 80 mm diameter. 1 PW and 3 TW for each group and then to be pumped continuously including recuperation test for a minimum period of 72 hours for assessing hydraulic parameters (radius of influence, permeability, river bed infiltration rate etc.) of sub surface profile. On the basis of test data, design of infiltration gallery then to be carried out by considering least saturated depth of water in river bed deposit on continuous pumping from Infiltration gallery to CWR, scour depth etc.	
1.02	Sieve analysis of bed deposits for assessment of types and quality of deposits for assessment of filter media of the gallery and assessment of scour depth etc.	**Do**
1.03	Soil exploration of the required depth at suitable location to assess safe Bearing capacity for designing and construction of Intake Well and Foot Bridge	**Do**
1.04	Geo- Technical investigation for designing suitable foundation work	
1.05	Submission of Geo-physical Investigation Report and calculation of hydraulic parameters and scour depth. This Report must includes assessment of guaranteed minimum yield of sub surface water that may be available by considering continuous pumping for 20 hours per day and all seasonal variation. **NOTE:** • All drawings, designs except E/M work should be vetted by the premier Institutions like, NITs/IITs and • Superintending Engineer, M.E.Dte (West Circle). Shall finally vet the design and drawing after due recommendation from the Executive Engineer Burdwan Division(for civil portion) and same should be submitted in 6(six) copies • The Chief Engineer / the Superintending Engineer (E/M), KMDA. Shall vet the E/M drawings and for necessary approval of of E/M works.	**Do**
02.	INTAKE Wells:- **Design, Drawing & Construction of minimum 6.00 meter inner diameter RCC Collector well Cum Pump House (2.0 m above High Flood level) having 1.0m wide walk way at periphery including Civil & Electro-Mechanical works (including 2W+1S VT pump and motor) complete in all respect including supply & carriage of all materials with suitable foundation as per soil investigation report for the various units of Collector well.**	**2 items**
2.01	Suitable construction of RCC collector well with necessary foundation up to the bottom of Pump house with bottom plug.	**As per requirement**
2.02	Approach bridge having adequate clear walk way, rail on deck for material carriage and allied structures and utilities and 2 nos 450 mm dia. M.S. piping arrangement (both end).	**Do**
2.03	Temporary 5.00 meter wide approach road with supply and hand packing of stone boulder (two layers of boulder 150 mm thickness each) rolling the same, morrum /soil 75 mm thk., placing necessary hume pipe for under pass for flowing water of river to facilitate movement of construction equipment / materials from river bank to gallery/construction site for transporting materials from river bank.	**Do**
2.04	Inspection gallery inside collector well at every 3m from deck level to bottom of well 1 meter width with joist, flats, angles of minimum 10 mm thickness and heavy pipe with ladder from one gallery to next gallery with anti corrosive paint 3 coats.	**Do**
2.05	M.S. ladder with heavy pipe and flats 10 mm thick from deck level to bed level.	**Do**
2.06	Inlet hole with standby provision with flanged short piece 10 mm thick puddle collar including supplying and fixing of Butterfly valve 400 mm diameter ISI marked as per IS: 14846 with	**As per design but**

	test certificate & necessary extended spindle, Plummer block, head stock with gear arrangement, spacer with anchor bolt etc. To operate from inspection gallery just after pump platform.	**Minimum of 4 Nos.**
2.07	Construction of deck slab with RCC / joist keeping provision of turbine pump accommodation 3 nos. along with checker plate minimum 10 mm thick.	**As per requirement**
2.08	Provision of trolley type chain pulley arrangement with necessary joist, angle etc of reputed make like INDEF.	**Do**
2.09	Level indicator mechanical type with S.S. float and wire rope of chrome alloy.	**Do.**
2.10	Construction of Pump House above the Collector Well (Plinth level will be 2.0 m high above HFL) for accommodating pumps, motors, panel etc. including its all electro-mechanical works complete in all respect and direction of Engineer-in Charge.	**Do**
03.	Infiltration Gallery: - **Design, Drawing & Construction of Infiltration gallery at either side of well at the lowest level of sand deposit from bed level with minimum 450 mm diameter stainless steel V- type strainers or as per design with necessary flange joint and nut, bolt, gasket including removal of foreign materials to construct a straight gallery, levelling the bed of trench in supervision of divers, placing pebble of requisite (to be designed) to support deposits of river. Detailed design based on Darcy's law, drawing is to be provided keeping at least 1000 mm thick suitable pebble packing all around strainer pipe and 1.2 m at top and 1.20 m height Boulder** sausage **work 1.0m below the bed to protect the strainer from scouring in future.**	**2 items**
3.01	The gallery pipe top should be at least 7.5 meter below the saturated water level at lean period of river or as design data as per site condition and should be placed after over pumping for development of formation. Open excavation of sand including removal of localized clay, other foreign materials like wood, rock; debris etc. as is necessary accordingly with excavator, sand pump, grab etc. and grading the bottom of trench to lay the strainer pipe at a slope of 1: 500 (around) towards well under the supervision of divers. Placing the pebble from top of water level along the gallery at under and above strainer as per approved drawing and direction of E.I.C. under supervision of divers.. The depth of gallery as mentioned is a binding criterion for which necessary investigation has to be done. Localized rock, debris etc under water has to be cleared to complete the gallery as per drawing and direction of E.LC to achieve required yield of 18.5 MLD (each well) sand free water from the gallery to well during lean period.	**As per requirement**
3.02	Stone boulder sausage work on top of gallery of minimum thickness of 1.20 meter after carrying it up to gallery site as per drawing of boulder size more than 150 mm. with 3 mm thick G.I. wire net of 125 x 125 mm opening along with studs.	**Do**
3.03	Backfilling of sand on top of gallery from excavated bed material as shown in drawing.	**Do**
3.04	Maintaining a channel for diverting the water course if necessary to construct the gallery.	**Do**
04.	Intake well **Access** & pipe carrying bridge: - **Planning,** Design, **Drawing & Construction of minimum 3 m wide Access and Pipe carrying Steel structural Bridge from river high bank to intake well (2.0 m above HFL) is having adequate width of clear walkway with rail at centre to facilitate trolley movement for material carriage having cable trays at both side of bridge, 1.5 m high railing on either side of bridge along with 2 nos 450 mm dia MS Pipe rising main line on Bridge with necessary RCC abutments, piers, columns supported on pile foundation with all illumination & electrification work. (Minimum Length of bridge is 350m or as per site condition).**	**2 items**
4.01	Suitable pier to support the bridge at suitable spacing preferably not more than 30 m having Pile foundation up to bed level and then column having aerodynamic profile.	**As per requirement**
4.02	Construction of steel structural pipe carrying Bridge with saddle support, walkway railing etc.	**Do**
4.03	Supplying & Laying of 2 nos 450 mm dia MS Pipe line for carrying water main on Bridge	**Do**
05.	**800 KVA HT SUB STATION BUILDING: Geo technical investigation, Planning, Design & Construction of single storied minimum 200 m2 plinth area frame**	**1 item**

	structure building for 800 KVA HT Substation including office & rest room, guard room, bathroom and RCC Framed Boundary Wall with M.S Gate along with brick work, Plastering, Painting, Roof treatment, flooring, door & windows, ramp, Sanitation & Plumbing complete in all Civil & Electromechanical works as per requirement & in consultation with Power Supply Agency and Approved design as per direction of E.I.C for feeding power.	
5.01	Construction of sub-station Building and other structures	**As per requirement**
5.02	Land Development at the Sub Station Building Site near Collector Well by Earth work in filling in compound, tank, low land, ditches etc. with good earth, in layers not exceeding 150 mm. including breaking clods and consolidating the same by ramming and dressing complete With carried earth arranged by the contractor. Complete in all respect with all labour& materials as per scope of work, specification Tender Document & direction of E.I.C.	**Do**
5.03	Design, supply and construction of Paver Block Topped Internal road, Drain, Arboriculture and Beautification including all allied works at the Sub Station	**Do**
5.04	Supply & Installation of permanent electrification, Internal lighting, yard lighting, Compound lighting, All Cabling works along with earthing arrangement complete in all respect as per approved drawing and direction of Engineer-in Charge.	**Do**
5.05	Collector well internal illumination, yard lighting including necessary conceal wiring	
06.	**ELECTRO-MECHANICAL WORKS :-**	**2 items**
6.01	Supply, delivery & installation of approved make Vertical Turbine Pumping unit of 1150 m3/hr or as required as per site condition & head to be decided by bidder, 3 nos. (2W+1SB) for each Infiltration Gallery with supply, delivery & installation of corresponding capacity M. V. Induction Motor set to match with the pump complete in all respect with coupling hub & all other accessories as mentioned in the technical specification.	**As per requirement**
6.02	Supply, delivery & installation of Electrical Control Panel in M.S. Sheet enclosed wall mounting ATS control panel consisting of i) Incomer circuit breaker & protection relay ii) Motor feeder breaker with motor protection relay iii) MCCB for electrical units iv) Start stop push button with indicating lamp & power capacitor v) Air cooled auto transformer (1w+1 stand by) = 2 nos	**Do**
6.03	Supplying, Laying and fabricating of ERWS mild steel 2 nos. M.S. Pipe line (TATA / SAIL make) on each foot way bridge 450 mm dia. 10 mm thick including all necessary different types of valves and accessories such as Butterfly valve, Sluice valve, Non Return valve, Tempered proof Kinetic air release valve, Dismantling Joint, Common Manifold, Pressure gauges etc along with painting of whole equipments complete in all respect as per approved drawing and direction of EIC	**Do**
6.04	Supply & Installation of 5.0 MT HOT crane at Pump House	**Do**
7.0	**Laying of 600mm & 750 mm dia. DI (K9) Rising Main from Well to CWR at Zalkal Building, along the River Bundh including construction of pipe carrying Bridge at DVC Canal and Banka khal along with valve chamber, thrust blocks, anchor blocks, permanent road restoration, hydraulic testing , cleaning washing and flushing with supply, fitting and fixing all types of DI specials including all allied works, complete in all respect with all labour& materials as per enclosed drawing , scope of work, specification, Tender Document & direction of E.I.C. (DI pipe will be supplied by Burdwan Municipality & agency has to carry the pipe from Municipal Godown to working site at his own cost).**	**1 item**
7.01	Laying of 600mm & 750 mm dia. DI (K9) Rising Main from Well to CWR at Zalkal Building, along the River Bundh with earth work in excavation, filling, supports, specials, valves, permanent road restoration and other all allied works.	**Approx. 9500 m length, or as per site requirement**
7.02	Supply, laying 750 mm Dia, MS Pipe line on Construction of 3m & 4 m wide pipe carrying MS Structural with suitable supported on Bridge with hand rail at DVC Canal and Banka khal respectively.	**Approx. 100m & 40 m or as per site requirement**

8.0	**Planning, designing, Drawing & Construction of 2 nos at least 3 m wide pipe carrying M.S. Structural Bridges with necessary RCC piers, columns supported on pile foundation and direction of EIC at DVC Canal and Banka khal with all labour& materials. (considering design & also provision of another 2 nos 500 mm dia pipe line support at DVC Canal and 3 nos 500 mm dia pipe line on Banka khal Bridge of approx. 100m & 40 m or as per site requirement).**	**1 item**
8.01	Suitable pier to support the bridge at suitable spacing preferably having Pile foundation up to bed level and then column having aerodynamic profile	
8.02	Construction of 3m & 4 m wide pipe carrying MS Structural / RCC Bridge with suitable supported on Bridge with hand rail at DVC Canal and Banka khal respectively with walkway saddle supports & railing.	
8.03	Provision of extra 2 nos 500 mm dia & 3 nos 500 m dia pipe saddle support arrangement for clear water main & distribution line including design calculation of bridge at DVC Canal and Banka khal respectively	
9.0	**Planning, Design, supply and providing Bank Protection work including repairing of Bank by boulder pitching & boulder sausage work on both upstream and downstream of abutment of the access bridge of the Infiltration Gallery well including all allied works, complete in all respect with all labour& materials as per scope of work, specification, Tender Document & direction of E.I.C. (2 items)**	**2 items**
9.01	Supply and providing Bank Protection by boulder sausage work on both upstream and downstream of abutment of the access bridge. Double layer boulder pitching at bank slope & Stone boulder sausage work of minimum thickness of 1.20 meter at toe after carrying it up to gallery site as per drawing of boulder size more than 150 mm. with 3 mm thick G.I. wire net of 125 x 125 mm opening along with studs.	**Both side 200 m of the Bridge or as per requirement (FOR EACH WELL)**
10	**CONCRETE APPROACH ROAD FROM IRRIGATION BUNDH TO SUB STATION BUILDING AND INTAKE SITE WITH MINIMUM 3.0 M WIDTH AS PER SITE CONDITION APLLICABLE TO BOTH APPROACH BRIDGE WITH ADEQUATE CONNECTIVITY FOR VEHICULAR MOVEMENT FOR CARRYING PUMP, MOTOR AND OTHER ACCESSORIES**	**1 item**
11.0	**COMMISSIONING, TRIAL RUN AND OPERATION & MAINTENANCE**	**1 item**
11.01	Operation and maintenance of the plant for 5 (five) years. The work includes supplying adequate number of operating personnel and skilled labour with a provision for necessary training to the staff appointed by the ULB including supplying all sundry materials, and replacement of all types of damaged component etc. as per Bid document and complete in all respect and as per direction of Engineer-in Charge. N.B:- This item will be executed after three (3) months trial run. (The electricity cost shall be paid by Burdwan Municipality)	

Notes:

(i) The Bid includes Survey, Planning, Design, Supply, Erection, Fabrication, Operation & maintenance of Intake well Pumping Station, Supplying, Laying and fabricating of spiral welded mild steel M.S. Pipe line (TATA / SAIL make) on foot way bridge including all necessary different types of valves and accessories all complete up to the starting point of Water Rising Mains [to be done separately]. However end point of the MS pipe must be flanged jointed.

(ii) The total work includes design, supply, fitting, fixing, commissioning trial run (for three months) and thereafter operation and maintenance of 5 (five) year for the pumping machinery, motors etc. and allied equipment's including proper engagement of operating personnel. The essential prerequisite of the operation and maintenance work is to maintain uninterrupted water supply from the pumping station to ground level reservoir.

(iii) The Bidder has to submit in due course the specific size and capacity of all machineries & equipment offered along with data related to static & dynamic loads in different operating conditions. The size of all the equipment's should be so selected to match with the civil works.

(iv) The vibration & noise should be within the acceptable limit as per I.S. or as per existing norms for all equipment's.

(v) The dimension and centreline of pedestals for supporting the Pumps as well as the valves should strictly be in line for both Civil & electromechanical works.

(vi) The centre-to-centre distance of the pumps, clearance from wall for pumps should be as per I.S specifications.

(vii) The installation of all electrical equipment should be strictly as per I.E. Rules and as per IS specification.

(viii) The minimum distance from the pump centre to centre is to be maintained in such a manner so that no vortex formation takes place in the entry of pump i.e. the flow should be maintained streamlined at the entry point of pump. The minimum distance of the pump motor centre line to wall of the pumping station will be maintained in such a fashion that no obstetrical is to be found at the time of maintenance.

(ix) The Bidder has to submit parallel operation curves for pumps & the same is to be matched with the system resistance curve of the delivery grid to the WTP. Pump head selection should be done after surveying of details rising main pipe line. Family curves for individual and multiple operations at all possible consequences depending upon the variation in % opening of the butter fly valves are to be submitted.

(x) The total capacity of the pumping station will be as per design at head (supplied by the bidder after surveying the site condition) Meter with operation of three VT pumps (2W+1SB) for raw water supply (Running hours of 20 Hrs. /day) would yield to a supply of approx. 18.5 MLD each well as per present requirement. The pumps & Motors must be of continuous duty and vertical execution type.

The individual pump delivery pipelines should be connected to a common delivery manifold placed inside/outside of the pump house which will be connected with the rising main placing with butterfly valve, a temper proof kinetic air release valve and full bore type flow meter. The delivery pipes lines connected with the common delivery line below the 45 degree.

The suction bell mouth of the vertical turbine pumping unit should be placed in such a manner that no eddy and starvation occurred when pumping operation will put to operation at lowest flood level.

(xi) The Bidder has to consider all butter fly valves electrical actuator control, NRV, dismantling joints in individual pump delivery pipe lines as per detail technical specification.

(xii) The puddle collars/wall casting needed to be fixed into the wall for entry & exit of delivery pipelines are also to be considered (if required).

(xiii) The Bidder must work out the natural frequency analysis for the structural work and the same should be verified with the RPM & critical speed of the rotating equipment's to eliminate any chance of vibration.

(xiv) All the cabling work required to operate the equipment at Intake well pumping station will be drawn from the LT PDB panel of the LT substation. Power cable of all sizes must be 11/1.1 KV grade 3 Nos. aluminium armoured 3 / 3.5 core 400 sq mm XLPE/PVC cable for all electrical component or as design data.

(xv) Designing, drawing and construction of collector well RCC walkway with pump house building having good architectural view including machine foundation for pumps and motors will be constructed on the Intake well pumping station on the river Damador as per Bid drawing. The height of the pumping station is to be designed in such a manner that there will be no hindrances for repair maintenance of the vertical pump motor unit. One electrically operated crane of 5 MT capacities shall have to be provided to handle pump and motor sets for repairing and maintenance purpose in the pump house. In order to accommodate control panel room equipment/appliances will be housed at a level of pumps floor. The control panel room shall have to be covered by wooden glass frame room.

(xvi) Designing, drawing and construction of Intake Well steel bridge is to be made minimum 3.0 m wide walkway with hand railing all along and arrangement for Laying and fabricating of spiral welded mild steel M.S. Pipe line (TATA / SAIL make) & laying of 3 Nos. (2 Nos. on each side) aluminium armoured cable 400 sq mm3 / 3.5 core cable and two nos. earthing GI (25mm X 6 mm) strip, illumination system, aviation lighting arrangement and lightening arrestor with separate earthing arrangement or as design data.

(xvii) The design of Intake well has to be made on the basis of the Static load of pump house as prescribed and dynamic loading pattern thereof, taking into account of the vibration both horizontally and vertically that will be generated due to operation of each pump motor set as well as parallel operation of the pumping unit.

(iv) The Bidder, whose Bid is accepted in the course will have to furnish details of the design of the pump house and Intake well in all level duly incorporating the requirement of the pump manufacturer.

4.0 LIMIT OF CONTRACT:

The limit of contract starts from construction of Intake well with pumping station including arrangement and installation of vertical turbine pumping unit with its electro-mechanical works and raw water delivery line with valves arrangement and interconnected with Supplying, Laying and fabricating of spiral welded mild steel M.S. Pipe line (TATA / SAIL make) on both sides of foot way bridge 450 mm dia. including all necessary different types of valves and accessories all complete which will be bidder's scope up to CWR at Zalkal Building, Burdwan Municipality. A full bore digital discharge meter and flow meter with valve chamber at outlet of the Intake well of pumping station will be in the bidder scope. The LT sources of Electric Power would be taken from High Lift LT panel room of Sub-Station. Necessary arrangements to connect the cables of appropriate size with full satisfaction of Engineer in Charge are within the limit of this work. The excavation of cables trenches, laying the cables within boundary of intake pumping station units, covering the cable trenches, insert plates, cable trays etc. also includes under this contract. Laying of 600 mm & 750 mm dia DI pipe rising main line from Intake wells to CWR at Zalkal Building, Burdwan Municipality.

It is the responsibility of the contractor to make good or reconstruct the part or whole of a structure if gets damaged or demolished/ crushed/ settled down due to water thrust or similar external reasons or faulty design at his own cost. Faulty Design submitted by the contractor even if accepted by the department will not relieve the contractor from above responsibility. Contractor will be considered total responsible for any accident caused due to negligence on his part/poor workmanship/faulty design.

Contractor has liberty to go for design mix for achieving Rich concrete having minimum cement content as stipulated in I.S. code or go for variation if so required at the subject to the satisfaction & permission of E.I.C. The same is also applicable when contractor opt to adopt alternative methodology for facilitating any construction work.

Executive Officer
Burdwan Municipality

SECTION - B

CONDITIONS & REQUIREMENTS FOR BIDDING

1. Submission of eBid document will not be allowed beyond the schedule time indicated in the e Bidding.

2. Each Bidder shall upload his offer in envelopes (statutory and non-statutory)& .xls sheet after digitally signed super scribing the name of the work, name & address of the bidder, NIB No and date of submission of the eBid.

3. Each page of the eBid documents, drawing etc. has to be digitally signed / initiated by the authorized signatory.

4. No eBid proposal will be entertained without the earnest money being submitted as indicated in the NIB. No interest will be allowed for the said earnest money and the Bid issuing authority will hold the same till finalization of the eBid.

5. Any conditional eBid will be liable for rejection.

6 The Bid inviting Authority reserves the right to reserve or amend the eBid documents prior to the date notified for submission of the eBid or also to extend the time mentioned in the NIB under intimation to the Bidders.

7. eBid once offered cannot be withdrawn within a period of 120 calendar days from the date set for opening of eBids. Any extension of this validity period if required will be subject to concurrence of the Bidders.

8. Bidders would be at liberty to point out any ambiguities, contradictions, omissions, etc. seeking clarifications thereof or interpretation of any of the conditions of the eBid documents before the Bid Inviting Authority by uploading his/her doubt within a period of Forty eight hours before the date of Pre bid meeting as per schedule.

9. Written clarification or amendments etc. as may be issued by the Bid Inviting Authority in pursuance to the representation made by the intending Bidders under Clause 10 above shall be final and binding on the Bidders and shall form a part of the eBid documents. Bid Inviting Authority however, reserves the right to have pre Bid conference with the intending Bidders if deemed necessary. Any point or irregularities or questions could not be raised after expiry of pre bid meeting.

10. Intending Bidders are required to inspect the site of the Project with particular reference to location and infrastructure facilities. They are to make a careful study with regard to availability of materials and their sources and all relevant factors as might affect their rates and prices. The Bidders must be acquainted with existing ground level(EGL), Highest flood level(HFL), Finished ground level(FGL)/Proposed ground level(PGL), and other required levels.

11. If expenses incurred for site inspection and all activities in the preparation and uploading of the eBid shall be borne by the Bidders.

12. Extra claim or any concession on the ground of insufficient data or information and absence of knowledge of conditions prevailing at the site or situation arising during the execution of the work shall not be entertained.

13. eBid, which have been considered valid on the result of general examination (Prequalification stage) at the time of opening, shall be subjected to subsequent detail scrutiny. Notwithstanding the general examination carried out earlier, the Bid Inviting authority reserves the right of rejection of any eBid, which may be found to be defective during the detail scrutiny.

14. Bidders before uploading the eBid documents shall have to ensure that “Declaration by the eBidder” in the pro-forma set out in the eBid documents is to be filed separately with the eBid documents in the form of Affidavit to be affirmed by the same person signing the Bid documents.

15. The Bid inviting authority reserves the right to accept or reject any or all of the eBid received or to split up the work in groups or to relax any clause without assigning any reason thereof.

16. This set of Bid documents consists of:

a. Detail Notice inviting Bid.

b. Declaration by the eBidder.

c Main Bid Documents consists of PART I & PART II (Technical) &financial(.xls format)

d. Municipal Tender Form.

SECTION – C

GENERAL CONDITIONS OF CONTRACT

1.0 DEFINITIONS AND INTERPRETATION

(1) In the Contract, as hereinafter defined, the following words and expressions shall have to be meanings hereby assigned to them, except where the context otherwise requires:

(a) "Approved" means approved in writing, including subsequent written confirmation of previous verbal approval and "approval" means approval in writing, including as aforesaid. "However in spite of approval from Competent Authority contractor is solely responsible for design-cum-execution of the whole project as it is turnkey job"

(b) Authority means the "The Administrator, Burdwan Municipality" or his Authorized representative.

(c) "Bank" means the "State Bank of India" or any other Nationalized Bank.

(d) "Calendar day" means a period of twenty four hours extending from midnight to midnight.

(e) "Cash" includes cheque, bank drafts and any other payment voucher authorizing payment from any bank or treasury.

(f) "Contractor" means the person or persons, firm or Corporation who have entered into the contract for the performance of the work.

(g) "Contract price" means the sum as stated in the Bid submitted by the contractor subject to such additions there to or deductions therefore as may be made under the provisions of the contract documents and accepted by the Employer.

(h) "Constructional Plant" means all appliances or things of whatsoever nature required in or about the execution or maintenance of the works but do not include materials or other things intended to form or forming part of the permanent works.

(i) "District" or Burdwan Municipal Area means the area described as such in Schedule-I of The Act;

(j) "Drawings" means the drawings referred to in the Bid documents and any modification of such drawings approved in writing by the "Superintending Engineer, West Circle, M.E.Dte." or his representatives of Municipal Engineering Directorate from time to time.

(k) "Employer" means "The Administrator, Burdwan Municipality"

(l) "Engineer in Charge" means the Executive Engineer, Purba Burdwan Division of Municipal Engineering Directorate.

(m)"Engineer's Representatives" means any Assistant Engineer or Sub-Assistant Engineer or any Technical Personnel of works appointed from time to time by the Employer or the Engineer to perform the duties set forth in Clause 2 hereof, whose authority shall be notified in writing to the Contractor by the Engineer-in Charge.

(n) "Existing Ground Level (EGL)" means the level of the referred point of the exposed surface of the ground, road or pavement free from extraneous materials and High Flood Level (HFL) means the maximum water level during flood for last consecutive years as decided by competent govt. Department and Finished Ground Level (FGL) is the referred top most point at which land development has to be done by good earth with proper compaction and consolidation.

(o) "Holidays" means a public holiday for the purpose of Section 25 of the Negotiable Instruments Act, 1881 or such other day on which the office of the Authority remains closed for the day.

(p) "Local Authority" not only means a Municipal Corporation or Municipality (ULB) or other authority legally entitled to the control or manage local funds but also includes the West Bengal State Electricity Distribution Company Ltd.

(q) "Month" means English calendar month.

(r) "Permanent Work" means the permanent works including equipment to be supplied, executed, erected and maintained in accordance with the Contract.

(s) "Road" shall include a street, avenue, lane, by-lane or any other access routes over which a person authorized by a Local Authority has a right of way.

(t) "Rupees" (or Rs. in abbreviation) shall mean Rupees in Indian Currency.

(u) "Site" means the land and other placed on, under in or through which the Permanent. Works or Temporary Works are to be executed and any other lands and places provided or arranged by the employer for working space or any other purpose as may be specifically designated in the Contract as forming part of the Site.

(v) "Specification" means the specification referred to in the Bid and any modification thereof or addition thereto as may from time to time be furnished or approved in writing by the "Superintendent Engineer, West Circle Municipal Engineering Directorate,. Further specification laid down in the P.W.D Schedule of Govt. Of West Bengal & all relevant& latest IS codes with latest amendments will be implied after due approval from S.E (SC). In case of any ambiguity or completion of different schedule the decision of S.E (SC), will be final and bindings.

(w) "Store" means such storage areas including depot, go down, stockyard, dumping yard etc. maintained by the Authority) or where supply of any material for the construction or any work has been undertaken by any authorized agent, by such agent within the District.

(x) "Temporary Works" means all temporary works of every kind required in or about the execution or maintenance of the Permanent Works.

(y) "Bid Date" means the date fixed for receipt of Bids as per Notice Inviting Bids or as extended by subsequent notification(s).

(z) "Bidder" means the person, or persons, Firm, Company or Corporation submitting a Bid for the work contemplated either directly or through a duly authorized representative;

(aa)"The Act" West Bengal Municipal Act, 1975.

(bb)"Time" expressed by hours of the clock shall be according to the Indian Standard Time.

(cc)"Water main" means any pipe or conduit of cast iron, steel or of any other material intended to conveyor distribute water;

(dd)"Works" shall include both Permanent Works and Temporary Works.

(ee)"Work" means all of the work of the project called for or shown in the Bid documents including preparation, construction improvement and cleans up.

(2) Singular and Plural: Works importing the singular only also include the plural and vice versa where the context demands.

(3) Headings or Notes: The headings and marginal notes in these Conditions of Contract shall be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

(4) Cost: The work "cost" shall be deemed to include overhand costs whether on or off the Site.

(5) Period of completion: The period of completion shall be 365 (Three sixty five Days) after issuing the work order.

2.0. ENGINEER IN CHARGE AND HIS REPRESENTATIVES

(1) Duties and Powers of Engineer in Charge and his Representative - The Engineer shall carry out such duties in issuing decisions, certificates and orders as are specified in the Contract. Fixation and acceptance of rates for altered or substituted items of work or for additional items of work or their deletion shall however always rest with the same authority (by designation) as had accepted the original Bid.

(2) Representative(s) shall be responsible to the EIC and his/their duties are to watch and supervise the Works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract, not, accept as expressly provided hereunder or elsewhere in the Contract, to order any work involving delay or any extra payment by the Employer, nor to make any variation of or in the Works.

(a) Failure of the Engineer's Representative to disapprove any work of materials shall not prejudice the power of the Superintendent Engineer, West Circle Municipal Engineering Directorate , thereafter to disapprove such work or materials and to order the pulling down, removal of breaking up thereof.

(b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative he shall be entitled to refer the matter to the Superintendent Engineer, West Circle Municipal Engineering Directorate, , who shall thereupon confirm, reverse or vary such decision.

3.0 ASSIGNMENT

The Contractor shall not assign the Contract or any part thereof, or any benefit or interest therein or there under, otherwise than a change in the Contractor's bankers of any money due or to become due under this contract, without the prior written consent of the EIC.

4.0 SUBLETTING

The Contractor shall not sublet the whole of the Works. Except where otherwise provided by the Contract, the Contractor shall not sublet any part of the Works without the prior written consent of the Superintendent Engineer, West Circle, Municipal Engineering Directorate, which shall not be unreasonably withhold and such consent, if given, shall not relieve the Contractor form any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of the said sub-contractor including his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen, provided always that the provision' of labours on a piece-work basis shall not be deemed to be a subletting under this clause.

5.0 CONTRACT DOCUMENTS

(1a) Language: The Contract documents shall be drawn up in the English language. All correspondence, orders, notices etc. shall also be in English.

(1b) Law: The law of India and of the State of West Bengal shall apply to the Contract and the Contract is to be construed accordingly.

(2) Documents Mutually Explanatory: The several documents forming the contract are to be taken as mutually explanatory of one another but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Superintendent Engineer, West Circle Municipal Engineering Directorate, in terms of the provisions in Clause B-2.3 of the Conditions and Requirements for Biding (omitted portion) who shall thereafter issue to the Contractor instructions thereon. Provided always that if, in the opinion of the Engineer, compliance with any such instructions shall involve the Contractor in any cost, which by reason of such ambiguity or discrepancy could not reasonably have been foreseen by the Contractor, the Engineer shall certify and shall pay such additional sum as may be reasonable to cover such costs with recommendation of the Superintendent Engineer, West Circle Municipal Engineering Directorate,.

6.0 DRAWINGS

(1) Custody of drawing: All the approved Drawings shall remain in the safe custody of the Executive Engineer, Purba Burdwan Division, Municipal Engineering Directorate, but one copy thereof shall be furnished to the Contractor free of charge. The Contactor shall provide and make at his own expenses any further copies required by him. At the Completion of the Contract, the Contractor shall return to the Executive Engineer, Purba Burdwan Division, Municipal Engineering Directorate, Govt. of West Bengal all drawings as provided under the Contract. (Minimum 6 copies of Design & drawing as hard copy has to be submitted by the contractor)

(2) One copy of approved drawing is to be kept on site. One copy of the Drawings furnished by the Contractor as aforesaid, shall be kept by the Contractor on the site and the same shall at all reasonable times be available for inspection and use by the Engineer, and his Representatives and by any other persons authorized by the Engineer in writing.

(3) Disruption of progress: The Contractor shall give written notice to EIC whenever planning or progress of the works is likely to be delayed or disrupted unless any further approval of drawing or order, including a direction instruction or

approval is issued by Superintendent Engineer, West Circle Municipal Engineering Directorate, on recommendation of Executive Engineer Purba Burdwan Division, Municipal Engineering Directorate within a reasonable time. The notice shall include details of the drawing or order required, and of why and by whom it is required and of any delay or disruption likely to be suffered if it is further delayed.

(4) The contractors should submit required design calculations along with drawing. If required by Superintendent Engineer, West Circle Municipal Engineering Directorate, / E.I.C the design shall be submitted in latest version of civil, Mechanical, & Electrical software's with their hard copies and soft copies (in CD). Besides this the soft copies of all Drawing may also be submitted in AutoCAD format as & when required.

7.0 ADDITIONAL COPIES OF DRAWINGS

The EIC shall have full power and authority to supply to or demand from the Contractor, from time to time, during the progress of the Works, such further drawings as shall be necessary for the purpose of the proper and adequate execution and maintenance of the Works. The Contractor shall carry out and be bound by the same. Adequacy as determined by the EIC shall be final and binding on the Contractor.

8.0 GENERAL OBLIGATION

Contractor's General Responsibilities - The Contractor shall, subject to the provision of the Contract, and with due care and diligence, execute and maintain the Works and supply all labour, including the supervision thereof, materials, equipment, Constructional Plant and machinery, tools and all other things whether of a temporary or permanent nature, required for such execution and maintenance, so far as necessary for providing the same is specified in or is reasonably to be inferred from the Contract. The Contractor shall take full responsibility for the adequacy, stability, safety & security or all Site operations and methods of construction, erection etc. During trial run and annual maintenance period the contractor has to assured safety and security of the whole plant by providing necessary guard/watchmen at his own cost.

9.0. CONTRACT AGREEMENT

The Contractor shall, when called upon to do so, enter into and execute a Contract Agreement, to be prepared and completed in the form annexed with such modification as may be necessary.

10.0. GUARANTEE

The contractor shall stand guarantee for successful operation of the plant for 12 months from the date of successful commissioning of the pump and shall within the O&M period, after 3 months trial run remove/rectify/ make good any such deficiency forthwith at his own cost. During the guarantee period (after the trial run period) the firm's representative shall visit the site once in a month and advice in writing the Superintendent Engineer, West Circle Municipal Engineering Directorate, about the condition, state of health, and operation & maintenance procedure of the equipment.

The successful Bidder shall also give the following guarantee in respect of the equipment supplied by him.

i) All equipment shall be free from any defects due to faulty design of the components, materials and/or workmanship

ii) The equipment shall operate satisfactory. The performance and efficiency shall not be less than guaranteed values.

iii) Formal acceptance of the work or equipment covered under the contract will not be made by the EIC until all the work done by the contractor has satisfactorily passed all tests required and run for a reasonable period to his satisfaction.

If during testing of work, including equipment prior of formal acceptance, the same or the material thereof must satisfy in respect of meeting the specification guaranteed or otherwise the Contractor shall replace all such equipment etc. in a condition which will meet the guaranteed performance and be up to the specification, in both material and workmanship.

Any such work shall be carried out by the contractor at his own expense, if such work shall, in the opinion of the Engineer-in-Charge, be necessary due to the use of materials or workmanship not in accordance with the contract and/or to the neglect or failure on the part of the contractor to comply with any obligation expressed or implied on the contractor's part under the contract. If the contractor shall fail to do any such work as per aforesaid requirement of the Engineer-in-Charge, the EIC shall be entitled to have such work carried out by its own workman, or by others hired for the purpose, and if such work is in the opinion of the Engineer-in-Charge for which the contractor should have carried out at the contractor's own cost, the department shall be entitled to recover from the contractor the supervision cost deemed fit together with the cost increased for the purpose and may deduct the same from any money due to or that may become due to the Contractor.

10.1 START-UP GURANTEES

Until such time as the equipment or material installed and erected under the contact is finally accepted by the Department in keeping with the terms and condition of this contract and associated specifications the responsibility for proper storage, testing, maintenance and efficient of the same shall be that of the contractor. Prior to start-up contractor shall be required to service of the equipment and during start-up render such assistance as may be necessary or request for by the Employer.

When the equipment has not been manufactured by the bidder, Back to Back Guarantee shall be provided and the manufacturer recommendations for installation of the same shall be strictly adhered to and any defects developing due to faulty installation transportation and / or erection during start-up or during a period of one year from the date of commissioning shall be rectified, remedied or made good by the contractor through manufacturer, if considered by the Department, at his own cost. When the equipment has manufactured by the bidder himself, rectification within similar period is compulsory.

11.0. INSPECTION OF SITE

The EIC shall have made available to the Bidder with the Bid documents such data like its location, distance from fixed point including the layout drawing and location of the primary grid point, level drawing data the source of filling the reservoir and the Bid shall be deemed to have been based on such data. But the Bidder shall be responsible for his own interpretation thereof. The Bidder may also undertake investigations at his own cost on such levels or any other levels prior to submission of his offer.

The Bidder shall also be deemed to have inspected and examined the site and its surroundings and information available in connection therewith and to have satisfied himself, so far as is practicable, before submitting his Bid; as to the form and nature thereof, including the sub-surface conditions, topography together in the level, the hydrological and climatic conditions, the extent and nature of work and materials necessary for the completion of the Works, the means of access to the Site and the accommodation he may require and, in general shall be deemed to have obtained all necessary information, subject as above mentioned, as to risks, contingencies and all other circumstances which may influence or affect his Bid.

12.0 SUFFICIENCY OF BID AND ADVERSE PHYSICAL CONDITIONS, ARTIFICIAL OBSTRUCTIONS

The Bidder shall be deemed to have satisfied himself before Bidding as to the correctness and sufficiency of his Bid for the Works and of the rates and prices quoted in the Schedule of prices, which Bid rates and prices shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and maintenance of the Works. If, however, during the execution of its Works the Contractor shall encounter physical conditions, other than Climatic conditions on the Site, or artificial obstructions, which conditions or obstructions could, in his opinion, not have been reasonably foreseen by an experienced contractor, the Contractor shall forthwith give written notice thereof to the Engineer and if, in the opinion of the Engineer, such conditions or artificial obstructions could not have

been reasonably foreseen by an experienced contractor, then the Engineer shall certify and the EIC shall pay the additional cost to which the Contractor shall have been put by reason of such conditions, including the proper and reasonable cost with due recommendation of Superintendent Engineer, West Circle Municipal Engineering Directorate.

a) Of complying with any instruction which the Engineer may issue to the Contractor in connection therewith, and

b) Of any proper and reasonable measures approved by the EIC on recommendation of Superintendent Engineer West Circle Municipal Engineering Directorate, which the Contractor may take in the absence of specific instructions from the EIC as a result of such conditions or obstructions encountered.

13.0. WORK TO BE TO THE SATISFACTION OF ENGINEER IN CHARGE

Save in so far as it is not legally or physically impossible, the Contractor shall execute and maintain the Works in strict accordance with the Contract to the satisfaction of the EIC and shall comply with and adhere strictly to the EIC's instructions and directions on any matter whether mentioned in the Contract or not touching or concerning the Works.

14.0. WORK PROGRAM

(1) Program to be furnished: Within thirty (30) calendar days, the Contractor shall, after the acceptance of his Bid, submit to the EIC for his approval a program showing the order of procedure in which he proposes to carry out the Works. The Contractor shall, whenever required by the EIC, also provide in writing for his information, general description of the arrangements and methods, which the Contractor proposes to adopt for the execution of the Works.

(2) If at any time it should appear to the EIC that the actual progress of the Works does not conform to the approved program referred in sub-clause (1) of this Clause, the Contractor shall produce, at the request of the EIC, a revised program showing the modifications to the approved program necessary to ensure completion of the Works within the time for completion as defined in Clause 42 hereof.

(3) The submission to and approval by the EIC of such program or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

15.0. CONTRACTOR'S SUPERINTENDENCE

The Contractor shall give or provide all necessary superintendence during the execution of the Works and as long thereafter as the Superintendent Engineer, West Circle Municipal Engineering Directorate, may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. The Contractor or a competent and authorized agent or representative approved of in writing by the Chairperson, which approval may at any time be withdrawn, is to be constantly on the Works and shall give his whole time to the Superintendence of the same. If such approval be withdrawn by the Superintendent Engineer, West Circle Municipal Engineering Directorate, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned after receiving written notice of such withdraw, remove the agent from the works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another agent approved by the Superintendent Engineer, West Circle Municipal Engineering Directorate,. Such authorized agent or representative shall receive, on behalf of the Contractor, direction and instruction from the Superintendent Engineer, West Circle Municipal Engineering Directorate, or, subject to the limitations of Clause 2 hereof the Engineer's Representative. The agent or representative of the Contractor must be able to speak and communicate in English/Bengali. In the absence of the Contractor's designated agent or representative for a particular operation on any site of the works the Contractor's supervisory staff or sub-agent or leading hands shall be instructed to receive and carry out any instruction or direction issued or given by the Superintendent Engineer, West Circle Municipal Engineering Directorate, or the EIC.

16.0. EMPLOYEES

(1) Contractor's Employees - The Contractor shall provide and employ on the Site in connection with the execution and maintenance of the Works with minimum 3 nos. HT operator with 3 nos. electrician shall be provided at the time of operation of the plant and guarding arrangement should be provided at night.

a) Such technical assistants as are skilled and experienced in their respective calling and such sub-agents, foreman and leading hands as arc competent to give proper supervision to the work they are required to supervise, and

b) Such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution and maintenance of the Works.

c) Employees covered under (a) and (b) may have to be provided with identity cards as specified by the EIC.

(2) The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Work any person employed by the Contractor in or about the execution or maintenance of the Works who, in the opinion of the Executive Engineer, Purba Burdwan Division, misconducts himself, or is incompetent or negligent in the proper performance of his duties, or whose employment is otherwise considered by the Executive Engineer to be undesirable and such person shall not be again employed upon the Works without the written permission of the Executive Engineer. Any person so removed from the Works shall be replaced as soon as possible by a competent substitute approved by the Executive Engineer.

17.0. SETTING-OUT

The Contractor shall be responsible for the true and proper setting-out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing and for the correctness, subject as above mentioned, of the position levels, dimensions and alignment of all parts of the Works and for the provision of all necessary instruments, appliances/and labour in connection therewith. If, at any time during the progress of the Works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the Works, the Contractor required to do so by the Engineer or the Engineer's Representative, shall at his own cost, rectify such error to the satisfaction of the Engineer or the Engineer's Representative, unless such error is based on incorrect data supplied in writing by the Engineer, in which case the expense of rectifying the same shall be borne by the Employer. The checking of any setting-out or of any line or level by the Engineer or the Engineer's Representative shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and reserve all bench-marks, sigh trails pegs and other things used in setting out the Works.

18.0. WATCHING AND LIGHTING

The contractor shall in connection with the works provide and maintain at his own cost all lights, guards, fencing, as and when/where necessary or as required by the EIC or the

Engineer's Representative, for the protection of the works, contractor's employees, and employee's supervisor or for any other reason deemed fit by the Engineer.

19.0. WORKS & RISKS

(1) Care of Works: From the commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works, pursuant to Clause 47 hereof, the Contractor shall take full responsibility for the care thereof. Provided that if the EIC shall issue a Certificate of Completion in respect of any part of the Permanent Works, the Contractor shall cease to be liable for the care of that part of the Permanent Works (O&M not counted) from the date stated in the Certificate of Completion in respect of that part and the responsibility for the care of that part shall pass to the EIC provided further that the Contractor shall take full responsibility for the care of any outstanding work which he shall have undertaken to finish during the period to Maintenance until such outstanding work is completed. In case any damage, loss or injury shall happen to the Works, or to any part thereof, from any cause whatsoever, save and except the expected risks as defined in sub-clause (2) of this Clause, while the Contractor shall be responsible for the care thereof the Contractor shall, at his Own cost, repair and make good the same, so that at completion the permanent Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the EIC instructions. In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the EIC and subject always to the provisions of Clause 62 hereof, repair and make good the same as aforesaid at the cost of the Employer. The Contractor shall also be liable for any damage to the Works occasioned by him in the Course of any operations carried out by him for the purpose of completing any outstanding works or complying with his obligations under Clause 48 or 49 hereof.

(2) Expected Risks: The 'expected risks" are war, hostilities, invasion, act of foreign enemies, rebellion, revolution insurrection or military or usurped power, civil war or unless solely restricted to employees of the Contractor or of his sub-contractors and arising from the conduct of his workers, riot commotion or use or occupation by the EIC of any part of the Permanent. Works, or a cause solely due to the Engineer's design of the Works, or ionizing radiations or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive, nuclear assembly or nuclear component thereof, pressure waves

cause by aircraft or other aerial devices travelling at sonic or supersonic speeds, or any such operation of the force of nature as an experienced contractor could not foresee, or reasonably make provision for or insure against all of which are herein collectively recurred to as "the expected risks."

20.0. INSURANCE OF WORKS, ETC.

Without limiting his obligations and responsibilities under Clause 19 hereof the Contractor shall insure in the names of the Employer and the Contractor against all loss or damage from whatever cause arising, other than the expected risks, for which he is responsible under the terms of the Contract and in such manner that the Employer and Contractor are covered for the period stipulated in Clause 19(1) hereof and are also covered during the Period of Guarantee for loss or damage arising from a cause, occurring prior to the commencement of the Period of Guarantee, and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 48 or 49 hereof.

a) The Works for the time being executed to the estimated current contract value thereof together with the materials for incorporation in the Works at the replacement value.

b) The Constructional Plant and other things brought on the Site by the Contractor to the replacement value of such Constructional Plant and other things. These shall include materials belonging to the EIC but issued to or intended to be issued to the Contractor for use in the Works. Such insurance shall be affected with an insurer and in terms approved by the Employer, which approval shall not be unreasonably withheld, and the Contractor shall whenever required, produce to the EIC or the Engineer's Representative the policy or policies of insurance and the receipts for payment of the current premiums.

21.0. DAMAGES

(1) Damage to persons and property: The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the EIC against all losses and claims in respect of injuries or damage to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution, operation and maintenance of the Works and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation or damages for or with respect to :

a) The permanent use of occupation of land by the Works or any part thereof.

b) The right of the EIC to execute the Works or any part thereof on over under, in or through any land.

c) Injuries or damage to persons or property which are the unavoidable result of the execution, operation or maintenance- of the Works in accordance with the Contract.

d) Injuries or damages to persons or property resulting from any act or neglect of the Employer, his agents, servants or other contractors, not being employed by the Contractor, or for or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the Contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the EIC, his servant or agents or other contractors for the damage or injury.

(2) Indemnity of EIC: The Contractor shall indemnify the EIC against all claims, proceedings, damages, costs charges and expenses in respect of the matters referred to the provision to sub-clause (1) of this Clause.

22.0. INSURANCE

(1) Third Party Insurance : Before commencing the execution of the Works the Contractor, but without limiting his obligations and responsibilities under Clause 21 hereof, shall insure against his liability for any material or physical damage, loss or injury which may occur to any property, including that of the EIC, or to any person, including any employee of the EIC, by or arising out to the execution of the Works or in the carrying out of the Contract, otherwise than due to the matters referred to in the proviso to Clause 21 (I) hereof.

(2) Minimum Amount of third party insurance: Such insurance shall be affected with an insurer and in terms approved by the EIC, which approval shall not be unreasonably withheld, and for a least the amount started in the Appendix to the Bid.

The Contractor shall, whenever required, produce to the EIC or the Engineer's Representative the policy or policies or insurance and the receipts for payment of the current premium. However, the Bidder should insure for an amount commensurate with the risk involved subject to the minimum amount prescribed elsewhere in the Bid.

(3) Provision to indemnify Employer: The terms shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive It identify under the policy being brought or made against the Administrator, Burdwan Municipality the insurer will indemnify the Employer against such claims and any costs, charges and expenses in respect thereof.

20.0. ACCIDENT, INJURIES

(1) Accident or injury to Workmen: The EIC shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any subcontractor, save and except an accident or injury resulting from any act or default of the EIC, his agents, or servants. The Contractor shall indemnify and keep indemnified the EIC against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

(2) Insurance Against Accident, etc., to workmen: The Contractor shall insure against such liability with an insurer approved by the EIC, which approval shall not be unreasonably withheld, and shall continue such insurance during the whole of the time that any person is employed by him on the works and shall, when required, produce to the EIC or the Engineer's Representative such policy of insurance and the receipts for payment of the current premium. Provided always that, in respect of any person employed by any sub-contractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that the EIC is indemnified under the policy, but the Contractor shall require such sub-contractor to produce to the EIC when required, such policy of insurance and the receipt for the payment of the current premium.

(3) Notification to insurer: It shall be the duty of the Contractor to notify the insurers under any of the insurance referred to in Clause 20, 22 and 20 hereof any matter or count which by the terms of such insurance are required to be notified and the Contractor shall indemnify and keep indemnified the EIC against all losses, claims, demands, proceedings, costs, charges and expenses whatsoever arising out of or resulting from any default by the Contractor in complying with the requirements of this sub-clause whether as a result of the avoidance of such insurance or otherwise.

(4) All Insurances at Contractor's cost - The insurances referred to in Clause 21, 22 &

20 hereof shall be entirely at the cost and expenses of the Contractor and be included within his rates.

24.0. REMEDY ON CONTRACTOR'S FAILURE TO INSURE

If the Contractor shall fail to effect and keep in force the insurance referred to in Clause 20, 22 and 20 hereof, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the EIC may effect and keep in force any such insurance and pay such premium or premiums including fines as may be necessary for that purpose and from time to time and deduct double the amount so paid by the employer as aforesaid from any moneys due or which may become due to the Contractor or recover the same as a debt due from the Contractor.

25.0. (1) Giving of Notices and Payment of Fees:

The Contractor shall give all notices and pay all fees required to be given or paid by any National or State Statute, ordinance, or other law, or any rules regulation, or bye-law of any local or other duly constituted authority 111 relation to the execution of the Works and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works.

(2) Compliance with Statutes, Regulations, etc. - The Contractor shall conform in all respects with the provisions of any such Statute, Ordinance or Law as aforesaid and the Rules, regulations or bye-laws or any local or other duly constituted authority which may be applicable to the Works and with such rules and regulations of public bodies and companies as aforesaid and shall keep the EIC indemnified against all penalties, fines and liability of every kind for breach of any such Statute, ordinance of Law, regulation of bye law.

26.0. FOSSILS, TREASURE TROVE ETC.

All fossils, Any treasure trove, coins articles of value or object with antiquity and structures and other remains or things of geological or archaeological interest discovered on the site of the Works shall as between the Employer and the Contractor be deemed to be the absolute property of the Employer and shall be handed over to the owner.

27.0. PATENT RIGHTS AND ROYALTIES

The Contractor shall save harmless and indemnify the EIC from and against all claims and proceedings for or on account of infringement of any patent, rights, design Trade mark or name or other protected right in respect of any Constructional Plant, machine works, or material used for or in connection with the Works or any of them and from and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof in relation thereto. Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensations, if any, for getting stone, sand, gravel, clay or other materials or equipment required for the works or any of them.

28.0. INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES

All operations necessary for the execution of the Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the convenience of the existing plant workers, member of the public, or the access to use and occupation of public or private roads, railways and footpaths to or of properties whether in the possession of the EIC or of any other person or local authority.

29.0. TRAFFIC

(1) Extraordinary Traffic: The Contractor shall use every reasonable means to prevent any of the highways, railways or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of this sub-contractors and, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant and material from and to the Site shall be limited, as far as reasonably possible, and so that no unnecessary damage or injury may be occasioned to such highways, railways and bridges.

(2) Special Loads: Should it be found necessary for the Contractor to move one or more loads of Constructional plant, machinery or pre-constructed units or parts of units of work over part of a highway, railway or bridge, the moving whereof is likely to damage any highway, railway or bridge unless special protection or strengthening is carried out, then the Contractor shall before moving the load on to such highway, railway or bridge give notice to the EIC or Engineer's Representative or the local authority of the weight and other particulars of' the load to be moved and his proposals for protecting or strengthening the said highway, railway or bridge. The Contractor at his own cost and expenses shall carry out such proposals, including any modifications thereto that the Engineer or the local authority may require.

(3) Settlement of Extraordinary Traffic Claims: If during the Carrying out of the Works damage or injury to railways, railway or bridge occurs due to moving of one or more loads of Constructional Plant machinery or pre-constructed units or parts of units of work, the Employer shall conduct the necessary investigation for the purpose of determining the Contractor's liability. If the damage is due to failure on the part of the Contractor to observe and perform his obligations under sub-clause (1) and (2) of this Clause then the restoration / repair of the damaged portion of road or structure certified by the Engineer or local authority to be due to such failure shall be undertaken by or be chargeable against the Contractor.

(4) Water-borne Traffic: Where the nature of the Works is such as to require the use by the Contractor of water-borne transport the foregoing provisions of this Clause shall be construed as though "highway" included a lock, dock, sea wall or other structure related to a waterway and "vehicle" included craft, and shall have effect accordingly.

30.0. RESTRICTION

(a) Restriction of Movements: The work shall have to be executed within the protected area of existing water works. The existing rules and regulation related to ingress and egress of labour and material shall have to be followed strictly in consultation with and as per direction of the EIC or the local authority as the case may be. No labour, Supervisor or Engineer of the contractor shall enter inside the treatment plant, pump house or any other existing installations without prior permission of concerned officers EIC.

(b) Opportunities for other contractors: The Contractor shall in accordance with the requirements of the EIC, afford all reasonable opportunities for carrying out their work to any other contractors employed by the Employer and their workmen and to the workmen of the employer and of any other duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works. If, however, the Contractor shall, on the written request of the EIC or the Engineer's Representative, make available to any such other contractor, or to the Employer or any such authority, any roads or ways for the maintenance of which the Contractor is responsible, or permit the use by any such of the Contractor's scaffolding or other plant on the Site, or provide any other service of whatsoever nature, the Employer shall pay to the Contractor in respect of such use or service such sum or sums if at all as shall, in the opinion of the Engineer, be reasonable.

31.0. CONTRACTOR TO KEEP SITE CLEAR

During the progress of the works the Contractor shall keep the site reasonable free from all necessary obstruction and shall store or dispose of any Constructional Plant and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required.

32.0. CLEARANCE OF SITE ON COMPLETION

On the completion of the Works the Contractor shall clear away and remove from the site all Constructional Plant, surplus materials, rubbish and Temporary Works of every kind, and leave the whole of the Site and Works clean and in a workmanlike condition to the satisfaction of the Superintending Engineer, West Circle, and Municipal Engineering Directorate.

33.0. LABOUR

(1) Engagement of labour: The Contractor shall make his own arrangements for the engagement of all labour, local or otherwise, and save in so far as the Contract otherwise provides, for the transport, housing, feeding and payment thereof.

(2) Supply of water: The Contractor shall, so far as is reasonably practicable having regard to local conditions, provide on the Site, to the satisfaction of the EIC representative, an adequate supply of drinking and other water for the use of the Contractor's staff and work people.

(3) Alcoholic Liquor or Drugs: The Contractor or his workmen shall not consume or sale or gift or be under the influence of any drug/narcotics or Alcoholic liquor within the vicinity of the Construction site.

(4) Arms and Ammunition: The Contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

(5) Festivals and Religious Customs: The Contractor shall in all dealing with labour in his employment have due regard to all recognized festivals days of rest and religious or other customs.

(6) Epidemic: In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government, or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

(7) Disorderly Conduct etc.: The contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst his employees or workers and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

(8) Compliance with Laws, regulation etc. relating to labour: In respect of the engagement, employment, transport, payment, feeding, housing and working conditions of labour and all matters connected there with the Contractor shall at all times during the continuance of the Contract, comply in all respects with and carry out all obligations imposed on him by the provisions and requirements of the following statutes.

(a) The Apprentices Act 1961 (Act 52 of1961) and Rules and Regulations issued there under from time to time.

(b) The Contract Labour Regulation and abolition Act 1970 (Act 37 of 1970) and Rules made there under (West Bengal Contract Labour Regulation and Abolition Rules 1972) from time to time.

(c) The Payment of Wages Act 1936, the Minimum Wages Act 1948, the Employees Liability Act 1938, the Industrial Disputes Act 1947, the Maternity Benefits Act 1961, the Employees State Insurance Act 1948 including modifications thereto the Rules and Regulations framed there under from time to time.

(d) Other existing National or State Statute, Ordinance or other Law or any Regulation or Bye-law of any local or other duly constituted authority which may be applicable, including any such Law, Regulation or Order that may be passed or ordered from time to time and come into force during the tenure of the Contract.

(9) Employees Provident Fund: The Contractor shall comply with the provisions of the relevant Employees Provident Fund Act or Rules in force in the State along with the provisions of all rules and Regulations made there under from time to time, and shall in particular be responsible for the payment of all contributions as laid down under the Act/Rules.

(10) Trade union rights: The Contractor shall recognize the freedom of all workmen employed by him in and for performance of the Contract to be members of registered Trade Unions and shall not in any manner prevent or discourage any such workman from becoming a member of a registered Trade Union or discriminate against any workmen who is a member of a registered Trade Union.

(11) Local Labour: As far as possible local labour shall be engaged as unskilled labour.

(12) Fair Wages - The Contractor shall in respect of all workers employed by him in and for the performance of the Contract pay rates of wages and observe the conditions of employment not less favourable than those provided under the relevant labour law as applicable to the State.

(13) Medical Attendance: The Contractor shall provide, to the satisfaction of the Government or Local Authorities Concerned, adequate medical attendance for his employees and labour.

(14) Report or Accident: The Contractor shall, within twenty four (24) hours of the occurrence of any accident at or about the site or in connection with the execution of the Work, report such an accident to the Engineer. The Contractor shall also report such accident to the competent authority whenever law requires such a report.

(15) Report required by Labour Commissioner: The Contractor shall submit, at the request of the Labour Commissioner or of the Assistant Commissioner of the State such returns as may be called for from time to time in respect of labour employed by the Contractor and by his subcontractors in the execution of the Contract. If so required, the Contractor shall furnish the names and address of all subcontractors to the Labour Commissioner. Statutory provisions in these regards are to be also complied with.

(16) The Contractor shall be responsible for observance by his subcontractor of all the foregoing provision of sub-clause (1) to (15) of this Clause 33.

34.0. RETURNS OF LABOUR ETC.

The Contractor shall, if required by the EIC, deliver to the EIC, or at his office a return in detail in such form and at such intervals as the EIC may prescribe showing the supervisory staff and the number of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Constructional Plant as the Superintending Engineer, West Circle, Municipal Engineering Directorate or his Representative may require.

35.0. MATERIALS AND WORKMANSHIP

(1) All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer may direct at the place of manufacture or fabrication, or on the Site or at such other place or places as may be specified in the Contract, or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used and shall supply samples or materials before incorporation in the Works for testing as may be selected and required by the EIC, be it at site or at the manufacturer/Vendors premises or elsewhere.

(2) Cost of samples: The Contractor at the cost and expense of him shall furnish all samples of materials as may be required by the EIC.

(3) Cost of Tests: The cost of making any test shall be borne by the Contractor if such test is clearly intended by or provided for in the Contract and in the cases only of a test under load or of a test to ascertain whether the design of any furnished or partially finished work in appropriate for the purpose which it was intended to fulfil is particularized is the Contract in sufficient detail to enable to Contractor to price or allow for the same in his Bid.

(4) Cost of Tests not provided for, etc.: If the EIC orders any test, which is either;

a) Not so intended by or provided for, or

b) (In the cases above mentioned) is not so particularized, or

c) Though so intended or provided for is ordered by the Engineer to be carried out by an independent person or organization at any place other than the Site or the place of manufacture or fabrication of the materials tested, then the cost of such test shall be borne by the Contractor, if the tests shows the workmanship or materials not to be in accordance with the provisions of the Contract or the Engineer's instruction, but otherwise the cost shall be borne by the Employer.

36.0. INSPECTION OF OPERATIONS

The Engineer and any person authorized by him shall at all times have access to the Works and to all workshops stores and places where work is being prepared or from where material manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

37.0. EXAMINATION

(1) Examination of work before covering up: No work shall be covered up or put out or view without the approval of the Superintending Engineer, West Circle, Municipal Engineer Directorate or the his authorized Representative and the Contractor shall afford full opportunity for the EIC or the Engineer's Representative to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Engineer's Representative where any such work or foundations is or are ready or about to be ready for examinations and the Engineer's Representative shall, without unreasonable delay, unless he considers if unnecessary and advises the Contractor accordingly attend for the purpose of examining and measuring such work or of examine such foundations

(2) Uncovering and making openings: The Contractor shall uncover any part or parts of the Works or make opening in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Superintending Engineer, West Circle, Municipal Engineer Directorate or the his authorized Representative. If any such part or parts have been recovered up or put out of view after compliance with the requirement of sub- clause (I) of this Clause and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating and making good the same shall be, borne by the Employer, but in any other case all costs shall be borne by the Contractor.

38.0. REMOVAL

(1) Removal of improper work and materials: The EIC shall during the progress of the works have power to order in writing from time to time.

a) The removal from the Site, within such time or time as may be specified in the order, of any materials, which in the opinion of the Engineer, are not in accordance with the Contract.

b) The substitution of improper, substandard and unsuitable materials, and

c) The removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefore, of any work which in respect of materials or workmanship is not in the opinion of the Engineer, in accordance with the Contract

(2) Default of Contractor in Compliance: In case of default on the part of the Contractor in carrying out such order, the Employer shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Employer, or may be deducted by the Employer from any sum due or' which may become due to the Contractor.

39.0. SUSPENSION

(1) Suspension of work: The Contractor shall, on the written order of the Engineer, suspend the progress of the works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work, so far as is necessary in the opinion of the Engineer. The extra cost incurred by the Contractor in giving effect to the Engineer's instruction under this Clause shall be borne and paid by the Employer unless such suspension is

a) Otherwise provided for in the Contract, or

b) Necessary by reason of some default on the part of the Contractor, or

c) Necessary by reason of climatic conditions on the Site, or

d) Necessary for the proper execution of the work or for the safety of workmen or Works of any part thereof in so far as such necessity does not arise from any act or default by the Engineer or the Employer or from any of the expected risks defined in Clause 19 hereof provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Employer within twenty-eight days of the Engineer's order. The EIC shall settle and determine such extra payment and/or extension of time under Clause 43 hereof to be made to the Contractor in respect of such claim as shall in the opinion of the Employer be fair and reasonable.

(2) Suspension lasting more than 90 days: If the progress of the Works or any part thereof is suspended on the written order of the EIC and if permission to resume Work is not given by the EIC within a period of ninety days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of sub-clause (1) of this Clause, the Contractor may serve a written notice on the Employer requiring permission within twenty eight days from the receipt thereof to proceed with the Works, or that part thereof in regard in which progress is suspended and, if such permission is not granted within that time, the Contractor by a further written notice so served may, but is not bound to, elect or treat the suspension where it affects part only of the Works as an omission of such part under Clause 50 hereof, or where it affects the whole Works as an abandonment of the Contract by the Employer.

40.0. COMMENCEMENT TIME AND DELAYS

Commencement of works: The Contractor shall commence the Works on Site within the period named in the Appendix to the Bid after the receipt by him of a written order to this effect from the Engineer and shall proceed with the same with due expedition and without delay, except as may be expressly sanctioned or ordered by the Engineer, or be wholly beyond the Contractor’s Control. The successful contractor shall within four weeks from the date of issue of Letter of Intent furnish one or more drawing stating and showing the following:

1.0 Layout of cable trenches, cable trays showing the locations and levels together without position of hooks at the under site of the operating platform stating the maximum load required to be withstood.

2.0 Any other data that the Bid considers relevant for construction of civil structure.

3.0 Any other reasonable data that may be asked for.

41.0. POSSESSION

(1) Possession of site: Save in so far as the contract may prescribe, the extent of portions of the Site of which the Contractor is to be given possession from time to time and the order in which such portions shall be made available to him and subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will, with the Engineer's written order to commence the Works, give to the Contractor possession of so much of the Site as may be required to enable the Contractor to commence and proceed with the execution of the Works in accordance with the Programmed referred to in Clause 14 hereof, if any, and otherwise in accordance with such reasonable proposals, of the Contractor as he shall, by written notice to the Engineer, make and will, from time to time as the Works proceed, give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the execution of the Works with due dispatch in accordance with the said Programmed or proposals, as the case may be. If the Contractor suffers delays or incurs cost for failure on the part of the Employer to give possession in accordance with the

terms of this Clause, the Employer shall grant an extension of time for the completion of the Works and certify such sum as, in his opinion, shall be fair to cover the cost incurred, which sum shall be paid by .the Employer.

(2) Way leaves etc.: The Contractor shall bear all costs and charges for special or temporary way leaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional accommodation outside the site required by him for the purpose of the works.

42.0. TIME

(1) Time of Completion and progress of Works: The progress of the work shall conform to the approved Work Programmed in terms of Clauses 14 hereof, and subject to any requirement in the contract as the completion of any section of the Works before completion of the whole, the whole of the Works shall be completed, in accordance with the provisions of Clause 47 hereof, within the time stated in the Contract calculated from last days of the period named in the Appendix to the Bid as that within which the Works are to be commenced, or such extended time as may be allowed under Clause 43 hereof.

(2) Failure in keeping to stages of work Programmed: If the Contractor does not keep to the approved program and continues at any stage to fail behind his schedule by as much as twenty percent (20%) of the said approved work programmed, within thirty (30) days from receipt by him of a written notice from the Engineer, or if in the opinion of the Engineer the delay will substantially affect operation activities or execution of a major work item and it is ascertained by the Engineer that the Contractor cannot remedy the occasion within the stipulated time, the Superintending Engineer, West Circle, M.E.Dte on recommendation of Engineer shall have full authority to undertake measures to recover from such adverse condition as he feel so as per govt. norms or in terms of the provisions of Clause 62 thereof.

43.0. EXTENSION OF TIME FOR COMPLETION

Should the amount of extra or additional work of any kind or any cause of delay referred to in these Conditions, or other special circumstances of any kind whatsoever which may occur, other than through a default of the Contractor, be such as fairly to entitle the Contractor to an extension of time for the completion of the works, the EIC on recommendation of Engineer shall determine the period of such extension and shall notify the Employer and the Contractor accordingly. Provided that the Engineer is not bound to take into account any extra or additional work or other special circumstances unless the Contractor has within twenty-eight days after such work has been commenced, or such circumstances have arisen or as soon as is practicable, submitted to the Engineer full and detailed particulars of any extension of time to which he may consider himself entitled in order that such submission may be investigated at the time.

44.0. NO NIGHT OR SUNDAY WORK

Subject to any provision to the contrary contained in the Contract, none of the Permanent Works shall, save as hereinafter provided, be carried on during the night or on Sundays, if locally recognized as days of rest, or other locally recognized equivalent without the permission in writing of the Engineer, except when the works is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer, provided always that the provisions of the Clause shall not be applicable in the case of any work which it is customary to carry out by rotary of shifts.

45.0. RATE OF PROGRESS AND NIGHT WORK WHEN PERMITTED

If for any reason, which does not entitle the Contractor to an extension of time, the rate of progress of the Works or any section is at any time, in the opinion of the Engineer, too slow to ensure completion by the prescribed time or extended time for completion, the EIC on recommendation of the Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as are necessary and the Engineer may approve to expedite progress as to complete the Works or such section by the prescribed time or extended time. The Contractor shall not be entitled to any additional payment for taking such steps. If as a result of any notice given by the EIC under this Clause, the Contractor shall seek the EIC permission to do any work at night or on Sundays, If locally recognized as days of rest, or their locally recognized equivalent, such permission shall not be unreasonable refused. When work at night has to be carried out, the Contractor shall, at his own cost and expense, make adequate arrangements for lighting and provide necessary facilities for safety etc. and comply with all stipulations as may have been imposed by the EIC in granting permission for night work.

46.0. DAMAGES FOR DELAY

(1) Liquidated Damages for Delay: If the Contractor shall fail to achieve completion of the Works within the time prescribed by Clause 42 hereof, then the Contractor shall pay to the Employer the sum stated in the Contract as liquidated damages for such default and not as a penalty for every day of part of a day which shall elapse between the time prescribed by Clause 42 hereof and the date of certified completion of the Works, the Employer may without prejudice to any other method of recovery, deduct the amount of such damages from any money in his hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor form his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

(2) Reduction of liquidated Damages: If, before the completion of the whole of the Works any part or section of the Works has been certified by the Engineer as completed, pursuant to Clause 47 hereof, and occupied or used by the Employer, the liquidated damages for delay shall, for any period of delay after such certificate and in the absence of alterative provision in the contract be reduced in the proportion which the value of the part or section so certified bears to the value of the whole of the Works.

(3) Extent of Liquidated Damages: The liquidated damages referred to in sub-clause (1) for delay of each day or part thereof, shall be at the rate of one percent (l %) or such smaller amount as the Employer may decide, or the total value of the Contract Price excluding the value of such part or section of the works as may have been covered by certificate of completion in terms of the provisions of sub-clause (2) above, Provided however that in no case shall be total amount of liquidated damages exceed ten percent (10%) of the total Contract Price for whole Works.

(4) Liquidated Damage as Reasonable Compensation: The 'Liquidated damage' referred to in sub-clause (1) to (3) above, shall be considered as reasonable compensation to the applied to the use of the Employer without reference to the actual loss or damage sustained and whether or not any damage shall have been sustained.

(5) No bonus for early completion: -The Contractor shall not be entitled to payment of any bonus for early completion of the Works.

47.0. CERTIFICATION OF COMPLETION OF WORK

(1) Erection: Erection of Mechanical and electrical equipment shall be construed to have been completed where equipment in question is placed in position undergoes all necessary tests such as those for alignment, verticality, leak proof, insulation etc. as may be specified elsewhere in the Bid documents and put to operation.

(2) Completion: Completion is a stage when the equipment and the structure as a whole is certified by the Employer. The date shall only be indicative for the purpose of reckoning the period of Maintenance Period and shall not be co-related with the release of any payment provided that non-continuous of sporadic functioning shall not be deemed as commissioning and also provided that non-commissioning of minor works, the decision on determination of major or minor works resting with the employer, shall not nullify the act of completion for the aforesaid purpose. An item shall be considered as minor work where its non-completion may not in the opinion of the employer, stand in the way of commencement of plant operation.

(3) Trial Run:-The Trial Run period shall be for three months including 72 hours with load operation of 8 hours at a stretch operation of all equipment as per specification and to the satisfaction of Engineer-in-Charge.

48. MAINTENANCE

(1) Maintenance Period: Maintenance period shall be for a period of one year counted from the date of certified commissioning i.e. after successful trial runs of 3 months. The Contractor shall provide spare parts at his cost required during the maintenance period.

(2) Cost of Execution of work of repair, etc.:- The repair work shall be carried out by the Contractor at his own expense if the necessity thereof shall, in the opinion of the Engineer, be due to the use of materials or workmanship not in accordance with the Contract, or to neglect or failure on the part of the Contractor to comply with any obligation, expressed or implied, on the Contractor's part under the Contract. If, in the opinion of the Engineer, such necessity shall be• due to any other cause, the value of such work shall be ascertained and paid for as if it was an additional work.

(3) Remedy on contractor's failure to carry out work required: If the Contractor shall fail to do any such work as aforesaid requirement by the Engineer, the Employer shall be entitled to employ and pay other persons to carry out the same, which in the opinion of the Employer, the Contractor was liable to do at his own expense under the Contract. In the said event, all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Employer, or may be deducted by the Employer from any sum due or which may become due to the Contractor.

49.0. CONTRACTOR TO SEARCH

The Contractor shall, if required by the EIC in writing, search under the directions of the Engineer, for the cause of any defect, imperfection or fault appearing during the progress of the Works or in the period of Maintenance. Unless such defect, imperfection or fault shall be one for which the contractor is liable under the contract, the cost of the work carried out by the contractor in searching as aforesaid shall be borne by the Employer. If such defect, imperfection or fault shall be one for which the contractor is liable as aforesaid, the cost of the work carried out in searching as aforesaid shall be borne by the contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his Own expense in accordance with the provisions of Clause 48 hereof to the satisfaction of the Engineer.

50.0. DI pipes of 600mm & 750mm dia will be supplied to agency free of cost from Municipal Godown & agency hasto carry the pipe to site at his own cost.

51.0. Laying of pipelines includes all fittings & specials which will be supplied by the agency.

52. PLANT TEMPORARY WORKS AND MATERIALS

1. Plant, etc. exclusive use for the works: All Constructional Plant, Temporary Works and materials provided by the Contractor shall, when brought to the Site be deemed to be exclusively intended for the execution of the Works and the Contractor shall not remove the same or any part thereof, except for the purpose of moving it from one part of the Site to another, without the consent, in writing, of the Engineer which shall not be unreasonably withheld.

2. Removal of plant, etc.: Upon completion of the Works the Contractor shall remove from the Site all the said Constructional Plant and Temporary Works remaining thereon and any unused material provided by the Contractor to the satisfaction in the Engineer.

3. Employer not liable for damage to plant, etc. The employer shall not at any time be liable for the loss of or damage to any of or damage to any of the said Constructional Plant, Temporary Works or materials same as mentioned in Clause 19 and 62 hereof.

4. GST, Octroi, Sales tax, VAT, Cess and other imposts. The Contractor shall pay GST, Octroi, Sales Tax, VAT, Cess, Work Contract Tax and all other taxes, duties and charges as may be applicable from time to time in respect of materials purchased by him or plants and equipment brought to Site. No separate payment shall be made for all these and they shall be deemed to have been covered within the Contractor's rates for the finished items of work.

5. Temporary Works: At least fourteen (14) days in advance of taking up any temporary works, the contractor shall submit to the Engineer for approval complete drawings of all temporary works he may require for the execution of the Works. He shall, so required by the Engineer, submit his calculations relating to the strength of the temporary works proposed. Modifications that the Engineer may require shall be made by the Contractor at the latter's cost and expenses. At the discretion of the Engineer, a higher stress up-to a maximum of twenty five percent (25%) in excess of the stress normally allowed for permanent structures may be permitted in the design of temporary works. Notwithstanding the approval by the Engineer of any of the temporary works, the contractor shall remain wholly responsible for their adequacy, safety, proper maintenance and of all obligations in regard to such works specified or implied in the Contract, until the removal of such works.

53.0. APPROVAL OF MATERIAL, ETC. NOT IMPLIED

The operation of Clause 52 hereof shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein shall not interfere with rejection of any such materials at any time by the Engineer.

54.0. MEASUREMENT

For measurement, the metric system should be used.

55.0. WORKS TO BE MEASURED

The engineer shall, except as otherwise stated, ascertain and determine by measurement the value in terms of the Contract of work done in accordance with the Contract. He shall, when he requires any part or parts of the works to be measured, give notice to the Contractor's authorized agent or representative, who shall forthwith attend or send a qualified agent to assist the Engineer or the Engineer's Representative in making such measurement, and shall furnish all particulars required by either of them. Should the Contractor not attend, or neglect or omit to send his agent on two consecutive occasions, then in the third occasion the measurement shall be made unilaterally by the Engineer, which shall be taken to be the correct measurement of the work. For the purpose of measurement such permanent work as is to be measured by records and drawings at suitable intervals of such work and the Contractor, as and when called upon to do so in writing shall, within fourteen days, attend to examine and agree upon such records and drawings, with the Engineer or Engineer's Representative and shall sign the same when so agreed. If the Contractor does not so attend to examine and agree upon such records and drawings on two consecutive occasions they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree with the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor shall, within fourteen days of such examination, lodge with the for decision by the Engineer, a notice in writing giving details of the respects in which such records and drawings are claimed by him to be incorrect together with reasons thereof.

56.0. METHOD OF MEASUREMENT

The Works shall be measured but, notwithstanding any general or local custom, except where otherwise specifically described or prescribed in the Contract

57.0. PAYMENT TERM

Terms of Payment : Item wise break up		
INFILTRATION GALLERY, INTAKE WELL AND SUB-STATION		
1	**Geo-Technical & Hydro- geological Sub Surface Investigation, Surveying, Pumping test & Planning (layout drawing) of the Project of Damodar River which include surveying the river Damodar up-to a desired length and full width of river course, Geo-physical investigation of river bed deposits for assessment of hydraulic parameters of sub surface deposits and soil investigation at Damodar, Banka & DVC, planning includes the location of Infiltration Gallery, Intake Well and Pipe carrying access Bridge with a view of best utilization of sub surface water resources for gallery, hard strata for safe and stable construction of Well and Pipe carrying access Bridge at a reasonable cost**. (1 item)	
	Break up :	
A.	On Completion of the Hydro- geological Sub Surface Investigation work & after approval of reports in all respect as per Bid & direction of Engineer-in Charge.	70%
B	On Completion of the Geo-Technical work & after approval of reports in all respect as per Bid & direction of Engineer-in Charge.	20%
C	After Commissioning and successful trial run of the plant.	10%
	Total	100%
2	**Planning, Design, Drawing, Construction & commissioning of minimum 6.00 meter inner diameter RCC Collector well Cum Pump House (2.0 m above High Flood level) having 1.5m wide walk way at periphery with minimum 450 mm dia. of v- type stainless strainer of minimum 10 mm thick or as per design with required length to harvest 18.5 MLD water with 20 hours operation each infiltration gallery including Civil & Electro-Mechanical works (including 2W+1S VT pump and motor) complete in all respect including supply & carriage of all materials with suitable foundation as per soil investigation report for the various units of Collector well related to water intake arrangement from river Damodar including approach road & lighting with yard and internal illumination complete in all respect on turnkey basis and direction of Engineer-in Charge. (2 items)**	
	Break up :	
A	Completion of Intake well with well foundation up to bed Level including detail design calculation and necessary working drawing after approval by department and Construction of Approach Road	18%
B	Construction of Intake well from bed level to High Flood level	8%
C	Construction of Pump House above Intake well	5%
D	Supplying of stainless steel strainer pipe for Infiltration gallery	12%
E	Completion of infiltration gallery	17%

F	Completion of boulder sausage work	4%
G	Supply of all Electro- mechanical works including VT Pump, Motors, Panels etc. including approval of Electro- mechanical design & Drawing.	8%
H	Installation of all Electro- mechanical works including VT Pump, Motors, Panels, illumination etc. including all complete.	8%
I	Finishing works including Plastering, painting, roof treatment, Door & Window arrangement, Flooring etc. complete in all respect as per approved drawing and direction of EIC.	10%
J	After Commissioning and successful trial run of the plant.	10%
	Total =	100%
3	**Planning, Design & Construction of single storied minimum 200 m2 plinth area frame structure building for 800 KVA HT Substation (transformer 1W + 1Standby = 2 nos) including office & rest room, guard room, bathroom and RCC Framed Boundary Wall with M.S Gate along with brick work, Plastering, Painting, Roof treatment, flooring, door & windows, ramp, Sanitation & Plumbing complete in all Civil & Electro-mechanical works as per requirement & in consultation with Power Supply Agency and Approved design as per direction of E.I.C for feeding power. (1 item)**	
	Break up :	
A	Planning, designing of HT Substation Building and submission of working drawing of the Substation including detail design calculation and completion of all structural work up to EGL	20%
B	All structural work above EGL to Roof	18%
C	Supply of all E/M Works equipments.	30%
D	Installation of all E/M Works	15%
E	All work including finishing Complete in all respect	7%
F	After Commissioning and successful trial run of the plant.	10%
	Total =	100%
4	**Planning, Design, Drawing & Construction of minimum 3 m wide Access and Pipe carrying MS structural Bridge from river high bank to intake well (2.0 m above HFL) is having adequate walkway with rail at centre to facilitate trolley movement for material carriage having cable trays at both side of bridge, 1.5 m high railing on either side of bridge along with 2 nos 450 mm dia MS Pipe rising main line on Bridge from common manifold at well to common manifold at bank of the river with necessary RCC abutments, piers, columns supported on pile foundation and direction of Engineer-in Charge. (Length of bridge is to be assessed after visiting the site and available pathway). (2 items)**	
	Break up :	
A	Planning, designing, Drawing and completion of piling work of supports up to river Bed	30%
B	Completion of next bridge structural work and access bridge	40%
C	Supply & Laying of 450 mm Dia. MS pipe line with painting, valves & specials and finishing works complete in all respect	20%
D	After successful trial run and Commissioning of the plant.	10%
	Total =	100%
5	**Laying of 600mm & 750 mm dia. DI (K9) Rising Main from Well to CWR at Zalkal Building, along the River Bundh including construction of MS Structural pipe carrying Bridge at DVC Canal and Banka khal along with valve chamber, thrust blocks, anchor blocks, permanent road restoration, hydraulic testing , cleaning washing and flushing with supply, fitting and fixing all types of DI specials including all allied works, complete in all respect with all labour& materials as per enclosed drawing , scope of work, specification, Tender Document & direction of E.I.C. (only DI pipes will be issued to the Agency from Municipal Store at free of cost, loading, unloading & pipe carriage is under scope of the Agency) (1 item)**	
	Break up :	
A	After completion of 600mm dia. Pipe laying works	15%
B	After completion 50% works of 750mm dia. Pipe line	25%
C	After completion of rest 50% works	25%
D	750 mm dia MS Pipe line at access Bridge, jack pushing work, road restoration & finishing work completion in all respect.	25%
E	After successful trial run and Commissioning of the plant.	10%
	Total =	100%

6	**Planning, designing, Drawing & Construction of 2 nos of minimum 3 m wide pipe carrying M.S. Structural steel Bridges with necessary RCC piers, columns supported on pile foundation and direction of EIC at DVC Canal and Banka khal with all labour& materials. (considering design & also provision of another 2 nos 500 mm dia pipe line support at DVC Canal and 3 nos 500 mm dia pipe line on Banka khal Bridge) (1 item)**	
	Break up :	
A	Planning, designing, Drawing and completion of piling work of supports up to river Bed	40%
B	Completion of next bridge structural work and access bridge	50%
C	After finishing and complete in all respect	10%
	Total =	100%
7	**Planning, Design, supply and providing Bank Protection work including repairing of Bank by double layer boulder pitching & boulder sausage work at toe on both upstream and downstream of abutment of the access bridge of the Infiltration Gallery well including all allied works, complete in all respect with all labour& materials as per scope of work, specification, Tender Document & direction of E.I.C. (2 items)**	
	Break up :	
A	Planning, designing, Drawing approval and supply of stone materials including repairing of Bank & Providing Bank Protection by double layer boulder sausage work on both upstream and downstream of the access bridge	50%
B	Providing Bank Protection by double layer boulder sausage work on both upstream and downstream of the access bridge	50%
C	Total =	100%
8	**CONCRETE APPROACH ROAD FROM IRRIGATION BUNDH TO SUB STATION BUILDING AND INTAKE SITE WITH MINIMUM 3.0 M WIDTH AS PER SITE CONDITION APLLICABLE TO BOTH APPROACH BRIDGE WITH ADEQUATE CONNECTIVITY FOR VEHICULAR MOVEMENT FOR CARRYING PUMP, MOTOR AND OTHER ACCESSORIES (1 item)**	
	Break up :	
A	Construction of road to both approach bridge from near substation	30%
B	Construction of approach road from Bundh to substation after completion of 50% works	30%
C	Construction of approach road from Bundh to substation after completion of rest 50% works and all allied works.	40%
	Total=	100%
9	Completion of indoor and outdoor lighting arrangement, yard lighting etc. complete in all respect as per approved drawing and direction of EIC. **(1 item)**	
	Break up :	
A	indoor and outdoor lighting arrangement, yard lighting etc.	90%
B	After successful trial run and Commissioning of the plant.	10%
	Total =	100%

10	Operation and maintenance of the plant for 5 (five) years. The work includes supplying adequate number of operating personnel and skilled labour with a provision for necessary training to the staff appointed by the ULB including supplying all sundry materials, and replacement of all types of damaged component etc. as per Bid document and complete in all respect and as per direction of Engineer-in Charge. N.B:- This item will be executed after three (3) months trial run. ((The electricity cost shall be paid by Burdwan Municipality) **(1 item)**	
	Break up :	
A	Lump sum price to be quoted at BOQ for five years and payment will be made yearly basis throughout whole O/M period against the quoted rate.	
(i)	After completion 1 year of O&M	15%
(ii)	After completion 2 years of O&M	15%
(iii)	After completion 3 years of O&M	20%
(iv)	After completion 4 years of O&M	20%
(v)	After completion 5 year s of O&M	30%
	Total =	100%
Note:	***a) 2% of Earnest money deposited earlier will be converted into Security deposit after awarding the Contract and 8% of security deposit, will be recovered from each running account bill.***	
	b) Total Security period will be reckoned from date of completion of project including O& M period of 5 (Five) years as per Notification no. 5784-PW/L&A/2M-175/2017 dated 12.09.17 of Law & Arbitration cell of Public Works Department (Govt. of W.B.)	

58.0. APPROVAL ONLY BY MAINTENANCE CERTIFICATE

No Certificate other than the Maintenance Certificate referred to in Clause 59 hereof shall be deemed to constitute final approval of the Works.

59.0. MAINTENANCE CERTIFICATE

(1) The Maintenance Certificate stating that the Works have been completed and maintained to the satisfaction of the Engineer, shall be issued by him within twenty eight days after the expiration of the period of Maintenance, or if different periods of maintenance shall become applicable to different sections or parts of the Works, the expiration of the latest such period, or as Soon thereafter as any works ordered during such period, pursuant to Clauses 4) and 48 hereof (shall have been completed to the Satisfaction of the Engineer). With regard to defects that may arise during the Period of Maintenance, the Contractor shall be responsible to carry out restoration/rectification of damages as are attributable to defects in works carried out under this Contract. The decision of the Employer in the regard shall be final and binding on the contractors.

2) Cessation of Employer's liability: The Employer shall not be liable to the Contractor for any matters or thing arising out of or in connection with the Contractor for any matters or thing arising out of or in connection with the Contract or the execution of the Works, unless the Contractor shall have made a claim in writing in respect thereof before the delivery of the Maintenance Certificate under this Clause.

3) Unfulfilled obligations: Notwithstanding the issue of the Maintenance Certificate the Contractor and, subject to the sub-clause (2) of the Clause, the Contractor shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract prior to the issue of the Maintenance Certificate which remains imperforated at the time such Certificate is issued and for the purpose of determine the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties hereto.

60.0. REMEDIES AND POWERS

1) Default of contractor: If the Contractor shall become bankrupt, or have a receiving

order made against him, or shall present his petition in bankruptcy, or shall made an arrangement with or assignment in favour of his creditors, or shall age to carry out the Contract under a committee of inspection of his creditors or, being a corporation, shall go into liquidation (other than a voluntary liquidation for the purpose of amalgamation or reconstruction), or if the Contractor shall assign the Contract, without the consent in writing of the Employer first obtained, or shall have an execution levied on his goods, or if the Engineer shall certify in goods, or if the Engineer shall certify in writing to the Employer that in his opinion the Contractor :

a) Has abandoned the Contract, or

b) Without reasonable excuse has failed to commence the Works or has suspended the progress of the Works for twenty eight days after receiving from the Engineer written notice to proceed, or

c) Has failed to remove materials from the Site or to pull down and replace work for twenty eight days after receiving from the Engineer written notice that the said materials or work had been condemned and/or rejected by the Engineer under these conditions, or

d) Despite previous warnings by the Engineer, in writing, is not executing the Works in accordance with the Contract, or is persistently or flagrantly neglecting to carry out his obligation under the Contract, or

e) Has, to the detriment of good workmanship, or in defiance of the Engineer's instructions to the contrary, sublet any part of the Contract.

Then the Employer may, after giving fourteen day notice in writing to the Contractor, enter upon the Site and the Works and expel the Contractor therefore without thereby avoiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor or agency to complete the Works. The Employer or such other contractor may use for such completion so much of the Constructional Plant, Temporary Works and materials, which have been deemed to be reserved exclusively for the execution of the Works, under the provisions of the Contract, as he or they may think proper and the Employer may, at any time, sell any of the said Constructional Plant, Temporary Works used and unused materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to him from the Contractor under the Contract.

2) Valuation at date of forfeiture: The Engineer shall, as soon as may be practicable after any such entry and expulsion by the Employer, fix and determine expert, or by or after reference to the parties, or after such investigation or enquiries as he may think fit to make or institute and shall certify what amount, if any, had at the time of such entry and expulsion been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract and the value of any of the said unused or partially used materials, and Constructional Plant and any Temporary Works.

3) Payment after forfeiture: If the Employer shall enter and expel the Contractor any money on account of the Contract until the expiration of the Period of Maintenance and thereafter until the costs of execution and maintenance, damages for delay in completion, if any and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Engineer. The Contractor shall then be entitled to receive only such sums or sums, if any, as the Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Employer the amount of such excess and it shall be deemed a debt due by the Contractor to the Employer and shall be recoverable accordingly.

61.0. URGENT REPAIRS

If, by reason of any accident, or failure, or other event occurring in connection with the Works, or any part thereof, either during the execution of the Works, or during the period of Maintenance, any remedial or other work or repair shall, in the opinion of the Engineer or the Engineer's Representative, be urgently necessary for the safety of the Works and the

Contractor is unable or unwilling at once to do such work or repair, the Employer may employ and pay other persons to carry out such work or repair as the Engineer or the Engineer's Representative may consider necessary. If the work or repair so done by the Employer is work which in the opinion of the Engineer, the Contractor was liable to do at his own expense under the Contract, all expenses properly incurred by the Employer in so doing shall be recoverable from the Contractor by the Employer, or may be deducted by the Employer from any sums due or which may become due to the Contractor. The Engineer or the Engineer's Representative, as the case may be, shall, as soon after the occurrence of any such emergency as may be reasonably practicable, notify the Contractor thereof in writing.

62.0. SPECIAL RISKS

Notwithstanding anything in the Contract contained:

1) No liability for war, etc., Risks- The Contractor shall be under no liability whatsoever whether by way of identity or otherwise for or in respect of destruction of or damage to the Works, same to work condemned under the provision of Clause 38 hereof prior to the occurrence of any special risk hereinafter mentioned, or to property whether of the Employer or third parties, or for or in respect of injury or loss of life which is the consequence of any special risk as hereinafter defined The employer shall indemnify and save harmless to Contractor against and from the same and against and from the same and against and from all claims, proceedings, damages, costs, charges and expenses whatsoever arising there out or in connection therewith.

2) Damage to works, etc., by special risks - If the Works or any materials on or near or in transit to the Site, or any other property of the Contractor used or intended to be used for the purposes of the Works, shall sustain destruction of damage by reason or any of the said special risks the Contractor shall be entitled to payment for:

a) Any permanent work and for any materials so destroyed or damaged and so far as may be required by the Engineer, or as may be necessary for the completion of the Works, or the basis of cost plus such profit as the Engineer may certify to be reasonable;

b) Replacing or making good any such destruction or damage to the Works;

c) Replacing or making good such materials or other property of the Contractor used or intended to be used for the purposes of the Works.

3) Projectile missile etc.: Destruction, damage, injury or loss of life caused by the explosion or impact whenever and wherever occurring of any mine, bomb, shell, grenade, or other projectile, missile, ammunition, or explosive of war, shall be deemed to be a consequence of the said special risks.

4) Increase cost arising from special risks: The Employer shall repay to the Contractor any increased cost of or incidental to the execution of the Works, other than such as may be attributable to the cost of reconstructing work condemned under the provisions of Clause 38 hereof, prior to the' occurrence of any special risk, which is howsoever attributable to or consequent on or the result of or in any way whatsoever connected with the said special risks, subject however to the provisions in this Clause hereinafter contained in regard to outbreak of war, but the 'Contractor shall as soon as any such increase of cost shall come to his knowledge forthwith notify the Superintending Engineer, West Circle, Municipal Engineering Directorate thereof in writing.

5) Special Risks: The special risks are war, (whether war be declared or not), invasion, act of foreign enemies, the nuclear and pressure waves risk described in Clause 19(2) hereof, or in so far as it relates to the country in which the works are being or are to be executed or maintained, rebellion, revolution, insurrection, military or usurped power, civil war, or unless solely restricted to the employees of the Contractor or of his Sub-Contractor and arising from the conduct of the works, riot, commotion or disorder.

6) Outbreak of war: If, during the currency of the Contract, there shall be an outbreak of war, whether war is declared or not, in any part of the world which, whether financially or otherwise, materially affects the execution of the works, the Contractor shall, unless and until the Contract is terminated under the provisions of this Clause, continue to use his best endeavours to complete the execution of the Works. Provided always that the Employer shall be entitled at any time after such outbreak of war to terminate the Contract by giving written notice to the Contractor and upon such notice being given, this Contract shall, except as to the rights of the parties under this Clause and to the operation of Clause 64 hereof, terminate but without prejudice to the rights of either party in respect of any antecedent breach thereof

7) Removal of plant of termination: If the Contract shall be terminated under the provisions of the last proceeding sub-clause, the Contractor shall, with all reasonable dispatch, remove from the Site all constructional Plant and shall give similar facilities to his Sub-Contractors to do so.

8) Payment if Contract terminated: If the Contract shall be terminated as aforesaid, the Contractor shall be paid by the Employer, in so far as such amounts or items shall not have already been covered by payments on account made to the Contractor, for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition

a) The amounts payable in respect of any preliminary items, so far as the work carried out or performed, and a proper proportion as certified by the Engineer of any such items, the work or service comprised in which has been partially carried out or performed.

b) The cost of materials or goods reasonably ordered for the Works which shall have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery such materials or goods becoming the property of the Employer upon such payments being made by him.

c) A sum to be certified by the Engineer, being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works in so far as such expenditure shall not have been covered by the payments in this sub-clause before mentioned.

d) Any additional sum payable under the provisions of sub-clause (I), (2) and (4) of this Clause.

Provided always that against any payments due from the Employer under this sub- clause, the Employer shall be entitled to be credited with any outstanding balances due from the contractor for advances in respect of Constructional Plant and materials and any other sums which at the date of termination were recoverable by the Employer from the Contractor under the terms of the Contract and provided that if the termination be made in exercise of Clause C-60(1), no payment shall be released under ClauseC-62(8) (a) to (d).

63.0. FRUSTRATION

Payment in event of Frustration: A war, or other circumstances outside the control or both parties, arises after the Contract is made so that either party is prevent from fulfilling his contractual obligations, or under the law governing the Contract, the parties are released from further performance, then the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as would have been payable under Clause 62 hereof if the Contract had been terminated under the provisions of Clause 62 thereof.

64.0. SETTLEMENT OF DISPUTES

Settlement of Disputes: If any dispute or difference of any kind whatsoever shall arise between the Employer and the Contractor or the Engineer and the Contractor in connection with, or arising out of the Contract, of the execution of the Works, whether during the progress of the Works or after their completion and whether before or after the termination, abandonment or breach of the Contract, it shall be settled in the court of law having jurisdiction provided that such a recourse shall not be resorted to without exhausting all other reasonable avenues of redresser.

65. NOTICES

(1) Contractor's local office and service of notices to contractor: The Contractor shall have a local office at or near the Site of Work full address thereof shall be intimated by the Contractor or his authorized Agent to the Employer as well as to the Engineer. All Certificates notice or written orders to be given by the Employer or by the Engineer to the Contractor under the terms of the Contract shall deemed to have been served by sending by post to or delivering the same to the Contractor's local office.

(2) Service of notice to employer: All Notice to be given to the employer under the terms of the Contract shall be served by sending by Registered post or delivering the same to the address given below:

OFFICE OF THE BURDWAN MUNICIPALITY

P.O. - Burdwan, Dist. – Purba Burdwan

(3) Change in Address of the Employer, the Engineer or the Contractor may change a nominated address to another address by prior written notice to the other two and in that event shall resume receiving of communication 28 days after delivery of such notice.

66. PRICE ADJUSTMENT

(1) The prices to be paid to the contractor for the whole work shall remain firm during the stipulated Contract period or extension thereof and no price adjustment shall be allowed.

(2) The statutory changes in price in the form of Taxes, duties etc. shall however be taken into account. For this purpose the taxes and duties prevailing on the last date of submission of the technical bid (or revised price bid, if applicable) shall be taken as the base. Such taxes and duties for different bought out items shall be specified by the contractor, falling which the assessment of the Employer shall be final and binding. Changes in price of Petrol, Diesel Lubricants, and Electricity etc. shall not be considered.

67.0. MISCELLANEOUS

Dangerous materials: Explosive, chemicals, combustible articles and items and similar materials intended for the Works shall be conveyed, stored and used by the Contractor and his sub-contractors In accordance with all laws, decrees, instruments, orders and regulations imposed by the Government or any of its instrumentalists. Observance of all safety provisions shall be the obligation of the Contractor and nothing herein shall release him from full responsibility for damage or injury to persons or properties resulting from his use of these dangerous materials.

68.0. CONTRACT CONFIDENTIAL

Except with the prior written approval of the Employer and to subject the such conditions as may be prescribed, the Contractor and/or any member of his organization shall not in any case communicate to any person or entity and information connected with the performance of the Services or in carrying out the Works not make public any information for the purpose of publication or advertisement. The Contractor shall treat all matters related to the Contract as private and confidential.

69.0. CONTRACTOR TO PROVIDE FACILITIES

The Contractor shall provide such labours, materials and other facilities that the Engineer or his Representative may require to assist them in carrying out normal tests and checks on materials and workmanship and in measurement of works.

70.0. INTERFERENCE WITH EXISTING FACILITIES

The Contractor shall carry out the works in such a way as to the minimum extent of interference to the use of existing facilities of any kind.

71.0. ACTS OF INFLUENCE

Neither the Contractor nor any of his Agents, Representatives, Employees or members of his organization shall commit any act which may influence the judgment or decision of the Employer or the Engineer or any their agents, representatives, employees or members of their respective organization. Any breach of this provision shall constitute a breach of Contract on the part of the Contractor and apart from penal measures against the Contractor according to the law the Employer shall have the Authority to take action for the Contractor's default in terms of the provisions of Clause 60 hereof.

72.0. INDIVIDUALS NOT PERSONALLY RESPONSIBLE

No personal liability shall be imposed on the members or the Employer or on the Engineer or their duly authorized representatives, agents or employees for acts performed or discharged in the exercise of their authorized duties or responsibilities or in carrying out their obligations by virtue of the provisions or scope of work contained in the Contract, if being understood that they are acting solely as agents and representatives of the Employer in good faith.

73.0. CONTRACT EMBODIES WHOLE ARRANGEMENT

The Contract becomes effective immediately on Issue of the letter of acceptance to the successful Bidder. The Contract (with annexure if any) as subsequently executed embodies the whole arrangement between the parties entering into the Contract All previous correspondence, negotiations, representation, explanations statements, promises or guarantees (whether oral or written) as are not included with the Contract as executed, shall normally be excluded in the interpretation of the Contract.

74.0. COMPLETION DRAWING

Completion drawing including detailed construction drawing shall have to be submitted in original with 6 (six) copies of prints of each. The original drawings shall be drawn on thick polyester film approved by the Engineer-in-Charge. Scale and size of drawings shall also be as specified by the Engineer-in-Charge. Soft copy of drawing copied in CD/DVD should be submitted in addition. No extra payment will be made for it. The Completion drawings are to be got approved by the Employer and shall have to be submitted before the issue of certificate of final acceptance as in Clause C-57 (6).

75.0. BIDDER SHALL VISIT THE SITE

Intending Bidder shall visit the site and make him thoroughly acquainted with the local site condition, nature and requirements of the works, facilities of transport condition effective labour and materials, access, delivery, loading, unloading and storage for materials and removal of unsuitable materials. The Bidder shall deemed to be incorporate in their Bidder quotation for cost of procurement, carriage, freight and other charges as also for any special difficulties and including incorporation any or all inconveniences, police restriction for transport etc for proper execution of work as indicated in the drawing. The successful Bidder will not be entitled to any claim of compensation for difficulties faced or for losses incurred on account of any condition which existed before the commencement of the work or which in the opinion of the owner might be deemed to have reasonably been inferred to be so existing before commencement of work.

76.0 GOVERNMENT AND LOCAL RULES / LAW OF STATE

The contractor shall conform to the provisions of all local Bye-laws and Acts relating to the work and to the work and to the Regulations etc. of the Government and Local Authorities and of any company with whose system the structure is proposed to be connected. The contractor shall give all notices required by said Act, Rules, Regulations and Bye-laws etc. and pay all fees payable to such authority/authorities for execution of the work involved. The cost, if any, shall be deemed to have been included in his quoted rates, taking into account all liabilities for licenses, fees for footpath encroachment and restorations etc. and shall indemnify the owner against such liabilities and shall defend all actions arising from such claims or liabilities.

77.0 STORE SHED

The Contractor shall provide at his own cost a store shed of adequate capacity for storing materials. The shed should be of such construction that it must protect the materials against deterioration. A raised platform well above the highest flood level shall be made for stacking cement in such a way that the cement procured earlier can be consumed first so as to avoid deterioration due to prolonged stacking. Any modifications to the store shed in suggested by the Superintending Engineer of West Circle of Municipal Engineering Directorate recommendation for better storing of materials that shall have to be carried out by the Contractor at his own cost.

78.0 LAND FOR CONTRACTOR'S ESTABLISHMENT

For the purpose of constructing Contractor's Store yard, go-downs, site office and ancillaries, he may utilize portion of the land belonging to the Employer at such location as would not interfere to execute other co works. For all these, the Contractor shall have to obtain the requisite permission of the Engineer. The Contractor shall for this purpose submit to the Engineer for his approval a plan of the proposed layouts for the site facilities. The Engineer reserves the right to alter and

modify the Contractor’s proposals as the Superintending Engineer of West Circle of Municipal Engineering Directorate may deem fit.

79.0 WATER AND ELECTRICITY FOR CONSTRUCTION

1. The Contractor shall have to make his own arrangement for supply of water and for electrical power that may be required for or in connection with the works. No payment on this account will be entertained. However, Municipality may assist in getting power.

2. Arrangement for supply of piped water may not be possible. The Contractor will have to make arrangement for supply of drinking water and water required for constructions works by sinking tube wells or other suitable alternatives. The Bidders shall investigate this matter during site inspection before submission of Bidders: No payment will be entertained on •this account.

3. Nevertheless electrical power from usual supply agencies may not be continuously available due to various reasons including load shedding. In case of non- availability of electrical power the contractor will have to make his own arrangements for electrical power through generations. Contractor should include such aspects while quote his rate. No payment will be entertained on this account. When drawing power from the Municipality power point, the contractor shall have to bear the cost of electrical charges. The route of conveyance shall be subject to approval by the Engineer-in-Charge and will be in accordance with prevailing I.E. Rules.

80.0 FIRST-AID FACILITIES

The Contractor shall arrange for medical attentions to be promptly available when necessary. He shall for this purpose provide a number of First-Aid stations at suitable locations within easy reach of the workmen and other staff engaged in the Works. Each First-Aid station shall be properly equipped and will remain in charge of a suitably qualified person. The Contractor shall also provide for transport of serious cases to the nearest hospital. All these arrangements shall be to the approval of the Superintending Engineer of West Circle of Municipal Engineering Directorate.

81.0 FIRE FIGHTING ARRANGEMENT / FIRE EXTINGUISHING ARRANGEMENT

The Contractor shall provide suitable arrangement for fire fighting / fire Extinguishing. For this purpose he shall provide requisite number of Fire Extinguishers and adequate number of buckets, some of which are to be always filled with sand and some with water. This equipment shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

82.0 SAFETY MEASURES

The Contractor shall be responsible for the safety of all workmen and other persons entering or in the works and shall at his own expense and to the approval of the Superintending Engineer of West Circle of Municipal Engineering Directorate, take all measures necessary to ensure their safety. Such measures shall include the provisions of helmets (Specially where work at a height is involved), provision of gum-boots to workers engaged in cement concrete or other works, scaffolding or other measures required for working at a height, shall be strong and rigid and have to be provided with suitable and convenient access. Shoring required for deep excavation must be adequate and rigidly braced and strutted. The Contractor shall provide depending on the exigencies of the location and nature of work and other relevant factors, other safety measure that the Superintending Engineer of West Circle of Municipal Engineering Directorate may direct.

83.0 SUPERVISORY STAFF

The Contractor shall engage an experienced and qualified Site Manager to be in day-to- day charge of the work and he should be authorized to receive instructions from the Engineer. He shall receive orders given by the Engineer from time to time and shall act on them promptly. The Contractor shall, during working hours, maintain engineer and supervisors of sufficient training and experience to supervise the various items and operations of the work. Orders and directions as given to such engineers and supervisors or other staff of the Contractor shall be deemed to have been given to the Contractor. The Engineer of the Contractor responsible for this work, by whatever designation he may be known, but who will be specified on award of the Contract shall at least once in a fortnight inspect the works and shall discuss with the Engineer the conduct and progress of the work.

84.0 JOINT SURVEY

The Contractor shall satisfy himself regarding the correctness of the layouts, levels etc. as are shown in the drawings or given in the specifications. Before starting the work he shall also carry out at his own cost, survey of the whole work site jointly with the representative(s) of the Authority. Discrepancies noticed between drawings and the joint survey shall be informed in writing to the Superintending Engineer of West Circle of Municipal Engineering Directorate and got set right before execution of works. Such deviations as may arise out of the joint survey shall not viable the provisions of contract or entitle the Contractor to any extras in any way.

85.0 LAYOUT AND CHECKING

The contractor shall provide all labours, skilled and unskilled and all materials needed for carrying out, as directed, survey, laying out, setting out, checking of works, taking measurements, testing hydraulic and other structures, without any extra payment. The Contractor shall also provide approach and access to all the works and stores without any extra cost.

85. Reference Points

After the joint survey has been plotted and approved by the E.I.C. recommendation or his authorized representative, permanent base lines, cross line and bench marks shall be established by the Contractor so as to serve as reference points and "Dimensional Control Basis" of works. He shall prepare and submit a plan showing such reference points with their full description.

86.0 CO-OPERATION WITH OTHER CONTRACTORS

Some works in plant site, have been already done/are being done/will be done through other contractors. In the event of any such work the contractor shall have to work in full co-operation and in close co-ordination with other contractor/contractors. Any difficulty that may arise in this connection will have to be amicably settled by the contractors amongst themselves. If that be not possible, the matter shall be referred to the Superintending Engineer of West Circle of Municipal Engineering Directorate whose decision shall be final and binding on all the parties.

However, the site allocated to the contractor may be fenced at the Contractor's cost provided any necessary access to others as it required is given. The contractor will be permitted to use only the access to the site as indicated on the site plan of Bidder Drawing.

87.0 APPROVAL OF MATERIALS AND EQUIPMENT TO BE USED

Samples in large enough quantity of materials and descriptive data therefore requiring prior approval shall be furnished by the contractor to the E.I.C. Municipal Engineering Directorate in good time before the collection of such materials and equipment so as to permit inspection and testing. The samples shall be properly marked to show the name of the materials, name of the manufacturer and place of origin and item for which it is to be used. Only upon approval, the materials of approved quality shall be brought to site. Samples approved shall be on exhibition at all times, properly stores and prevented from deterioration for the purpose of comparison with the materials brought to site of work from time to time for use in work.

88.0 CONSTRUCTION RECORDS

The Contractor shall keep and supply to the Engineer the up-to-date records of the dimensions and positions of all permanent works (showing therein any approved deviation between the drawing and the work as actually executed), The information available from the records must be adequate and complete to enable preparation of "as- made" drawing by the Contractor from these records.

89.0 PROGRESS PHOTOGRAPHS

The Contractor shall at his own cost and expense arrange to take periodic photographs to show the progress of work or interesting features thereof. The time and the position where from a photograph is to be taken should be as per direction of the Engineer or his Representative, Three copies of each of these photographs to an enlarged size of about 25 cm x 20 cm together with the CD/DVD, shall be supplied to the Superintending Engineer of West Circle of Municipal Engineering Directorate and these shall become the property of the Employer. Each photograph shall be suitably captioned with the date of the photograph, location and other relevant particulars, further prints and CD of the photograph, location and other relevant particulars shall not be kept by the Contractor or reproduced without written permission of the Employer. Digital Camera with 13.0 Mega pixels should be used for taking photos. Restrictions to photography or security restrictions that may be applicable to any particular area must be carefully and rigidly observed. The number of photographs (each consisting of three prints and the CD/DVD as aforesaid) for the complete works is not expected to exceed 100 (one hundred), No photograph of the plant and other installations shall be taken without prior approval of the concerned officers

90.0 SATISFACTORY COMPLETION OF VARIOUS ITEMS

The sub-works included in the Schedule of Prices are job works on lump sum basis. The various items of the sub-work are to fit in perfectly in the whole plant in every respect so as to form effective working parts of the whole plant as per satisfaction of the Superintending Engineer of West Circle of Municipal Engineering Directorate. Each sub- work will be considered as complete when it is completed as per specifications and put into commission, as per standards, as a successful component part of the whole plant.

91.0 CHECKING QUALITY OF WORK

Should the Engineer consider it necessary to satisfy himself as to the quality of the work, the Contractor shall, at any time during continuance of the contract, offer sample of work done or if necessary pull down a reasonable part of the work enough for such inspection and testing as the Engineer may direct and the Contractor shall make good the same at his cost and to the satisfaction of the Engineer without any extra cost.

92.0 RECORDING MEASUREMENTS

Though the offer is on lump sum basis, the Contractor shall give not less than five days' notice, in writing to the Engineer, about the work which is proposed to be covered or placed beyond the reach of measurements so that measurements may be taken before the work is covered, bar bending schedule is to be provided five days before the casting date. If any work is covered without such written notice, the same shall be uncovered at the cost of the Contractor and in default hereof no payment or allowances shall be made for such work. These requirements apply for all the component items executed for the sub-work for which lump sum price is quoted

93.0 SITE ORDER BOOKS

1. For the purpose of quick communication between the Engineer or his Representative and the Contractor or his Agent or Representative, Site order Books shall be maintained at site in the manner described below. Any communication relating to the works may be conveyed through records in the Site Books. Such a communication from one party to the other shall be deemed to have been adequately served specified elsewhere in the General Conditions of Contract. Each Site Book shall have machine-numbered pages in triplicate and shall be carefully maintained and preserved.

2. The Contractor shall keep Site Books at various places Site work is being carried out so as to be readily available to the Engineer or his Representative. Any instruction or order which the Engineer or his Representative may like to issue to the Contractor may be recorded by him in the Site Book and two copies thereof taken by him for his record. The Contractor or his Agent or Representative may similarly maintain separate Site Book for any communication he may like to send to the Engineer or his Representative. Two copies thereof when sent to the Engineer's Representative and receipt obtained thereof, will constitute adequate service of the communication to the Engineer.

94.0 TECHNICAL ASSISTANCE

Training of Technical Personnel:**-**The Contractor shall undertake to train three technical personnel selected and sent by the ULB to the works of the Contractor. These engineers shall be given special training in the shop and drawing office where the equipment will be designed and manufactured and where possible in any other plant where Contractor's manufactured equipment of similar type is under installation tests or maintenance, to enable them to become fully familiar with the equipment being supplied by the Contractor. The period of training shall be as decided by the ULB but in any case shall not exceed six months for any individual. During the period of training the Contractor shall arrange for reasonable accommodation of the engineers and transport from the place of accommodation to the works or plant. The Contractor's supervisory personnel at site shall continuously and intensively instruct and train an adequate number of the ULB authority operating and maintenance personnel at site during erection and commissioning of the plant to enable them to take over the operation and maintenance of the plant after the maintenance period. No extra payment shall be made by ULB for the training of personnel under this clause.

Executive Officer
Burdwan Municipality

SECTION – D
SPECIAL PROVISIONS

1.0 GENERAL

1.1 Extended scope of the contract

The contract comprises the surveying, planning, designing, drawing supplying materials and equipment, construction, testing of the plant, commissioning of E/M Equipment's with continuous operation for 72 hrs, trial Run for 3 months and maintenance for a period of (5) years after successful trial run upon completion of the works and commissioning and except in so for as the contract otherwise provides, the provision of all labour, materials, constructional plant, temporary works and everything (whether of a temporary or permanent nature) required red in and for such planning, design, construction, completion and maintenance so far as the necessity for providing the same in specified in or reasonably to be inferred from the contract.

1.2 Item wise details of the lump sum prices and interim payment schedule

The successful contractor will, against each of the job items quoted in the schedule or prices on lump sum basis, submit a detailed break up of lump sum prices on the basis of clause 57 of section C for the approval of the Administrator for the purpose of preparing interim payment schedule and calculating the consumption of materials to be issued by the Authority. The break ups will be such as to fairly agree with the lump sum price quoted. The Administrator, on recommendation of Superintending Engineer of West Circle of Municipal Engineering Directorate shall have the authority to modify the breakup of prices keeping, however, the total of the prices fairly equal to the lump sum amount quoted. Lump sum prices quoted in the schedule of prices shall remain fixed irrespective of the variations (i) in Items and quantities during actual execution compared with those provided in the break-ups.

Such break-ups for Civil Works shall include for each of the unit of the treatment plant the following broad items of works:

i) Foundation work

ii) Cement Concrete

iii) Reinforcement

iv) Brick Work

v) Structural Steel Work

vi) Doors, Windows, Rolling Shutters, Gates etc.

vii) Roof Treatment

viii) Plumbing and Sanitary Works

ix) Pipe Lines and appurtenant structures

x) Finishing works and other miscellaneous works (to be specified by the Contractor)

Break-ups for Mechanical Equipment shall be into the following broad items:

xi) Electrical actuator control valves

xii) Structural Steel Works

xiii) Pipes and specials

xiv) Flow meters

xv) Filter media

xvi) Equipment for each filter

xvii) Miscellaneous (to be specified by the Contractor)

Break-ups for Electrical Equipment shall be into the following broad items:

i) Motors

ii) Cables HT & LT

iii) Starting of the motor arrangement from the control panel.

iv) Transformer (1w+1S), VCB and PDB

v) Other electrical equipment (to be specified by the contractor)

The above-mentioned details should be submitted by the contractor as early as possible after receipt of the Letter of Intent in order to enable him to start any sub-items of work and to receive interim payments. Where a component includes civil mechanical and electrical equipment, the break ups should invariably be submitted.

1.3 Store shed

The Contractor shall provide at his own cost a store shed of adequate capacity for storing materials. The shed should be of such construction that it must protect the materials against deterioration. A raised platform well above the highest flood level shall be made for stacking cement in such a way that the cement procured earlier can be consumed first so as to avoid deterioration due to prolonged stacking. If any modifications of the store shed shall have to be required in suggested by the Administrator recommendation of the Engineer for better storing of materials that should be carried out by the Contractor at his own cost.

1.4. Land for Contractor's Establishment

For the purpose of constructing Contractor's Store yard, go-downs, site office and ancillaries, he may utilize portion of the land belonging to the Employer at such location as would not interfere to execute other co works. For all these, the Contractor shall have to obtain the requisite permission of the Engineer. The Contractor shall for this purpose submit to the Engineer for his approval a plan of the proposed layouts for the site facilities. The Engineer reserves the right to alter and modify the Contractor’s proposals as the Administrator may deem fit.

1.5 Water and Electricity for Construction

1.5.1 The Contractor shall have to make his own arrangement for supply of water and for electrical power that may be required for or in connection with the works. No payment on this account will be entertained. However, Municipality may assist in getting power.

1.5.2 Arrangement for supply of piped water may not be possible. The Contractor will have to make arrangement for supply of drinking water and water required for constructions works by sinking tube wells or other suitable alternatives. The Tenderer shall investigate this matter during site inspection before submission of tenders: No payment will be entertained on ·this account.

1.5.3 Nevertheless electrical power from usual supply agencies may not be continuously available due to various reasons including load shedding. In case of non-availability of electrical power the contractor will have to make his own arrangements for electrical power through generations. Contractor should include such aspects while quote his rate. No payment will be entertained on this account. When drawing power from the Municipality power point, the contractor shall have to bear the cost of electrical charges. The route of conveyance shall be subject to approval by the Engineer-in-Charge and will be in accordance with prevailing I.E. Rules.

1.6 First-Aid Facilities

The Contractor shall arrange for medical attentions to be promptly available when necessary. He shall for this purpose provide a number of First-Aid stations at suitable locations within easy reach of the workmen and other staff engaged in the

Works. Each First-Aid station shall be properly equipped and will remain in charge of a suitably qualified person. The Contractor shall also provide for transport of serious cases to the nearest hospital. All these arrangements shall be to the approval of the Administrator.

1.7 Fire Fighting Arrangement / Fire Extinguishing arrangement

The Contractor shall provide suitable arrangement for fire fighting / fire Extinguishing. For this purpose he shall provide requisite number of Fire Extinguishers and adequate number of buckets, some of which are to be always filled with sand and some with water. This equipment's shall be provided at suitable prominent and easily accessible places and shall be properly maintained.

1.8 Safety Measures

The Contractor shall be responsible for the safety of all workmen and other persons entering or in the works and shall at his own expense and to the approval of the Administrator, take all measures necessary to ensure their safety.

Such measures shall include the provisions of helmets (Specially where work at a height is involved), provision of gum-boots to workers engaged in cement concrete or other works, scaffolding or other measures required for working at a height, shall be strong and rigid and have to be provided with suitable and convenient access. Shoring required for deep excavation must be adequate and rigidly braced and strutted. The Contractor shall provide depending on the exigencies of the location and nature of work and other relevant factors, other safety measure that the Administrator may direct.

1. 9 Supervisory Staff

The Contractor shall engage an experienced and qualified Site Manager to be in day-to-day charge of the work and he should be authorized to receive instructions from the Engineer. He shall receive orders given by the Engineer from time to time and shall act on them promptly. The Contractor shall, during working hours, maintain engineer and supervisors of sufficient training and experience to supervise the various items and operations of the work. Orders and directions as given to such engineers and supervisors or other staff of the Contractor shall be deemed to have been given to the Contractor. The Chief Engineer of the Contractor responsible for this work, by whatever designation he may be known, but who will be specified on award of the Contract shall at least once in a fortnight inspect the works and shall discuss with the Engineer the conduct and progress of the work.

1.10 Joint Survey

The Contractor shall satisfy himself regarding the correctness of the layouts, levels etc. as are shown in the drawings or given in the specifications. Before starting the work he shall also carry out at his own cost, survey of the whole work site jointly with the representative(s) of the Authority. Discrepancies noticed between drawings and the joint survey shall be informed in writing to the Administrator and got set right before execution of works. Such deviations as may arise out of the joint survey shall not viable the provisions of contract or entitle the Contractor to any extras in any way.

1.11 Layout and Checking

The contractor shall provide all labour, skilled and unskilled and all materials needed for carrying out, as directed, survey, laying out, setting out, checking of works, taking measurements, testing hydraulic and other structures, without any extra payment.

The Contractor shall also provide approach and access to all the works and stores without any extra cost.

1.12 Reference Points

After the joint survey has been plotted and approved by the Administrator recommendation of the Engineer, permanent base lines, cross line and bench marks shall be established by the Contractor so as to serve as reference points and "Dimensional Control Basis" of works. He shall prepare and submit a plan showing such reference points with their full description.

1.13 Co-operation with other Contractors

Some works in plant site, have been already done/are being done/will be done through other contractors. In the event of any such work the contractor shall have to work in full co-operation and in close co-ordination with other contractor/contractors. Any difficulty that may arise in this connection will have to be amicably settled by the contractors amongst themselves. If that be not possible, the matter shall be referred to the Administrator whose decision shall be final and binding on all the parties.

However, the site allocated to the contractor may be fenced at the Contractor's cost provided any necessary access to others as it required is given. The contractor will be permitted to use only the access to the site as indicated on the site plan of Tender Drawing.

1.14 Approval of Materials and Equipment to be used

Samples in large enough quantity of materials and descriptive data therefore requiring prior approval shall be furnished by the contractor to the Administrator in good time before the collection of such materials and equipment so as to permit inspection and testing. The samples shall be properly marked to show the name of the materials, name of the manufacturer and place of origin and item for which it is to be used. Only upon approval, the materials of approved quality shall be brought to site. Samples approved shall be on exhibition at all times, properly stores and prevented from deterioration for the purpose of comparison with the materials brought to site of work from time to time for use in work.

1.15 Testing & Testing Equipment

1.15.1 Testing of materials to be used in the permanent work or of the quality of finished items, sha11 have to be done from approved laboratory at the expense of the contractor.

The contractor shall afford at his own cost necessary facilities in providing the requisite materials and other assistance that may be required by the Engineer including transport of the test specimens to the laboratory referred to above,

1.15.2 The Contractor shall provide at his own cost necessary equipment for such testing which by the nature of work may have to be done at site or for taking samples for testing in laboratories. These include sufficient number of slump cones, standard 150 mm metal cube moulds, sets of I.S sieves, weighing balances, graduated measuring cylinders, complete set of equipment for in-site density test, thermometers and any other miscellaneous equipment that may be required by the Engineer or his Representative. The Contractor shall also provide necessary arrangement for curing of concrete cube specimens as instructed by the Engineer.

1.16 Construction Records

The Contractor shall keep and supply to the Engineer the up-to-date records of the dimensions and positions of all permanent works (showing therein any approved deviation between the drawing and the work as actually executed), The information available from the records must be adequate and complete to enable preparation of "as-made" drawing by the Contractor from these records,

1.17 Progress Photographs

The Contractor shall at his own cost and expense arrange to take periodic photographs to show the progress of work or interesting features thereof. The time and the position where from a photograph is to be taken should be as per direction of the Engineer or his Representative, Three copies of each of these photographs to an enlarged size of about 25 cm x 20 cm together with the CD/DVD, shall be supplied to the Administrator and these shall become the property of the Employer. Each photograph shall be suitably captioned with the date of the photograph, location and other relevant particulars, further prints and CD of the photograph, location and other relevant particulars shall not be kept by the Contractor or reproduced without written permission of the Employer. Digital Camera with 10.0 Mega pixels should be used for taking photos.

Restrictions to photography or security restrictions that may be applicable to any particular area must be carefully and rigidly observed.

The number of photographs (each consisting of three prints and the CD/DVD as aforesaid) for the complete works is not expected to exceed 100 (one hundred), No photograph of the plant and other installations shall be taken without prior approval of the concerned officers

1.18 Satisfactory completion of various items

The sub-works included in the Schedule of Prices are job works on lump sum basis. The various items of the sub-work are to fit in perfectly in the whole plant in every respect so as to form effective working parts of the whole plant as per satisfaction of the Administrator. Each sub-work will be considered as complete when it is completed as per specifications and put into commission, as per standards, as a successful component part of the whole plant.

1.19 Checking Quality of Work

Should the Engineer consider it necessary to satisfy himself as to the quality of the work, the Contractor shall, at any time during continuance of the contract, offer sample of work done or if necessary pull down a reasonable part of the work enough for such inspection and testing as the Engineer may direct and the Contractor shall make good the same at his cost and to the satisfaction of the Engineer without any extra cost.

1.20 Recording Measurements

Though the offer is on lump sum basis, the Contractor shall give not less than five days' notice, in writing to the Engineer, about the work which is proposed to be covered or placed beyond the reach of measurements so that measurements may be taken before the work is covered, bar bending schedule is to be provided five days before the casting date. If any work is covered without such written notice, the same shall be uncovered at the cost of the Contractor and in default hereof no payment or allowances shall be made for such work. These requirements apply for all the component items executed for the sub-work for which lump sum price is quoted

1.21 Reports and Returns

The Contractor shall maintain at Site daily records of progress with regard to the works carried out, labour engaged and construction equipment deployed. These will form the basis of preparing periodic reports and returns as may be required by the Engineer and in the manner as directed by him.

These daily records shall be made accessible to the Administrator, Engineer or his Representative as and when desired by him.

1.22 Site order Books

1.22.1 For the purpose of quick communication between the Engineer or his Representative and the Contractor or his Agent or Representative, Site Books shall be maintained at site in the manner described below. Any communication relating to the works may be conveyed through records in the Site Books. Such a communication from one party to the other shall be deemed to have been adequately served specified elsewhere in the General Conditions of Contract. Each Site Book shall have machine-numbered pages in triplicate and shall be carefully maintained and preserved.

1.22.2 The Contractor shall keep Site Books at various places Site work is being carried out so as to be readily available to the Engineer or his Representative. Any instruction or order which the Engineer or his Representative may like to issue to the Contractor may be recorded by him in the Site Book and two copies thereof taken by him for his record. The Contractor or his Agent or Representative may similarly maintain separate Site Book for any communication he may like to send to the Engineer or his Representative. Two copies thereof when sent to the Engineer's Representative and receipt obtained thereof, will constitute adequate service of the communication to the Engineer.

2.0 MATERIAL

2.1 The Contractor is liable to procure materials like Cement and Steel of required specifications from his own for smooth progress of the work under terms and conditions stipulated hereinafter.

Procurement of cement and steel materials require prior permission from appropriate authorities (Superintending Engineer, Municipal Engineering Directorate West circle) for approval of Brand & quality of materials to be procured by the Contractor.

2.2 However, if, in the interest of the Works, any material be issued to the Contractor, the provisions of Clause 2 shall apply mutates mutants and the issue rate thereof shall be as fixed by Administrator.

2.3 Cement

The Cement shall be Ordinary Portland Cement of strength not less than 53 MPa (53 Grade) complying with IS: 12269; 1987.

2.4 Steel

Steel bars for use in reinforcement shall be cold twisted bars complying with IS: 1786; 1985 (Reaffirmed 1990) specifications.

3. TECHNICAL ASSISTANCE

Training of Technical Personnel

The Contractor shall undertake to train one technical personnel selected and sent by the ULB to the works of the Contractor. These engineers shall be given special training in the shop and drawing office where the equipment will be designed and manufactured and where possible in any other plant where Contractor's manufactured equipment of similar type is under installation tests or maintenance, to enable them to become fully familiar with the equipment being supplied by the Contractor. The period of training shall be as decided by the ULB but in any case shall not exceed six months for any individual. During the period of training the Contractor shall arrange for reasonable accommodation of the engineers and transport from the place of accommodation to the works or plant.

The Contractor's supervisory personnel at site shall continuously and intensively instruct and train an adequate number of the ULB authority operating and maintenance personnel at site during erection and commissioning of the plant to enable them to take over the operation and maintenance of the plant after the maintenance period.

No extra payment shall be made by ULB for the training of personnel under this clause.

4. TERMS OF PAYMENT

As per Clause 57 of Section C

5. NO INTEREST ON DUES

No interest will be payable by the Employer on the amount due to Contractor pending final settlement.

6. DISPOSAL OF THE EXCAVATED MATERIALS

All materials obtained from any excavation required to be carried out under this contract will be the property of the ULB and the Contractor shall not have any claim on it. It will not be used for any purpose other than refilling the excavations as needed or levelling the compound or in construction of any embankment or in any manner as directed by the Engineer. After completion of work or earlier if so directed by the Employer the surplus excavated materials shall be disposed of by the contractor to any distance without any extra cost, but only after being so directed by the Employer.

7. POSSESSION PRICE TO COMPLETION

The Authority shall have the right to take possession for use of any completed or partly completed part of the work. Such possession or use shall not be deemed to be an acceptance of any work not completed in accordance with the agreement.

8. TENDER TO STRICTLY COMPLY WITH SPECIFIED CONDITIONS AND ALL OTHER SPECIFICATIONS

It should be clearly noted that the Bidders have to strictly comply with the specifications and other terms and conditions laid down in this document and no variations are permissible. This is necessary for the purposes of comparison of tenders received.

The Contractor shall stand guarantee for producing potable water as per the standards laid down in the tender and for the works carried out under this Contract.

Executive Officer
Burdwan Municipality

SECTION – E

GENERAL SPECIFICATIONS OF WORKMANSHIP AND MATERIALS FOR CIVIL WORK

1.0 GENERAL

1.1 General Materials

1.1.1 All materials used in the permanent works shall be of the best quality of the kind and to the approval of the Engineer-in-Charge. Any material not covered by these Specifications, shall comply with the relevant latest Indian Standard Specifications (Referred to as IS as revised or modified up-to the date one month prior to Tender date). British or American Standard Specifications shall be referred to in case any particular specification is not available in any of the aforesaid Specifications. For materials not specified in the aforesaid, direction of the Engineer-in-Charge shall be followed. All disputes shall be referred to the Employer, whose decision shall be final and binding.

1.1.2 Samples of materials to be supplied and used by the Contractor in the works shall shall have the prior approval of the Engineer-in-Charge. For this purpose the Contractor shall furnish in advance representative samples in quantities and in the manner as directed by the Engineer-in-Charge for his approval. Materials brought to the Site, which in the option of the Engineer-in-Charge do not conform to the approved sample and if so directed by him shall be removed by the Contractor from the Site and replaced by the materials of approved quality.

1.1.3 In spite of approval of the Engineer-in-Charge of any materials brought to the site, he may subsequently reject the same if in his opinion the materials has since deteriorated due to long or defective storage or for any reason whatsoever and is thereby considered unfit for use in the permanent works. Any material thus rejected shall be immediately removed from the Site at Contractor's cost and expense.

1.1.4 All materials brought to the Site shall be properly stored and guarded in the manner as directed by the Engineer-in-Charge and to his satisfaction.

1.1.5 The Engineer on written request of Administrator may carry out test of materials as he may decide. The Contractor shall, at his cost and expenses, for this purpose supply requisite materials and render such assistance to the Engineer-in-Charge as he may require.

1.2 **Workmanship**

All works are to be carried out in proper workman like manner. Items of works not covered by these Specifications or by other tender documents shall be carried out as per best practice according to the direction of the Engineer-in-Charge and to his satisfaction. The relevant IS Specifications or in case of necessity British or American Standard Specifications shall be taken as guide for the purpose.

1.3 **Works Included**

The rates for all items, unless specifically stated otherwise in the Contract, must cover the cost of all materials, labour, tools, machinery, plant, pumps, explosives, scaffolding, staging strong props, bamboos, ropes, templates, pages and all appliances and operations whatsoever necessary for efficient execution of work.

1.4 Ground Conditions

The Contractor is to visit the site and ascertain local conditions, traffic restrictions and obstructions in the area and allow for extra expenses likely to be incurred due to any limitations whatsoever.

1.5 Setting Out and Levelling

The Contractor is to set and level the works, and will be responsible for the accuracy for the same. He is to provide all instruments and proper qualified staff required for checking the Contractor's work.

1.6 Safety

The Contractor shall take adequate precaution to provide complete safety for prevention of accidents on the site.

1.7 Keeping Works Free from Water

The Contractor shall provide and maintain at his own cost, electrically or other power driven pumps and other plant and equipment to keep site excavated foundation pits and trenches free from surface as well as subsoil/leakage water from any other source thereof and continue to do so to the complete satisfaction of the Engineer-in-Charge till the site is handed over. Method of dewatering shall need approval of the Engineer-in-Charge but no payment whatsoever is allowed on this count.

1.8 Rubbish

1.8.1 The Contractor shall clear all rubbish, vegetation, roots, soda etc., and dump them in the area indicated to the satisfaction of Engineer-in-Charge. No separate rate shall be allowed for the above work.

1.8.2 After the work is completed, the Contractor shall clear the area surrounding the buildings, all hutments and excess stores and remnants of building materials such brick bats, metal, sand, timber, steel etc.

1.9 Bench Marks and Ground water Gauges

The Contractor shall protect surveyor's benchmarks and ground water gauges, zero line marks and base line marks and base line marks from damage of movement during work.

1.10 Inspection

The Contractor shall inspect the Site of works and ascertain site condition and the nature of soil to be excavated.

1.11 Contractor's Staff

The Contractor must provide at all times efficient staff of trustworthy, skilful and experienced assistance capable of carrying out the work in accordance with the drawings and specification and to correct levels. The cost this establishment should be included in his rates.

1.12 Method of Measurement

Unless otherwise specified, the method of measurement for building works shall be as per IS: 1200.

1.13 Specifications Referred to

1.13.1 The specification contained herein are not exhaustive and for such items of works which may arise and which are not covered by this specifications, the provisions in the relevant Indian Standard (Latest Edition) shall apply.

1.13.2 A list of some Indian Standards is given herein.

1.13.3 Wherever reference to the Indian Standard mentioned below or otherwise appears in the specification, it shall be taken as reference to the latest version of the Standard.

IS Code No	Description
IS: 1200	Method of measurement of building and Civil Engineering works.
IS: 1542	Sand for plaster.
IS: 383	Aggregates-Coarse and fine, from natural source for Concrete.
IS: 515	Aggregates for use in Mass Concrete, natural and manufactured.

IS: 456	Code of Practice for Plain and Reinforced Concrete for General Building construction.
IS: 3370	Code of Practice for Concrete Structures for the Storage of Liquids.
IS: 12269	Specification for 53 Grade Ordinary Portland cements.
IS: 1786	Specification for High Strength Deformed bars & wires for concrete reinforcement.
IS: 1077	Common Burnt Clay Building Bricks.
IS: 1205	Flooring Tiles, Cement Concrete, Floor Finish
IS: 1443	Cement Concrete, Flooring Tiles, Laying and finishing.
IS: 1661	Cement and Cement Lime Pointing Plaster finishes on walls and Ceilings.
IS: 226	Structural Steel (Revised) Iron Work
IS: 800	Code of Practice for use of Structural Steel in General Building Construction.
IS: 1199	Workability of Concrete

2.0 EARTH WORK IN EXCAVATION & FILLINGS

2.1 General

Applicable provisions of Conditions of contract shall govern work under this section.

2.2 Excavation for Foundation, Trenches, Pit etc.

The excavation work shall be carried out in all kinds of Soil including Sand in workman link manner without endangering the safety of the nearby Structures or works without causing any hindrance to other activities in the area. The existence of old buildings, boundary walls, hutment, sewer lines, water lines, if any very close to the area of excavation should be given careful consideration while designing carrying out the excavation work. The excavation shall be done in such method as would technically be appropriate and befitting the site conditions subject to the approval of the Engineer-in-Charge. All foundation trenches shall be excavated to the full width and depths shown on the approved drawing or to such ordered to the Contractor.

The Contractor shall not undertake any earthwork without having obtained prior approval from the Engineer-in-Charge to the methods he proposes to employ in order to execute the work in the most efficient manner. He shall not modify such methods without the approval of the Engineer-in-Charge. This approval, however, shall not in any way make the Engineer-in-Charge responsible for any consequent loss or damage.

2.2.2 Should any excavation be taken down the specified levels, the Contractor shall fill in such excavation at his own cost with concrete as specified for foundations, well rammed in position until it is brought up to the specified level.

2.2.3 The Contractor shall notify when the excavation is completed and no concrete or masonry shall be laid until the soil for each individual footing, rafts etc. is approved.

2.2.4 The Contractor shall keep the site clear of water at all times. To this end he shall provide arrangements for bailing and pumping or any special arrangements as required within his quoted prices.

2.2.5 All foundation pits shall be refilled to the finished ground level (formation level) with approved materials, which shall be suitably consolidated in layers to the satisfaction of the Engineer-in-Charge.

2.2.6 Nothing extra will be paid for bailing out water collecting in excavation due to rains, ordinary springs, leakage from any other sources etc., or any other reason.

2.2.7 For the work of excavation the Tenderer shall include in his quotation the shoring, sheeting, bracing and sheet pilling (if required). The quotation shall also include the cost of compaction of foundation sub-base, removal and storage of excavated materials and back filling.

2.3 **Shoring**

Timber shoring whenever required shall be closed boarded with minimum 50mm thick good and seasoned timber planks of sufficient length driven side-by-side to the required depth. The gaps between adjacent timber planks shall such would not allow any flow of soi1 particles, if necessary, the sides of the planks shall be planed smooth to ensure this. Sufficient number of bracing struts, walling etc. is to be provided to make the shoring rigid and non-yielding by earth pressure. Where necessary, sheet pilling shall be done to ensure safety to the adjoining structures, if it is found that it is not feasible to protect the structure by timber shoring only. The Tenderer is strongly advised to inspect the site before tendering and apprise himself of the requirement of any Sheet piling in addition to the timber shoring before submitting his Quotation accordingly.

2.4 **Back Filling**

The space around the foundations in trenches or sites shall be cleared of all trash and loose debris and filled with approved excavated earth, all clods being broken up to the finished G.I. Filling shall be done in 200mm layers, each layer to be property moistened and well ranm1ed. Excavated materials which is surplus or which is consolidated unsuitable for back filling shall have to be disposed of in spoil dumps as directed by the Engineer-in-Charge. No extra payment will be made for this.

3.0 CONCRETE

3.1 General

3.1.1 Applicable provisions of Conditions of Concrete shall govern work under this section.

3.1.2 All concrete work, plain or reinforced shall be carried out strictly in accordance with this specification and any working drawing or instructions given from time to time to the Contractor.

3.1.3 The Contractor's states shall allow for wastages in all materials as well as for all tests of materials and concrete.

3.1.4 No concrete shall be cast in the absence of the Engineer-in-Charge or any other person duly authorized by him. The Contractor's Engineer shall personally check that both the form work and reinforcement have been correctly placed and fixed, and shall satisfy himself that all work preparatory to the casting is completely ready, before informing the Engineer-in-Charge for final inspection and approval and for which purpose at least 24 hours' notice shall be given by the Contractor.

3.1.5 The Indian Standards wherever referred to herein shall be the latest addition of such standards.

3.2 **Cement**

Cement shall conform for IS: 12269; 1987 Cement tests shall have to be carried out at Contractor's expense as and when directed. Cement, which has or practically set, shall not be used under any circumstances. The important structures should be constructed with the grade of cement not below 53 (Grade-53). No extra payment will be made for using Grade-53 cement or more grades available in departmental store.

3.3 **Aggregates**

The fine and coarse aggregates shall conform to all provisions and test methods of IS: 383 and/or IS: 5l5. Samples of aggregates, proposed to be used in the work shall be submitted free of charge in sufficient quantities to the Engineer-in-Charge with sieve analysis and other physical and chemical analysis data for his approval. He will preserve approved samples for future reference. This approval will not in any way relieve the Contractor of his responsibility of producing of specified qualities.

3.3.1 **Coarse Aggregates**

Coarse aggregates for use all reinforced and other plain cement concrete works shall be crushed black granite trap stone obtained from approved source and shall consist of uncoated, hard, strong dense and durable pieces of crushed stone, and be free from undesirable matters, viz. Disintegrated stones soft, friable, thin, elongated or laminated pieces, dirt, salt, alkali, vegetable matter or other deleterious substances. The aggregates shall be thoroughly washed with water and cleaned before use to the satisfaction of the Engineer-in-Charge at no extra cost of the Employer.

The maximum size of coarse aggregates shall be as follows unless specified otherwise elsewhere.

Reinforced Concrete	:	20 mm
Plain Concrete	:	20 mm
Thin R. C. C. Members With very		
Narrow space	:	12/15 mm.
Mat/Lean Concrete	:	20/40 mm.

(The actual size to be agreed by the Engineer-in-Charge)

Grading of coarse aggregates for a particular size shall generally conform to relevant I.S Codes and shall be such as to produce a dense concrete of the specified proportions and or strength and consistency that will work readily in position without segregation.

3.3.2 **Fine Aggregates**

Sand shall be clear River sand brought from approved source and consist of siliceous material, having hard, strong, durable uncoated particles, free from undesirable matters viz. dust lumps, soft or flaky particles or other deleterious substances. The amount of undesirable shall not exceed the percentage limits by weights as specified in relevant IS Codes. Washing of aggregates by approved means shall be carried out, if desired by the Engineer-in-Charge, at no extra cost to the Employer.

Coarse and fine sand shall be well graded within the limits by weight as specified in relevant IS Code. Fineness Modulus shall not vary by more than plus or minus 0.20 from that of the approved sample. Fineness Modulus for sand should not be less than 2.5.

3.4 **Reinforcement**

3.4.1 The Contractor shall prepare and furnish to the Engineer-in-Charge, Bar Bending Schedules in considerations of the approved drawings for all R.C. C. works for review and checking by the Engineer-in-Charge well before taking up the work.

3.4.2 The High Yield Strength Deformed bar (HYSD) Fe - 415 shall conform to IS: 1786-1990. And to be used in all type of works. Design of the structure shall be made using Fe-415 grade of steel.

All steel for reinforcement shall be free from loose, oil, grease, paint or other harmful matters immediately before placing the concrete.

3.4.3 The Reinforcement shall be bent to the shapes shown on the approved drawings prior to placing and all bars must be bent cold. The Steel shall be placed in such a way that it is rigidly held in position while concrete is being cast. The correct clearance from the form shall be maintained by either pre-cast mortar blocks or by metal supporting chairs to be supplied by the Contractor free of charge.

The intersection of roads crossing one another shall be bound together with soft pliable with No. 16 to 18 SWG at every intersection so that reinforcement will not be displaced in the process of depositing concrete. The loops of binding wire should be tightened by pliers and welding of reinforcement for lapping & binding should be done if desired by E.I.C. No extra payment will be made for this purpose.

3.4.4 The work of reinforcement shall also be inclusive of stirrups distribution bars, binders, initial straightening and removing of loose rust, if necessary, cutting to requisite length, hooking and bending to correct shape, placing in proper position including supplying and binding with block annealed wire as stated in clause 3.4.3 above.

3.5 **Water**

The Water shall be clean and free from Alkali oil or injurious amounts of deleterious materials. As far as possible, the water is of such quality that it is potable. If any chemical analysis of water is necessary and ordered, the same shall be carried out at an approved laboratory at the Contractor's cost and expenses.

3.6 **Concrete Proportioning**

3.6.1 The concrete proportions shall be as indicated on the approved drawings and shall conform to IS: 456 & IS: 3370. The quality and character of concrete shall be governed by IS: 383. It should be sampled and analysed as per IS: 1199. The concrete should stand the test specified in IS: 516.

3.6.2 The minimum cover of main reinforcement shall be as per relevant IS: Codes. Cover to any reinforcement of R.C.C. piles shall be minimum 65 mm in case in-situ and 50 mm in case of pre-cast piles. Suitable spacer blocks shall be provided at intervals not exceeding 1.2 m. throughout the length of the pile.

3.6.3 The workability shall be measured by slump. Slump for different grades of concrete shall not exceed following unless specifically permitted by the Engineer-in-Charge.

i) For M 15 concrete - 3.75 cm.

ii) For M 20 concrete - 2.50 cm.

iii) For M 25 concrete – 2.00 cm

3.6.4 All concrete works shall be thoroughly compacted and fully worked around the reinforcement, around embedded fixtures and into comers of the form work.

The Concrete shall be thoroughly and shall be efficiently vibrated during laying. The use of mechanical vibrators shall comply with IS: 2608, IS: 2506 and IS: 4656. Whenever vibration has to be applied externally, the design of formwork and deposition of vibration shall receive special consideration to ensure efficient compaction and to avoid surface blemishes.

3.6.5 Test for Water Tightness of Structures / Pipes

For liquid retaining structures including inlet chambers etc. shall be deemed to be satisfactory water tight as per relevant clause of IS: 3370. The Contractor at his own expenses, if necessary, shall undertake approved corrective measures.

As regards the pipelines, the tests shall be performed for the Hydrostatic Pressure of 10 Kg./Sq. cm in case of S.W.M., D.I. Pipes and 2 Kg./Sq. cm. for P. S. C. respectively. The tests shall be carried out as per relevant IS Codes and pipes shall be considered satisfactory if the tests results satisfy the requirements of the relevant clauses of the Codes. The Contractor shall give all these Hydraulic Tests by making his own arrangements for water supply and filling and disposing the water after the tests. The Contractor shall rectify the defects noticed and carry out the tests again and repeat the testing operation till successful result is obtained and accepted by the Engineer. The rates Quoted for the work shall be considered as inclusive of cost of all Labour, materials and equipment required to give successful tests for Water tightness.

3.7 **Workmanship**

3.7.1 All Concreting work shall be carried out according to the IS: 456, IS: 3370, and other related codes. It should, however, be noted that for every 15 M^3 of concrete placed or for every one day's volume of concrete whichever is lower, a minimum of 3 (three) Cubes shall be kept for test purpose, and tested at the Contractor's cost and expenses at a Laboratory as approved by the Authority. The number of test cubes may, however, be altered at discretion of the Engineer-in-Charge. It is compulsory to test 3 (three) cubes in each case.

3.7.2 Structural Concrete

Design mix Concrete shall be on all concrete works except in case of Mud-mat concrete lean concrete where nominal mix concrete will be allowed.

Design mix Concrete to be used in Reinforced Concrete Structures shall be in Grade of M20 or mor; for works of water retaining structure Grade of concrete M30 to be used as per latest amendment of IS:3370.

The mix shall be designed to produce the grade of concrete having required workability and a Characteristic Strength not less than appropriate values given in IS: 456 - 2000. For mix design, procedure given in Indian Standard recommendation or any other standard procedure shall be adopted. As long as the quality of materials does not change a mix design done earlier may be considered adequate for later work. Batching mixing, sampling and Strength Test of concrete shall be carried out in compliance with the relevant clause of IS: 456-2000 and all other relevant Indian Standards recommended therein.

The mix design by the Contractor shall be used for works only after obtaining written approval of the Engineer-in-Charge. Mix design shall be entirely the responsibility of the Contractor and any approval by the Engineer-in-Charge shall not relieve him of his responsibility in respect thereof.

The Contractor shall prepare all the Calculations. Tabulations, Graphs etc. pertaining to Mix Design Test result and supply copies of such Calculations, tabulations, Graphs etc. required by the Engineer-in-Charge.

On proportioning concrete, the quantity of both cement and aggregate shall be determined by weight, where the weight of cement is determined on the basis of weight per bag a reasonable number of bags be weighed periodically to check the net weight or should be either weighed or measured by volume in calibrated tanks, All measuring equipment's shall be maintained in a clean serviceable condition and shall periodically checked for accuracy.

The grading of coarse and fine aggregates shall be checked frequently and frequency of testing shall be determined by the Engineer-in-Charge. Where weight batching is not possible or practicable, the quantities of coarse and fine aggregates may be determined by volume but cement in any case shall be weighed by weight only. If fine aggregate and volume batching is adopted, allowance shall be made for bulking. The bulking shall be determined in accordance with IS: 2086 (Part-III).

The Water-Cement Ratio shall be maintained to its correct value. Surface moisture content of aggregate shall be determined as per IS: 2086 (Part-III) and the amount of water to be added shall be adjusted accordingly to maintain the correct Water-cement ratio.

During the progress of work in order to ensure correct strength of concrete proper control should be exercised by the Contractor as specified in Specifications mentioned in the Clause 3.7.1 above. Test strength of every sample shall be determined in accordance with the recommendations of IS: 456-2000. If one out of ten consecutive test cubes shows a deficiency in strength up-to a maximum limit of 10%, the concrete will be deemed satisfactory. If two of the test cubes out of ten shows a deficiency in strength up to a limit of 10%, the concrete shall be deemed to be less satisfactory and a reduction of 1 % will be made on the cost of such concrete. If three out of ten test cubes show deficiency in strength up to a limit of 10%, a reduction of 5% will be made on the cost of such concrete. If more than three test cubes show a deficiency in strength up-to a limit of 10% a reduction of 10% will be made on the cost of such concrete. If more than five show a deficiency in strength up-to a limit of 10%, the concrete shall be rejected. Such rejected concrete work shall have to be dismantled and replaced to the satisfaction of the Engineer-in-Charge by the Contractor free of cost to the Employer. No payment for the dismantled concrete, the relevant formwork and reinforcement, embedded fixtures etc. wasted in the dismantled portion, shall be made. In the course of dismantling, if any, damage is done to the embedded items or adjacent structures, the same shall also be made good free of charge by the Contractor to the satisfaction of the Engineer-in-Charge.

If the deficiency in strength of one-test cubes exceeds the 10% limit, a reduction of 5%) will be made on the cost of such concrete. if the deficiency in strength to two out of ten test cubes exceeds the 10% limit, a reduction of 10% will be made on the cost of such concrete. If the deficiency in strength of three out of ten test cubes exceeds the 10% limit, a deduction of 20% on the cost of such concrete will be made.

With permission of the Engineer-in-Charge for any above mentioned grades of concrete, if the quantity of water has to be increased in special cases, cement shall also be increased proportionally to keep the ratio of water to cement same as adopted in trial mix design for each grade of concrete. No extra payment for additional cement will be made.

3.8 **Pre-cast Concrete**

Pre-cast Concrete items shall conform to relevant IS Specifications. Pre-cast items shall be suitably marked with the date of casting identification marks and shall show the right way up as may be required. The arrangements to be made by the Contractor for Site manufacture and handling of pre-cast items shall be done to the approval of the Engineer-In-Charge. Each pre-cast unit shall be cast in one operation and no construction joints shall be permitted. No damaged or defective units shall be built into the works and units shall be so stored that they are not over' stressed.

Pre-cast units shall be provided in places as shown in the approved drawings. The pre-cast units shall be cast at site strictly following the Specifications of Pre-cast Concrete work. Proper care shall be taken to ensure that the units are obtained from the moulds without any damage. Before erecting in position the units shall be cured adequately by keeping units immersed in water.

3.9 **Form Work**

3.9.1 The Form Work shall conform to IS: 456. Whenever necessary, shuttering must be provided.

The work shall also include providing all necessary staging, cantering, formwork and moulds for placing concrete. Shuttering may be of approved 12 mm thick ply & steel materials. Surface to be in contact with concrete are to be planed smooth. Alternatively, sufficiently rigid plywood shuttering or steel shuttering may be used. In every case, joints of the shuttering are to be such as to prevent the loss of liquid from the concrete. In timber shuttering the joints shall, therefore, be either tongued or grooved or the joints must be perfectly close and lined with draft paper polythene films or other types of approved materials. In case of plywood or steel shuttering also the joints are to be similarly lined. All shuttering and framing must be adequately stayed and braced to the satisfaction of the Engineer-in-Charge for properly supporting the concrete, during concreting and the period of hardening. It shall be so constructed that it may be removed without shock or vibration to the concrete. No through bolts are allowed for holding the shuttering in water retaining structure.

3.9.2 **Cleaning, Treatment and Removal of Forms**

All forms shall be thoroughly cleaned of old concrete, wood shavings, saw dust, dirt and dust sticking to them before they are fixed in position. All rubbish loose concrete chippings, shavings, saw dust etc. shall be scrupulously removed from the interior of the forms before the concrete is poured. Formwork shall not be used/reused, if declared unit or unserviceable by the Engineer-in-Charge.

If directed by the Engineer-in-Charge, compressed air jet/or water jet shall be kept handy along with wire brushes, brooms etc. for the purpose of cleaning.

Before shuttering is placed in position, the form surface in contact with the concrete shall be treated with approved non-staining oil or composition. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or existing concrete surface. They shall not be allowed to accumulate at the bottom of the shuttering.

Forms shall be struck in accordance with the relevant clause of IS: 456 or as directed by the Engineer-in-Charge. The Contractor shall record on the drawings or in other approved manner, the date in which the concrete is placed in each part of the work and the date on which the form work is removed there from and have this recorded checked and countersigned by the Engineer-in-Charge.

The Contractor shall be responsible for the safe removal of the formwork, but the Engineer-in-Charge may delay the time of removal if he considers it necessary. Any work showing signs of damage through premature removal of formwork or loading shall be entirely reconstructed without any extra cost to the Employer.

3.10 **Protection and Curing of Concrete**

Newly placed concrete shall be protected by approved means; from rain, sun and wind and extreme temperature. Concrete placed below the ground level shall be protected from failing earth during and after placing. Concrete placed in ground containing deleterious substance shall be kept free from contact with such ground or, with water draining from such ground during placing of concrete and for a period of at least 3 (three) days or as otherwise directed by the Engineer-in-Charge, the ground water around newly poured concrete shall be kept to an approved level by pumping or other approved means of

drainage at the cost of the Contractor. Adequate steps shall be taken to prevent flotation or flooding. Steps, as approved by the Engineer-in-Charge, shall be taken to project immature concrete from damage by debris, excessive loading, vibration, abrasion, mixing with earth or other deleterious materials, etc. that may impair the strength and durability of the concrete.

As soon as the concrete has hardened sufficiently for the surface to be marked it should be covered with Hessian, canvas, or similar materials and kept continuously wet for at least 7 (seven) days after final setting. This period may be extended at the discretion of the Engineer-in-Charge, up-to 14 (fourteen) days. Concrete slabs and floors shall be cured by flooding with water of minimum 25 mm depth for the period mentioned above.

Approved curing compounds may be used in lieu of moist curing with the permission of the Engineer-in-Charge. Such compound shall be applied to all exposed surface of the concrete as soon as possible after the concrete has set. No extra payment is allowed on such count.

3.11 Concrete Finish

The Concrete surface on removal of form work shall be such that no finish is necessary, If, however, the surfaces is not satisfactory the Contractor shall, if so instructed, remove unwanted, projecting parts by chipping and smoothening the surface with cement rendering at his own expenses. The shutter marks shall invariably be removed by rubbing with carborandum stone. The Contractor shall therefore take all precaution for avoiding the shutter marks.

3.12 Construction Joints

These shall be in according with IS: 337 or as directed.

3.13 Expansion Joints

Expansion joints shall be provided at position as directed and the spacing shall not exceed the limits specified in IS: 456. These shall comply strictly with the details shown on approved construction drawings. Reinforcement shall not extend across any expansion Joint and the break between the two sections must be complete.

3.14 Details of typical expansion joints and construction joints should comply with the suggestive arrangements shown in IS: 3370 (Part-I), Clause 8.1 (a)(2), Figure 2 (for expansion Joints) and Clause 8.1(a) Figure 1, Clause 8.1 (b) Figure 4 (for construction joints).

3.15 PVC Water Stops

The materials shall be durable and tough and as per approval of the Engineer-m-Charge. The minimum thickness of PYC sealing strips shall be 6 mm. and the minimum width 225-mm actual shape and size shall be as per drawings. The materials should be of good quality polyvinyl chloride highly resistant to learning abrasion and corrosion as well as to chemicals likely to come in contact with during use. The physical properties will generally be as follows:

Specific Gravity	1.3 to 1.35
Shore Hardness	60 A to 80 A
Tensile Strength	100 to 150 Kg./Cm2
Minimum Safe Continuous Temperature	75^0C
Ultimate Elongation	Not less than 275%
Water Absorption	Not more than 5% by weight in a 7 day test.

3.16 Rubber Water Stops

The materials must be very durable and tough and as per approval of the Engineer-in-Charge. The ribs shall be sufficient to ensure proper bonding with concrete. The width shall be minimum 225 mm and thickness minimum 6 mm. The rubber water stop must be used in long lengths to avoid splicing as far as practicable. Ends shall have at least 200 Cu M overlaps and

vo1canised. The materials shall be natural rubber and be resistant to corrosion tear and also to attacks from acid, alkalis and chemicals normally encountered in service. The physical properties will generally be as follows

Specific Gravity	1.1 to 1.15
Shore hardness	65 A to 75 A
Tensile Strength	250 to 800 Kg/ Cm2
Maximum safe continuous temperature	750C
Ultimate elongation	Not less than 350%
Water Absorption	Not more than 350% by weight in a 7 day test.

3.17 **Contractor's Supervision**

The Contractor shall provide constant and strict supervision of all the items of construction during progress of work, including the proportioning and mixing of the concrete and bending and placing of reinforcement. Before any important operation, such as concreting or stripping of form work adequate notice shall be given.

The cement and sand shall be thoroughly mixed dry in specified proportions. Water shall then be added just sufficient to make a stiff and workable paste. The mortar shall be used within half an hour of mixing.

4.1 The Contractor shall build all brickwork uniformly no one portion being raised more than 1 meter above another at a time. The joints shall not exceed 12 mm. in thickness and should extend the full thickness of the brickwork. All joints shall be properly raked and the surface washed down.

4.2 All the bricks shall be kept fully immersed in water at least for a minimum period of six hours till they are completely soaked and only thoroughly soaked bricks shall be used in the work.

4.3 The Contractor shall keep wet all brickwork for at least 10 (ten) days after laying. The surface of unfinished work shall be cleaned and thoroughly wetted before joining new work to it.

5.0 PLASTERING, PAINTING AND SURFACE TREATMENT

5.1 Cement Plaster

5.1.1 The plastering work shall be governed by IS: 1661. Unless otherwise specified cement plaster shall be composed of 1 part of cement and 6 parts of sand. For ceiling plaster, the composition shall be 1 part of cement and 4 parts of sand. The thickness of ceiling plaster shall be 6 mm. The thickness of plaster to the fair faces of brickwork shall be 19 mm. The thickness mentioned shall be minimum thickness. The Contractor shall allow in his rate for any rubbing out due to inequalities of brickwork.

5.1.2 The rate shall also include for forming of any moulding drip course etc., and for extra thickness due to corbelling of brick work in parapet or at any other place. All internal angles shall be rounded off as per drawing or as directed by the Engineer-in-Charge without any extra charges (if required).

5.1.3 Cement and sand shall be measured and mixed dry thoroughly to a uniform colour on a platform specially constructed for the purpose. Care should be taken to see that no foreign matters get mixed with the mixture. Only enough water shall be mixed to make the mixture workable. The mix shall then be turned over and again to a uniform colour and texture number more cement mortar shall be mixed at a time than cannot be used within thirty (30) minutes of mixing.

5.1.4 Surface to be plastered are to be brushed clean, wetted for 24 hours before the plaster is put in and the joints of the brick work raked out 12 mm. deep minimum. The concrete faces to be plastered shall be chipped, roughened and soaked with water for achieving required bond with the plaster without any extra cost.

5.1.5 The surface of the plaster shall be finished absolutely in one plane. The Contractor shall rub down any unevenness with carborandum stones at his cost and expenses. Care shall be taken to see that no mark remains at the junction of plastering done at different times. If necessary, the junctions shall be rubbed with carborandum stones to eliminate such undesirable marks. The Contractor may be required to use normal sprinkling of thin cement slurry on the surface for satisfactory finishing of the plastering work for which no extra payment shall be made.

5.1.6 Plaster shall be protected and cured by keeping it thoroughly wet with sprinkling of water for 10 (ten) days continuously.

5.1.7 The cost of plastering work shall also include the cost of necessary scaffolding, staging etc. as would be required for the work.

6.0 SURFACE FINISHING

6.1 General

The cost of all the items of work under this section should include the cost of necessary scaffolding, staging, preparing sub base, removing stains from the floor, skirting, wood work, glass etc. caused through execution of the work.

6.2 White Washing

6.2.1 White washing shall be done with 5(five) parts of stone lime and I (one) part of shell lime with necessary gum (about 2 Kg per M3 of lime) using a small quantity of blue as per direction of Engineer-in-Charge. The lime shall be brought to the site unslaked and shall be slaked at site with an excess of water and allowed to remain under water for (two) days. To the mixture fresh water may be added to bring the consistency to that of a thin cream. When thoroughly mixed, the mix is to be strained through coarse cloth. The surface of the wall is to be brushed thoroughly cleaned before the white washing is applied. Each coat of white wash has to be laid on with brushes. Each coat of White Wash means one continuous strike of brush with the prepared wash from top downwards. Another similar strike bottom upward over first strike followed by another similar strike from right to left and another from left to right over the right application of brush before it dries. Each coat must be perfectly uniform when finished and free from brush mark etc.

6.2.2 Three coats of white wash will mean a minimum of 3 (three) coats to produce on opaque white surface to the entire satisfaction of the Engineer-in-Charge. If the surface is blotchy or otherwise unsatisfactory, number of coats shall be applied till the desired effect is produced to the satisfaction of the Engineer-in-Charge without any additional cost.

6.2.3 Where specified interior wall shall be finished by acrylic distemper (two coats) over interior grade acrylic primer as per manufacturer's specification at all the places as per bid document. Generally all the internal parts of the building will be distempered wall painting as per Engineer-in Charge.

6.3 Exterior wall Finish

6.3.1 External surface shall be finished with two coats of Protective and decorative weathered coat paint of approved colour, shade and manufacture over acrylic primer. The surface to be finished shall be previously cleaned down to remove loose dust or dirt by use of stiff wire brush. All inequalities to be rubbed down and defects rectified. The surface to be wetted well with water and the surface water is to be allowed to run off. The acrylic emulsion paint to be applied strictly as per manufacturer's specification. The first coat should be well brushed into the surface to form a good bond. Second coat should be applied carefully to give a good finished appearance may be applied by brushing or spraying. Each weather coat paint application shall be wetted at the end of the day with a fine water spray.

6.4 Painting to Steel Works

6.4.1 Any shop coat of paint shall not be considered as a coat of paint for the purpose of specification.

6.4.2 Ready mixed synthetic enamel paint of 'Jenson & Nicholson' 'British Paints', 'Shalimar Paints or similar other approved make and approved colour and shade shall only be used. The primer shall be red oxide zinc chromate

primer (1S: 2074) or any other anticorrosive primer as approved and directed by the Engineer-in-Charge. The Contractor shall furnish the details of paints to the Engineer-in-Charge for approval of paints before commencement of painting work.

6.4.3 The surface to be painted shall be properly cleaned, de-rusted, all loose scales removed and smoothened with emery papers. Then a coat of anticorrosive priming shall be evenly applied. After this has dried up, two successive coats of best quality ready mixed synthetic enamel paint shall be given to the entire satisfaction of the Engineer-in-Charge. Brushes of approved size and make shall only be used for application of paint and use of cloth is definitely prohibited.

7.0 DAMP PROORING WORK

7.1 Unless otherwise specified, damp proof course shall be 25-mm thick cement concrete (1:2:4) with stone chips graded 10 mm to 3 mm with 3% Cica or similar approved water proofing compound conforming of IS: 2645 by weight of cement. The proportioning, laying etc., shall be done is conformity with specification for cement concrete work. The damp proof course shall be used for all brick walls of the building.

8.0 ROOF WATER PROOFING TREATMENT

8.1 Both flat and curved roofs, whether accessible or inaccessible, shall have to be provided with approved polyurethane based water proofing paint. And over it 40 mm thick screed concrete (M20 grade).

8.2 Preparation of Surface

The top surface of the roof shall be chipped off where necessary and all loose particles, dust impurities, are to be removed by rubbing the entire roof surface with wire brush and by application of High Pressure Compressed Heated Air to have a complete dust free and moisture free surface.

The roof surface, receiving polyurethane based Water Proofing paint, shall be provided with cement punning having smooth finish. A cross slope of 1 in 800 shall be provided in the roof of Building to allow proper drainage of rainwater.

8.3 Specification of Materials

The polyurethane based paint is essentially an elastic and water proof film having a good adhesion to concrete; water and abrasion resistant properties and shall have long term weather proof characteristics. The paint / film material shall be of two components which is to be mixed and processed as per manufacturer's specification. The mixture shall be homogeneous before applications, as it has tendency to settle.

The polyurethane based water proofing system shall be manufactured by reputed manufacturers of proven recorded and shall be approved by the Central Building Research Institute (CBRI)/ National Chemical Laboratory (NCL)/ The Council of Scientific and Industrial Research/New Delhi (CSRI)/ National Test House, Kolkata or similar such Government/ Public Sector Undertakings.

The materials are to be inspected/ approved by the Engineer-in-Charge as per procedure to be mutually agreed upon the agency and in charge of the work.

8.4 Since the product has a very short self-life, the materials are to be used in the work shall not be older than four (4) months from the date of manufacture (i.e. the date of bottling).

Necessary Test Certificate of CBRI/NCL/CSIR/National House etc. are to be furnished by the contractor or the Department, for the materials procured for the water proofing work.

8.5 Application

The two components of polyurethane based water proofing system should be mixed as per manufacturer's specification before application. The tack coat should be applied by brushing or roller to the entire surface in normal temperature and 406 hours setting time should be allowed before application of the second coat. The record and final coat of polyurethane based

mixed waterproofing sealing over the priming coat to be applied at normal temperature and curing time between 36 to 48 hours should be allowed.

The application to be made by technically trained and approved applicators duly certified by the manufacturers.

8.6 Guarantee Period

The entire waterproofing job shall be covered with a written guarantee of leak proof performance for a minimum period of 10 (ten) years.

8.7 Defects Liability Period

Ten percent (10%) of the cost of all works shall be retained by the Department for one (1) year from the date of commissioning. Any defect observed during the Defect Liability Period shall be rectified by the Contractor without any extra cost to the Department.

9.0 FLOORING

9.1 Patent Stone Floorings shall be 25mm. thick in M20 grade concrete with 10mm. to 6mm. stone ships laid in rectangular panel with diagonal length not exceeding 3.00M and finished smooth with neat comment punning 1.5mm thick. After finishing, the surface shall be left undisturbed for two hours and then with wet bags and after 24 hours cured by flooding with water and kept wet for at least 7 (seven) days. Required Camber or Slope should be provided in floor draining wash water, if necessary.

9.2 Cast-in-Situ Mosaic in floor shall be 25mm.thick (finished) laid in panels as directed with necessary underlay of cement concrete (1:2:4) with stone chips with 12mm. thick terrazzo topping finished to 9 mm. after final grinding with 0 to 10 mm. size Mosaic chips highly polished etc. - complete as per specification of IS; 2114-1962. Cast-in-situ Mosaic in Skirting and dedo shall be 12mm. thick. The Mosaic work shall be of approved color and to the entire satisfaction of the Engineer-in-Charge.

9.3 'Ferro site' or 'Ironite' Flooring shall be 50 mm. Thick to be laid in two layers. First a layer of 25mm. thick patent stone flooring shall be laid in M20 grade concrete and allowed to dry. Then the second layer of 25mm.thick flooring of M20 grade concrete with 10mm.to 6mm. stone chips using at least 1Kg./Sq.m. of floor hardening compound of approved quality and make shall be laid and cured. The flooring shall be laid in rectangular panel with diagonal length not exceeding 3.0 meters.

10.0 IRON MONGERY

10.1 The rain Water pipe of the materials and of size as specified shall be of approved manufacture end jointed as follow:

10.1.1 For heavy cast iron pipes with gasket and lead properly caulked.

10.1.2 Where required these are to be run in chase left out in walls, columns, slabs and to be encased in cement concrete 1:2:4 (1 Cement, 2Sand 4 washed Stone Chips 19mm. down) with metal wrapping or with M.S: loops placed at approximately 325mm center to center or as directed by the Engineer-in-Charge. All pipes encased in walls, columns or under floors must be heavy cast iron with lead caulked joints. For exposed lengths of pipes, these are to be neatly secured clear from the finished wall face with nails and bobbing in the case of cast iron pipes, nails or screwed to hard wood tapping pugs embedded in wall.

10.1.3 All cast iron rain water pipes shall be painted two coats inside with approved anticorrosive paint. The exposed cast iron pipes shall be painted outside with two coats of ready mixed Synthetic Enamel Paints of approved makes, shade and colour over a coat of priming of approved make.

10.1.4 The mouth of rain water pipes shall be fixed with C.I grating and the pipe jammed in position in 1:2:4 cement concrete with stone chips and neat finish on the surface.

10.1.5 The work shall include all supply, fitting and fixture of materials cutting, making chases, encasing, painting, jointing, etc. complete in all respect. The work shall include supplying, fitting, fixing, and jointing of all the specials required for the completed work.

10.1.6 Rain water Spouts shall be of C.I pipes cut to exact length as per approved drawing or direction of the Engineer-in-Charge and laid in position in 1:2:4 cement concrete with stone chips, adjoining roof being finished in neat cement. The interior faces shall be painted two coats with anticorrosive paint and the faces shall be painted with two coats of ready mixed Synthetic Enamel paint of approved make, shade and colour over a coat of priming of approved make.

10.2 Metal Casement

10.2.1 Unless specified otherwise, all doors, windows and ventilation in general should be of mild steel casement with sections as per IS: 1038. They shall be of approved make. The Contractor will submit the name and address of the manufacturer whose metal casements he intends to use for approval of the Engineer-in-Charge. The workmanship shall be of high quality and shall be up to the entire satisfaction of the Engineer-in-Charge.

10.2.2 All the steel doors and windows sashes shall be given a shop coat of Red Oxide Zinc Chromate Primer IS: 2070 after these are thoroughly cleaned off dust, dirt, scales etc., and passed after inspection by the Engineer-in-Charge.

10.2.3 Windows are to be prepared for puffy glazing from the outside and for opening outwards unless otherwise mentioned. All steel sashes shall have holes drilled at suitable places for inserting glazing clips which shall also be supplied by the Contractor All glazing shall be fixed to the shutters or frames in addition to glazing clips with quality putty of Shalimar or equivalent make. Glass must not be placed directly against the metal. A thin layer of putty must be evenly spread over the glazing rebate and the glass pressed firmly against it.

10.2.4 Ventilators shall be constructed from solid rolled universal casement section being double weathered at all points to ensure water tightness and bedded in mastic and screwed to the sashes.

10.2.5 The fitting shall be of heavy pattern bronze oxidized brass and of approved quality, side hung casement will have two point locking handle and casement fasteners. The hung windows shall have 200mm. long adjustable casement stay, arrange to lock the windows from inside horizontally at the centre, hung windows shall have spring catch designed for hand cord or pole operation as approved by the Engineer-in-Charge. The fittings to be fitted either by screwing to the window sections or to steel bracket welded to the window section as approved by the Engineer-in-Charge.

10.2.6 Galvanized weather bars shall be provided to sills of all windows.

10.2.7 Metal casement is on no account to build in at the time the walls are constructed. Holes to accommodate the fixing lugs are to be left or cut and the casement fixed after all rough masonry plaster works have been finished. The lugs of the casement shall be jammed in 1:2:4 cement concrete with stone chips after holding the casement in proper position, line or level.

10.2.8 Glazing for windows and ventilators shall weight not less than 8.0 Kg. /Sq. m for doors, 6mm. thick wire net reinforced glazing shall be used as approved by the Engineer-in-Charge. The glasses shall be cut to size accurately to suit all openings to glaze with slight margin of about 1.50mm. on all sides or as directed. These shall be securely fixed in position in the manner described earlier. On completion of the building, the Contractor shall clean all the glass and leave the same perfectly in a tidy condition.

10.2.9 The cost of marginal doors, windows and ventilations shall include supplying fixing, fitting, glazing cleaning, necessary scaffolding, staging etc. and shall be for the complete work in all respects to the satisfaction of the Engineer-in-Charge.

10.2.10 The Contractor shall without any extra charge, submit three sets of shop drawings from the manufacture showing full details of each type of doors, windows and ventilators including section, position of all fittings and fixtures for the approval of the Engineer-in-Charge before manufacture and finally six sets of approved final drawings with notes on the method of fixing.

10.2.11 The mosquito fly proof brass wire screen of approved gauge and mesh shall be used in combination with windows where required. The screen shall be fixed to the inside of the frames and the windows to be opened outside and be fitted with 'Folo operator' for opening to any position and closing. Additional intermediate members be fixed to the frames to receive the fly screen so that the clear span of the screen does not exceed 800 m or as approved by the Engineer-in-Charge.

10.2.12 All windows shall be provided with grills of approved design made of 25 mm x 6 rum M.S. Flats and the other clean openings not exceeding 100 mm.

10.2.13 The work for metal casements shall also include the cost of painting with 2 coats of ready mixed synthetic enamel paint of approved made, quality colour and shade over a coat of approved anticorrosive primer.

10.3 Collapsible Gate

The M.S. collapsible gates will be obtained from manufacturer as approved by the Engineer-in-Charge. These shall be of mild bar type, out of 20 mm. channels and shall be top hung with roller bearing and shall have locking arrangement. Collapsible gates under 2.700 m height shall be with 4 sets of lattices. Guide tracks shall be to the entire satisfaction of the Engineer-in-Charge. The gates shall be fixed in position, de-rusted, discalced and painted with 2 "coats of approved ready mixed paint over a coat of approved anticorrosive primer.

10.4 Rolling Shutter

10.4.1 The M.S. roller shutter shall be obtained from manufacturer as approved by the Engineer-in-Charge. The roller shutter shall be of 18 G x 75 mm galvanized mild steel lath of convex corrugation complete with one piece construction. These shall be fitted with pressed side guides and pressed bottom rail, brackets, door suspension shafts, top rolling springs (of strong English Continental Spring Steel Wire) with a four lever concealed lock as also separate locking arrangements for padlocks, pulling hooks, handles and top cover. The roller shutters shall be fixed in position with all accessories and the workmanship shall be to the entire satisfaction of the Engineer-in-Charge. This shall be finished with two coats of approved read/ mixed paint over a coat of approved anti corrosive primer.

11.0 STRUCTURAL STEEL WORK

11.1 All Structural Steel to be used for gantry beam etc. shall be of tested quality conforming to IS: 226 and IS: 2062 latest addition.

Finished steel shall be free from cracks, lamination and other visible defects. Section shall be adequately protected from rusting and scaling. Rivets and bolts, nuts and washers shall be of mild steel and comply with requirements of relevant IS Codes. Steel used for rails shall have tensile strength of about 50-60 Kg/Sq. mm. and yield point at 26 Kg/Sq. mm. The electrodes for welding shall conform to IS: 8l4. All steel work shall be fabricated and erected as per IS: 800 and IS: 806. Welding shall be carried out as per IS: 8l4, IS: 815, IS: 816 and IS: 820, all of the latest editions.

11.2 All steel work, after preparation of surface, shall be given a coat of red oxide zinc chromate primer (IS: 2074) and finished with two coats of Synthetic enamel paint. Surface to be painted shall be thoroughly cleaned of mill scale, oil grease, rust etc. over coating and finishing paints shall be of well-known make (vise Jenson & Nicholson/ Berger Paints/ Shalimar Paints). The Contractor shall furnish details of Paints to the Engineer-in-Charge for approval of paints before commencement of painting work.

11.3 Steel work shall be hoisted and erected in position in a safe and proper manner.

No riveting or permanent bolting shall be done until proper alignment has been made. For grouting, cement and clean fine sand shall be used in a proportion of 1:2 and properly mixed with water. All trapped pockets shall be fully vented for full penetration of grout. All grouting shall be cured for a minimum period of seven days.

12.0 CABLE TRENCHES

12.1 The cable trenches should normally be of dimension 750mm x 600 mm (D x W) with insert plates made of M.S. of dimension 100 mm x 75 mm x 12 mm (W x D x T) are to be provided on the wall side of the cable trench 600 mm apart all along.

12.2 The Cable Trenches shall be covered with pre-cast concrete slabs of dimension 650 x 600 adequate thickness to withstand a load of 500 Kg/m2 are to be provided as covers of trench all along. For easy access of cable from room to room, the design of the tie beam and level of the rooms may be adjusted to avoid bend in the cable.

12.3 The cable trenches shall be absolutely free from any obstructions as to allow the cables to be lowered in the trenches from top only during laying. The space inside the trenches throughout the entire lengths shall in no case be encroached by any beam or columns.

13.0 POCKETS & HOLDING DOWN BOLTS

Provision has also to be kept for pockets and holding down bolts as per requirement of the electrical and mechanical equipment's at no extra cost. The exact details of such pockets and holding down bolts will be supplied to the Contractor as per specifications of the suppliers of the equipment after award of the contract. It is contemplated that M.S. hangers shall be provided from the underside of slab/beam of the operating floor, and is to be executed in a separate contract. However, for the above arrangement suitable pockets and holding down bolts are to be left.

14.0 CHEQUERED PLATES ETC.

These shall be manufactured from structural steel conforming to IS: 226. They shall be of the specified size, thickness and pattern as per relevant drawings or as directed by the Engineer-in-Charge. Cover plates will generally be of Chequered plates with or without stiffeners as detailed in the drawings. Floor convenience, the Contractor shall prepare detailed floor plans of the layout of cover plates for floors and platforms so as to include all openings, cuts etc. and so as to match the patterns of adjacent cover plates/gratings. Where necessary, the floor will have to be made leak proof by properly welding cover plates. If necessary, packing shall 'be welded to the bottom of cover plates to raise the cover plates on sides, so as to provide necessary slopes as shown in the drawings or as directed by the Engineer-in-Charge in the floors and platforms to drain away any liquid failing on the floors and platform. Necessary gutters at the ends of platforms shall be provided for sloping floors and platforms as shown in the approved drawings or as directed by the Engineer-in-Charge. Krebs of flats shall be provided where necessary, around openings and cuts in order to prevent liquids falling to lower floors or platforms.

15.0 HAND RAILING

Double rows of 30 mm diameter G.I. tubular hand railing fixed in G.I. stanchions shall be provided on the edge of walkways and platforms as specified. The stanchions shall be fixed with mild steel rag bolts with chromium plated cap nuts. The stanchions shall not be less than 1000 mm. high and placed at a distance not exceeding 2500 mm. The hand railing shall be fixed true to exact line and level. G.I. stanchions and hand railing layout shall be of architectural design with pleasing appearance.

16.0 SANITARY INSTALLATIONS

16.1 The Urinals shall be of flat back, front lipped having a size of 46.5 cm. x 36.5 x 26.5 cm. or nearest available size. The Indian type W.C. shall be of minimum 58 cm. Complete with footrest in one piece.

16.2 All Sanitary works shall be of "Parry, "Neycer", or any other equivalent make. They shall be of approved quality conforming to relevant IS Codes and shall bear ISI Certification marks. All G.I. pipes shall be of ITC or equivalent make heavy quality conforming to relevant IS Code. Wheel valves and stop cocks shall be of gun metal and of "Leader" or "Annapurna" or equivalent make as approved by the Engineer-in-Charge and shall conform to relevant IS Codes.

16.3 Two urinals, one Indian W.C., one European W.C. (Commode) have to be provided in the toilet block.

17.0 MANHOLE COVERS

Heavy-duty plastic fibre reinforced concrete manhole covers shall be of heavy duty type conforming to IS: 1726.

18.0 TIMBER DOOR

The timber door shall be of 1st. Class CP Teak Wood for both frame (100 mm x 100 mm) and shutters (49 mm thick). All such doors shall be fully panelled. All timber shall be of best' quality, well-seasoned and/or well treated for prevention and protection against decay etc. It shall be uniform in substance, straight in fibres, free from large or dead knots, sap, flaws, sub cracks, shakes, or blemishes of any kind. Any insect damage or spoils across the grain shall not be permissible. The colour of the timber shall be uniform throughout, firm and shining with a silky lustre when placed and shall not emit dull sound when struck. The doors shall be made as per approved drawings and as directed by the Engineer-in-Charge and the timber shall

be sawn in direction of the grains and shall be straight and square. The door fittings shall be highly polished as per direction of the Engineer-in-Charge.

19.0 M.S. PIPELINES

M.S. Pipe lines in required lengths and should be spirally welded from reputed manufacturers and M.S. specials will be fabricated from the said MSSW pipe or from M.S. Plates cut to exact size and shape, bent true to curvature and welded using standard electrodes after necessary edge preparations. Both the inside and outside surfaces of the MSSW pipes and specials shall thereafter be thoroughly cleaned after de-rusting and brushing. The outside surface shall then be wrapped and coated with a protective coal tar based insulating tape of 4 mm. average thickness as approved over one coat of approved primer leaving 150 mm. on either end of pipes unwrapped. The inside-surfaces will be provided with 3 (three) coats of non-toxic paint over one coat of primer.

The pipes and specials will be lowered in trenches for laying only after testing the same with spark test by holiday detector so as to ensure that the pipes and special are free of holidays. The pipes thus lowered will then be interconnected by welding and the portions of 150 mm. width left unwrapped on either side of pipes will then the wrapped with said insulating tape.

The thickness of SWMS pipes and specials of up to 500 mm diameter shall be 10 mm and above 500 mm diameter shall be 12 mm thick.

20.0 P.S.C. PIPLINES / N.P.-2 CLASS PIPELINE

P.S.C./N.P.-2 Class Pipes will be laid on suitably designed 1:3:6 concrete bedding of 150 mm thickness. The pipes will join by rubber rings. Bends and specials will be of mild steel. The P.S.C./N.P.-2 Class pipes will be joined with M.S. special and machined ends will be wrapped and coated with an approved protective coal tar based insulting tape of 4 mm. average thickness over one coat of approved primer. The inside surface will be provided with 3 (three) coats of non-toxic paint over one coat of primer.

21.0 HAND OPERATED OVERHEAD CRANE

Provisions have to be made for a 5.0 M.T. capacity Hand Operated Travelling Crane (H.O.T.) suitable for inching operation with a lift up to motor floor level and cross travel of 12 M for handing pump, motor and other accessories. They shall be of reputed make as per vendor list and as approved by Engineer-in-Charge. Suitable type of crane rails, girders and all other accessories as necessary for installation and operation of the crane are to be designed and provided by the contractor within the Lump Sum pipe quoted. The two travels and two hoists i.e. long, cross & main Auxiliary etc. must be mechanical operation. The buffers must be spring-loaded operation. Suitable vertical clearance is to be provided over the rail level to the bottom of the roof beam.

22.0 SLUICE GATE/PEN STOCK GATE

Cast iron single faced Thimble mounted Sluice Gate/Pen Stock Gate will be designed as per IS: 13349-1992.

20.0 C.I. SLUICE VALVE

C.I. Sluice Valve conforming to IS: 2906-1869 suitable for water works purposes and as per requirements of the Clear Water Reservoir / Clear Water Pump Sump. The class of Sluice valves shall be class-I with maximum working pressure as per relevant IS standard.

24.0 C.I. COWL VENTILATOR

150 mm diameter Specially designed C.I. Cowl Ventilator shall be provided in the outer peripheral walls in between the underside of the reservoir roof and Top Water Level (T.W.L.) of the reservoir, in order to prevent breakage of the Cowl Ventilator, the same shall be encased with cement concrete of grade M 15 with nominal reinforcement as typically shown in the tender scheme drawing.

25.0 ARRANGEMENTS OR PLASTIC FIBRE REINFORCED CONCRETE MANHOLE COVER M.S. LADDER ETC.

25.1 Manhole Cover

Heavy duty plastic fibre reinforced concrete manhole covers with frame should conform to relevant IS Code. The clear opening for access to the M.S. Ladder for going inside the reservoir shall be 600 mm. and the overall dimension of the

heavy Duty Manhole Cover shall be specified by the Tenderer conforming to relevant IS Code. The manhole cover with frame shall be of 'Double Seal Type'. Location of manhole covers and frames are specified in the tender scheme drawing and the Bidders are to include the cost thereof in their offer.

25.2 M.S. Ladder

M.S. Ladder for going inside of the reservoir has been typically shown in the tender scheme drawing. The width of the ladder shall be 750 mm. with G.L. hand railing with M.S. angle posts. The steps of the ladder shall be provided with M.S. chequered plates with minimum 6 mm. in thickness. The rise and treads of the steps work of the ladder shall be provided with suitable anti-corrosive paints over two coats of primer as per manufacturer's specifications to be approved by the Department. There shall be 4 (four) numbers M.S. ladder in the locations shown in the Tender drawings.

25.3 Rung Ladder

Where over specified, shall be formed out of 20 mm diameter M.S. Rods. The rods forming Rung Ladder shall be properly bonded inside the R.C.C. walls. The spacing of Rung Ladder shall not exceed 800 mm. and the size of the rung formed shall be 800 mm wide x 150 mm deep. The rods are to be painted with anti-corrosive paint with suitable primer as per manufacturer's specification to be approved by the Department.

26.0 LEVEL INDICATOR (Manual)

One (1) Manual Level indicator shall be provided at the Pump Sump so that they can be visible from inside the operator's room in Pump House Building. The level indicator shall be manual type with PVC floor, guide wire, level indicator board etc. as per requirements. The arrangement of remote indications with display from inside the operator's room shall also be made. The arrangement and details to be get approved by the department.

27.0 LIGHTENTING ARRESTOR AND AVIATION LIGHT

Required sets of Lightening Arrestor and Aviation lighting arrangement shall be provided by the tenderer at the highest point or such places or of the Pump House Building conforming to the I.E. Rules specifications as per standard practice.

The job includes supplying, fixing and commissioning of sufficient no. of lightening arrestors which includes air-terminals, separate earth electrodes, grid earthing and individual earthing with approved size of air-terminals, earth electrodes, earthing strips as per IE rules/IS codes. Detail Calculations to be vetted by the department in the final design.

28.0 MOTOR FLOOR AND CONTROL ROOM

There must not be any column in the motor floor for easy movement of the HOT Crane. Similarly in the Control room cum office room, there must not be any columns in the room. The motor floor should have suitable openings at appropriate location as per requirement of the pump manufacturer for lowering and taking up of pumps, motors, valves, entry of cable etc. The motor floor shall be suitably designed to take care of the vibration generated from the motor pump assembly while in operation.

29.0 WRAPPING COATING

This work is to be completed in all S.W.M.S. pipe at ground level with 4 mm. thick coal tar based tape. Necessary 'Holiday Test' to be done to ensure perfection. This job is to be done before commencement of work of respective stretch.

30.0 TRIAL RUN

When in the opinion of the Engineer the initial performance tests as specified in Section- I are satisfactory the Contractor shall arrange for trial run of the plant at its rated capacity and also their performance tests. During such tests, the Contractor shall arrange to collect samples of effluents from the clarifier and representative. Samples minimum of SLX samples of each effluent shall be collected at intervals specified by the Engineer each day for 14 consecutive days. These samples shall be sent by the Engineer or his authorized representative to the plant laboratory or any other laboratory nominated by the Engineer, for analysis and determination of the quality of the two effluents. All costs of the sample collection, delivery to the laboratory and test shall be borne by the Contractor.

The Plant shall be deemed to be ready to be put into normal use when trial run of the plant and the quality of the clarified water and filtered water are certified satisfactory by the Engineer. The period of maintenance shall be reckoned from the date of the Engineer's certificate.

31.0 OPERATION AND MAINTENANCE

After the plant is deemed to be ready to be put into normal use the Contractor shall operate and maintain the same for a period of 5 (five) years by his own establishment and technical experts under the overall supervision chemicals and other consumable stores required for the operation of the plant shall be provided by the contractor at his cost. The Employer shall also bear the cost of electrical energy. During the aforesaid period of operation of the plant the Contractor's supervisory staff shall train and instruct technicians and other staff deputed by the Employer about the correct method of operation and maintenance of the plant as a whole and its various mechanical and electrical components. The Training shall be such as would enable the Employer's staff to take over the plant from the Contractor for its operation and maintenance independently. The Contractor's training personnel shall give special attention to this.

During the period of operation and maintenance the Contractor shall arrange to take regular samples of the clarified and filtered effluents as directed by the Engineer and shall have such samples tested at his cost in the plant laboratory or any other laboratory nominated by the Engineer, to determine the quality of the samples and the performance of the plant. Such tests shall be continued up-to the penultimate week prior to the end of the maintenance period and the plant shall be taken over by the Employer subject to the final performance tests being certified as satisfactory by the Engineer.

The Bidders shall submit with their offer a list of technical and non-technical staff they propose to engage for operation and maintenances of the plant for twelve months.

32.0 GUARANTEE PERIOD

The Contractor shall stand guarantee for the successful operation of the plant for 5 (five) years period from the date of the certified commissioning as stated in clause C-48 & 49 within which any defects and short coming due to faulty design of the plant, defective mechanical and electrical equipment or defective construction will have to be made good without any extra cost to the Authority. During the guarantee period the Contractor shall ensure thorough checking of the plant at least once every month and arrange for immediate rectification of any defects detected during this special drive by his experts.

33.0 GUARANTEES

The Contractor shall give the following guarantees

33.1 Civil and Structural Works

The Contractor shall guarantee the plant against any structural failure due to faulty design, bad workmanship, substandard materials, etc. for a period of twelve months. Any defect found during the guarantee period shall be rectified by the Contractor to the satisfaction of the Engineer without any extra cost.

33.2 Plant and Equipment

Even when a plant or equipment has been manufactured and / or marketed by a vendor, it would be deemed to have been supplied and installed under the contractor’s supervision. The Contractor shall provide back-to-back guarantee along with the vendor but shall solely be responsible for its repair/replacement. He shall not cite the vendor and claim absolvent. In addition, all equipment shall be free from any defects due to faulty designs, materials and / or workmanship. The equipment shall operate satisfactorily and performances and efficiencies shall not be less than the values guaranteed by the manufacturer and endorsed by the Contractor.

Formal acceptance of the work or equipment covered under the Contract by the Engineer shall not be made until all the work done by the Contractor has satisfactorily passes all tests required by the specifications.

If, during testing of work and / or equipment prior to formal acceptance, any equipment or materials shall fail in any respect to meet the guarantees, the Contractor shall replace such equipment in a condition, which will meet the guaranteed performance. Any such work shall be carried out by the Contractor at his own cost and expenses in necessity thereof, shall in the opinion of the Engineer be due to the use of materials or workmanship not in accordance with the Contract or to neglect or failure on the part of the Contractor to comply with any obligation expressed or implied on the Contractor's part under the Contract. If in the opinion of the Engineer, such necessity shall be due to any other cause, the value of such work shall be ascertained and paid for as if it were additional work.

If the Contractor shall fail to do any such work as aforesaid, required by the Engineer, the Employer shall be entitled to carry out such work by its own workman or by others and if such work is supposed to be carried out by Contractor the cost thereof, or may deduct the same from any money due or that may become due to the Contractor.

33.3 Treated Water Quality

The Contractor shall guarantee the quality of the clarified, filtered and disinfected water and these guaranteed results shall conform to the following:

i) Clarified water - The turbidity of the clarified water effluent from under normal design flow conditions and less than 20 ppm when under overload condition due to one of the clarifiers taken out of operation for maintenance, repair, etc., even when handling raw water at its worst condition i.e. at its highest turbidity level.

ii) Filtered and disinfected water - The quality of filtered and disinfected water shall be as specified in clause 12 hereinabove.

33.4 Wash Water Consumption

The Contractor shall guarantee that the wash water required for backwashing shall not exceed 3% of the total water filtered, based on the average working of the units over a period of the year.

34.0 IMPORTANT GUIDELINES AND SPECIFICATIONS

34.1 Unless otherwise specified elsewhere, the work shall be carried out as per the following specifications.

34.1.1 All civil works shall be carried out as per specifications contained in other section of these tender specifications.

34.1.2 All electrical works including supply of all electrical equipment shall be carried out as per specifications contained in other section of the tender specification.

34.1.3 All mechanical works including supply of equipment shall be carried out as per specifications contained in other section of these tender specifications.

34.1.4 The erection and commissioning works shall be carried out as per specifications contained in other section of these tender specifications.

34.2 A minimum free board of 500 mm shall be provided for all water containing structures viz., collecting well, flash mixer, stand wells, filter beds, channels, chambers, etc. unless otherwise specified elsewhere.

34.3 For the convenience and ready accessibility to the operating level, each unit of the treatment plant shall be so interconnected by walkways/gangways as will permit reaching one end of the treatment plant to the other by means of walkways/gangways without having any necessity to get down to the ground level.

34.4 Walkways and operating plant forms shall be provided with hand railings as specified in other section.

34.5 Roofs shall be provided with polyurethane paint.

34.6 All the exterior doors and windows shall be provided with R.C.C. chajja of approved design.

34.7 All windows and ventilators/skylights shall be provided with mild steel grills of approved design.

Specification of Additional works

1 . DI Pipe lines:

a) Laying D.I. pipes (All types & Class of different diameters) with specials including earth work in excavation in of adequate width as per relevant IS Code having minimum depth to keep the top surface of pipe 1.00M below of the existing ground level in any kind of soil mixed with boulder, metal crust, concrete pavement, road sub-grade and its flank etc., in position and carriage of materials from departmental store to work site, filling of the trenches with excavated materials, consolidating the same in layers, removing the surplus materials from site including all labour, tools and plants etc.
(Only the pipes and rubber rings, will be issued departmentally. The surplus and unused materials are to be returned to store at contractor's own cost.)

b) Laying of C.I. / D.I pipes & specials over brick or concrete pillar or wall upto height of 2m above ground level aligning assembling etc. all complete including cost of all sal-ballah staging, bamboo scaffolding tools & plants specials for hoisting and positioning etc. all complete as per specification and direction of E.I.C.

c)Cutting cast iron/D.I. (all types) by chisel/Hacksaw including rendering the surface smooth to make it suitable for rubber gasket/ rubber ring etc. complete as per direction of EIC. (for old line only).

d) Chamfering the spigot end of the C.I/D.I pipes for using in Tyton joints line or otherwise by means of electric grinder set at site as per directionof E.I.C

e) Cleaning thoroughly the inner surface of pipe line including special & valves by flushing with water & subsequently disinfection of the same pipe line by flushing again with water containing bleaching powder resulting in residual chlorine not less than 10 mg / Hr. after 24 hours of such filling including laboratory testing of water sample obtained from disinfected pipe line & disposal of water from the pipe line after completion of the work. The rate is including of cost of requisite water to be arranged by the Contractor.

f)Supplying& delivery at working site CIDF sluice valve conforming to IS 14846-2000 (ISI marked), withlatest amendment, including stacking and inclusive of Departmental inspection, packing charges, all taxes and duties as applicable and payable, Flanged drilled as per IS 1538-1993 with latest amendment all complete along with installation of the same as per direction of EIC.

(Approved make :Kirlosker/IVC/L&T/VAG/M&P/Upadhyay)

Class PN 1.0 with cap.(Sluice Valve to be supplied by agency)

g)Making flange joint to D.I pipes and specials and valves including dewatering of trenches, tools & plants,labouretc as per specification and instruction of E.I.C .

h)Hydraulically testing of different types of pipes in sections for a head of water not less than 1/2 (Half) thepressure recommended by I.S or corresponding pipe materials whether the gauge pressure will remain static for 30 minutes by filling water including supply of necessary equipment's such as generator sets, pumps gauges etc. All complete as per specification and instruction of E.I.C. [Water have to be arranged by the bidder himself and whole testing procedure will be accordance with as per IS : 3114 - 1965]

i) Hire and labour charges for 75 mm dia bamboo railing on Jhau / Eucalyptus or other approved timber / bamboo posts 1.4 m above GL and 0.6 m below GL including tying strongly with coir ropes and boring holes for posts in any soil/ concrete surface / Bituminous surface packing the sides etc. including cost of restoration to the damages of the ground to its original condition as per direction of EIC after removing barricade. 75 mm dia bamboo railing and 100 mm dia bamboo posts @1.4 mtr apart. railing with 3 rows.

j) Dismantling all type of masonry including cement concrete, stacking serviceable materials at site and removing rubbish as directed within a lead of 75m in ground floor including roof.

k)Cutting sub -grade of road (concrete bituminous carpeting & consolidated Ballast/brick soling&other sub-grade materials by means of chisels/Hammer other equipments (for trenches & laying of pipe line.)

l) Emergency horizontal road crossing by Auger-boring including boring charge, pipe laying and jointing, makingbarricades, lighting arrangement etc. all complete as per direction of E.I.C for 100 mm dia to 500 mm diapipes.(Including State Highways, National Highways and Railways crossing).

m) Construction of sluice valve chamber as per drawing supplied by concerned division or standard drawinggiven by contractor and approved by E.I.C with brick work in cement mortar (6:1) over 15 cm. of WCC (6:3:1)with supply of approved quality (Heavy type) C.I surface box embedded in 100mm thick removable slab in (4:2:1) including fitting, fixing and overhauling and instruction of E.I.C (Valves will be supplied by Agency).

n)Installation of CI Bolted collar as per IS 13382-1992 with latest amendment or end cap up to dateincluding all taxes & other incidental charges what so ever, carriage, loading unloading & stacking at working site.

2. Grade of concrete for different works: -

The grade of concrete for the collector well right from cutting edge, steining wall, working platformand up-to the floor of pump house shall be of M30 design mix concrete. Then onwards, the gradeof concrete work will be of M 25

The grade of concrete for the supporting piers, abutments, pier caps, pile caps, and deck slab / beams/ railings, etc. relating to the approach bridge will be as per relevant IRC / IS Code of practice.Execution of work shall have to be carried out according to the stated grade / mix on the approveddesign as per the relevant code of practice and specifications enclosed.

3. Cofferdam / Island:

In case of necessity, the cofferdam or Island may be constructed with an enclosure built around the location of the collector well or foundation well of each pier of gangway with timber/ ballah/ sheet piling whichever is found suitable to provide adequate space for carrying out the foundationwork. The space inside the piling work may be filled with earth and raised above the water level overthe bed to a height required for construction of the foundation work. The contractor shall quote hisrate keeping in the view of this provision.

The provision should include the cost of bailing out and pumping out water from the cofferdamduring laying of the foundation wells of collector well, piers and abutment etc. as required duringthe entire actual excavation or foundation work. The bailing out of water includes completedewatering by any convenient methods by employing pumping sets of required capacity inworking condition with all accessories to run the sets as required from commencement tocompletion of the work and until the foundation structure in completed all the trenches forfoundation shall be kept free from water till the concrete in foundation reaches initial setting.

The contractor on receipt of work order shall submit the drawings showing the details of his proposed method of construction of cofferdam or islanding and other design details for approval of the Engineer — in — Charge or the Departmental Designwing whenever necessary.

The cost should include the cost of construction and maintenance of any cofferdam, bunds, dams, canals or other devices necessary for diverting the flow of water on any such item of any sort whatsoever required to prevent water disturbing the work. No extra cost will be paid for any sand /earth / stuff of any sort which might find access by blowing or for any other reasons whatsoever from the sides or bottom of foundation or from elsewhere when dewatering operations are in progress. The contractor shall arrange for all necessary plants, pumps, engines and machineries tools and plants as required in this connection.The coffer dams constructed have to be maintained for more than one working season in the event the

foundation and substructure work being not completed in a single working season. He should keep provision in his quoted amount for reconstruction of cofferdam as per requirements for any subsequent working seasons, if necessary. No extra payment will be made for increase of work due to any additional requirements.

4. Cutting Edge:

Diversion of watercourse if necessary for setting out / casting / construction of cutting edge will have tobe done by the agency at his quoted amount. The mild steel to be used shall be "Tested" steel complying with IS: 226 — 1958 with latest amendment if any, for structural steel. The angle, R.S. Beams, channels.Tees, Flats, etc shall comply with IS 808 — 1957 with latest amendment if any.The cutting edge shall be fabricated of the exact shape and dimensions shown on the detaileddrawings. The steel section shall be bent cold to the required shape by making V-cuts in the horizontalportion at not less than eight places for a single well and at equal intervals along the length.

The V-cuts shall be then welded together electrically by gas welding bending steel section by heatingand forging is not permissible. If any reverting is done, the steel used for rivets shall comply with IS: 1148 specification with latest amendment if any, for rivets bars for structural purpose. Holes shall be drilled on the horizontal portion at the exact points shown in the detailed drawing forfixing the vertical ties rods of the RCC curbs. Except as otherwise specified herein the fabrication shall be done in accordance with IS: 800-1956code of practice with latest amendment if any, for use

of steel arc welding for general construction inmild steel. After fabrication etc. is completed, the cutting edge shall be conveyed to the spot where it is to belaid and which has been previously excavated to required level and nearly levelled. It shall be orientedand set in the exact position required.

The job includes all materials, plants, labour etc. required for the work. The fabricated cutting edge shall be lunched by the usual method as approved by the Engineer-in-charge to the site where it is tobe set. The rate includes welding (electric or gas), riveting, jointing cost of materials. The contractorshall have to arrange at his quoted cost and risk for procuring all the materials, steel sections as perIS specification and tested as per detailed design and drawing approved. No extra payment will beallowed for jointing, welding, reverting or 'wastage and the quoted rate must include all necessarysteel for fabrication including setting out the steel cutting edge at site for RCC curbs as per approveddrawing and design complete. The level at which the bottom of cutting edge is placed will be thesubsoil water level. It will be this level that payment will be made for sinking.

5. M-30 Grade Design Mix Cement Concrete:

The work shall be done as per clause no 301 to 322 of IRC code of practice and standard specificationfor road bridges, section No. — III fo r concrete work of this grade of concrete. Cement, course, fineaggregates and water provided by the contractor shall conform to the specification of clause No.301 to 322 of IRC code — III. The maximum size of course aggregate shall not be more than 15mm.

All materials shall comply with the standards laid down in IS: 456-2000 (Revised) with latest amendment if any, and IRC code of practice and standard specification for road bridge section — III. For the purpose of proportioning by volume 1 cum of cement shall be considered as to weigh 1440Kgs. (90 lbs / eft). The strength of concrete in work shall be determined from the result of tests onstandard 150mm work test cubes as per I.S:456-2000 (Revised) with latest amendment if any. Thetest specimen taken directly from batch concrete in actual use shall be compacted and cured under similarconditions.

The contractor shall furnish necessary concrete and the steel moulds for making the test specimen,materials and equipments and labour necessary for transportation. curing and storage and necessarytesting at Govt. recognized laboratory at his own cost. The minimum cube strength of the test cubestaken from the work concrete shall as per specification at 28 days and 7 days respectively. In case the overall strength of concrete is less than 70 percent of the desired strength, the corresponding work already done shall be liable to summary rejection and the contractor shall haveto replace the rejected work at his own risk and cost to the satisfaction of the Engineer — in —Charge.

In case the overall strength lie between 70% to 100% suitable reduction in cost may be doneby the Department as decided by the Engineer-in-Charge.

All concrete shall be thoroughly mixed in mechanically operated batch mixer of approved type andcapacity. Hand mixing of concrete shall not be permitted.

Concrete shall be deposited in condition horizontal layers in thickness not more than 400mm.

Notmore than one hour shall lapse between placing of next layer of concrete. Concrete shall be placedin its final position compacted and finished within 30 minutes of mixing the water and before settingcommence. The construction joints when required shall be made where location on plan are shownunless otherwise approved by E1C. Before commencing subsequent concreting, all loose particlesshall be removed and the surface shall be covered by thick cement mortar/ slurry. Before placing ofconcrete on hardened surface, it must be cleaned, roughened without dislodging coarse aggregate,thoroughly wetted and covered with 6 mm thick mortar layer composed of cement and sand in sameproportion as in the concrete for securing good bond.

During and immediately after placing the concrete, it shall be thoroughly compacted by using mechanical vibrators of adequate number to achieve compaction at the same rate of placing. Thefrequency of the vibrators shall not be less than 4500 cycles per minute, when operating under load.Ordinary method such on ramming tamping, rodding and slicing etc. with suitable tools shall beused as supplementary to mechanical vibrators only but not replace it.

Concrete shall not be placed during rain, high wind, dust storm and excessive heat. Concretingwhen continued beyond day light hours, the site should be sufficiently lighted.

6. Curing:

Curing shall be done by sweet portable water. Exposed surface of concrete shall be protected bycovering with canvas, straw etc. and kept moist by flushing or sprinkling water and shall continue notless than 14 days after concreting.

7. Form work and shuttering:

It should be so designed as prevent leakage of cement slurry from concrete and to maintain accuratealignment and surface as per relevant IS code of practice. Form work shall not be removed unlesspermitted by EIC and may be removed with adequate care when the EIC to permit to avoid damage tothe concrete.

The design of the forms of steining wall shall be such as to build the steining in the convenientnumbers of lifts not exceeding 1.5m in height. The height of each course of concreting shall beuniform so that height of steining at all points is same and thereby a level construction joint isassured. The steining of well to be built up shall be checked carefully with the help of straight edge. so as to ensure all the faces of the wall to be parallel to the vertical axis of the well. The contractorshall maintain adequate sets of form work to maintain adequate rate of progress.

8. Gauges:

Three gauge shall be provided at equal interval along the periphery on each well to show the height ofthesteining. Each gauge shall consist of 75 mm wide painted with enamel paint on outside face ofthesteining parallel to the vertical axis of the well. The zero of the gauge shall start from the bottomof the cutting edge. The gauge shall be marked very carefully at every meter height with sub-divisions of ten centimeter using a steel tape all along under the supervision of the EIC.

Permanent pillars or pegs along the two-perpendicular axis on all four sides of each well shall bemaintained well outside the zone of disturbance or sand blowing for facility of checking tilt or shiftof the well with progress of sinking of the well. One of the two axis must coincide with the centreline of the approach bridge from the collector well to the bank abutment. The lifts of the steining and that of the piers shall be so arranged as to attain same design datum height for each wells and piers.

9. Sinking of Wells:
Specification:

(a) This item includes sinking of wells for foundation through sand, loose boulders, silt clay softand hard moorum, and all such other similar strata to the required level as may be directed by

The Engineer — in — Charge including removal of excavated stuff, isolated boulders and trees logs or any other similar objects and adopting for this purpose suitable methods such as open dredging or technical grabbing by using winches including use of drop employing of drivers including pneumatic drilling for breaking and removing loose isolated boulders and all such other method of well sinking. The method to be adopted for sinking wells shall be first got approved from the Engineer-in charge. For any change in the method required during execution, the contractor shall first obtain the written

permission of the Engineer-in-Charge. Before laying the steel cutting edge, casting the

curb and commencing sinking open excavation shall be carried out in the river bed or bank or artificial islands as the curb and commencing sinking open excavation shall be carried out in the river bed or, bank or artificial islands as the case may be, so that the cutting edge is laid at the sub-soil water level or wherever possible below that level if the inflow of water is not enough to permit excavating below that level. Before commencing sinking of the well the level at which the cutting edges laid(which shall not be ordinary above the sub-soil water level) shall be recorded by the Engineer-in-charge or his representative in levelling field book and the entry counter signed by the contractor, his resident Engineer or his

authorized representative in taken of his acceptance. Sinking shall not bestarted till the concrete curb and steining to the required depth for the first stage have been cast, cured and allowed to attain the required strength.

The sinking shall be generally done by removing the materials inside the dredged holes and by applying kentledge when necessary. Dewatering of the well shall be discouraged and shall not be done unless (a) the well has been sufficiently sunk on has passed through a clay stratum, so that chances of tiles and shifts are minimized.

(b) Previous permission of the Engineer-in-charge has been taken, if there is any tendency to sandblowing dewatering shall be carefully observed for any subsidence which will indicate sandblowing. After the well has been sunk to long depth dewatering shall not be restored to unless grabbing chiseling, applying Kentledge etc. fail to sink the well. In this case, dewatering may be permitted up to maximum depression head of 6.0 m only. If a well gets struck and does not sinkby normal methods, water jetting on the outside of the steining may be done after obtaining permission of the Engineer-in-charge.

Utmost care shall be taken from the commencement of sinking operation to ensure that the wellis continuously kept perfectly vertical at all times and depths, checking frequently with plumb hanging on the inside surface. The materials from inside the well shall be methodically excavated evenly over the whole internal area, excavating first in centre and then working towards the circumference in all directions. The levels of the excavation in well shall be constantly checked soas to keep the bottom as nearly in level as practicable. It is of a great importance that the curb at the few metres lengths of well steining shall be kept perfectly vertical and never allowed to go out of place or plumb materially so as to assume subsequent sinking of well correctly to plumb and in the designed position. The removal of excavated stuff, isolated boulders etc. shall be carriedout as per the direction of Engineer-in-charge and shall be deposit at the place or places with all lead and lift in such a way as not to interfere with the free flow of water in channel. At all subsequent stages of the sinking the well shall be maintained in the true vertical position without any eccentricity from the designed centre lines as far as practicable. A temporary frame work shall be provided to guide the sinking in initial stages. The verticality shall be frequently checked with plumb bobs along the inside surface of the steining after first making sure with the help of straight edges that the steining itself is straight in a vertical direction. The maximum allowance of tilt and shift in well shall not exceed the following limits. The completed well shall not have:

i) A tilt more than 1 in 60 in any direction.

ii) A shift more than 200 mm at the top from designed vertical axis of the well in any direction. Any tilt and or shift beyond the permissible limit referred to above, shall be removed by all available means such as structure accepting Kent ledges railing by wire ropes or by any other approved method.

If under any circumstances, the tilt and shift exceed the above limit for any well, but do not exceed the extreme limits of 1 in 40 tilt and 400 mm shift in any direction.

If the tilt and shift exceed the above limit for any well, the well shall be liable to rejection at the direction of the Engineer-in-charge and or the shift more than the specification above, which cannot be corrected, the dimensions of the concerned well shall be suitably increased so as to cover completely the well top and also allow the pier to be located symmetrically on the well cap provided that the stresses at the foundations of the well can be brought within the permissible limit by suitably shifting the position of the pier to overcome the effect of tilt and shift.

No payment for any increase in the dimensions of the well cap and M.S. reinforcement herein shall be made. If even with adjusted location of the pier and increased dimensions of the well caps, the stresses at the foundation level due to tilt and /or shift cannot be brought within permissible limits, the contractor shall rectify the well or reconstruct the same at his own cost. In this event, the contractor shall also bear the extra cost resulting from any change in the design, span length etc. due to such fault of well. The cost of the cement and steel supplied to the contractor and used in the rejected well as inthe new well laid in its place shall be recovered from him.

Every well started during any working season must be completely plugged, filled with sand and sealed with top plug and well cap at the top within that working season so as to be safe from flood and tides as far possible. If the sinking of the well up to the designed or required level, plugging it at bottom and top, sand filling and concreting the well cap can not be completed in one working season the following 'precautionary measures shall be taken by the contractor at his own risk and cost.

All exposed reinforcing bars shall be carefully down along the steining and temporarily

embedded in lean concrete 1:4:8.The dredged area shall be filled up with the sand right up to the top of the well staining at no extra cost and suitably covered up with adequate wooden planking or by any other method approved by the Engineer-in-charge.

The above measures shall not however, absolve the contractor from any responsibility in the event of any damage occurring to the incomplete well and he shall have to rectify the same at no extra cost, to the entire satisfaction of the Engineer-in-charge.

The foundation levels as shown on the detailed drawing are tentative and are not taken as firm but are liable to alteration by Engineer-in-charge depending upon the actual site condition by ones ands required by the circumstances. The decision of the Engineer-in-charge regarding the foundation and its variety one during deduction of the work shall be binding on the contractor.

10. Measurement of well sinking: -

Sinking of well shall be measured in meters correct to 5 mm from the water level at the time of casting the curb or from the level at which the bottom of cutting edge is laid initially whichever islower, to the bottom of cutting edge in final position. The water level at the time of casting the well curb and the bottom of the cutting-edge level shall be kept recorded by the department duly countersigned by the contractor.

In case the well curb is cast on island or at higher level than the water of the bed due to unavoidable reasons, the sinking of the well will be counted from the initial level of the cutting edge to final level reached by the bottom of the cutting-edge initial level of the cutting edge shall be taken as zero level in this case.

All the cost of materials, labour, machinery and other equipments shall be included in the quotedrate under specification.

11. Well plugging:

The well plugging of the collector well is of vital importance and the plugging of the bottom of the collector well need be so done that complete dewatering of the well can be done after completion of plugging to enable working men to push the strainers into aquifer at pushing from inside the dewatering well safely. The well plugging therefore shall be of adequate thickness made of M20.

The contractor shall show the detailed designed calculation to justify the thickness of well plugging to be provided in well. In addition to this plugging by mass concrete under water, an RCC raft concrete of adequate thickness shall be laid over the plain concrete well plugging to make the well perfectly water proof. This RCC raft shall be inserted into a previously kept pepiherial groove of adequate horizontal depth and of height to accommodate the full thickness of the raft duly designed to withstand the upward pressure it will likely to resist at the time when the well is kept empty inside. This RCC raft also shall be of M30 (design mix).

Port holes at appropriate level of required size / dia. and spacing has to be kept in the steining of well as per drawing / direction of EIC. Testing of water tightness of the well from inside the well in phased manner under normal condition of water outside. Any leakage if detected has to be rectified by the contractor by suitable method. He should keep provision for all these works including cost of materials, labour and tools and plants in his quoted rate / amount. Dewatering the collector well at the time of high flood should not be done.

12. Casting of piers over pile foundation.

The piers of each well foundation caps are to be constructed with required reinforcements and grade of concrete as per IRC / IS code of practice and approved designed drawings. Cost of all materials, tools and plants, labour and equipments and reinforcements, scaffolding, centering, shuttering, vibrating curbing etc shall be included in his quoted rate / amount. Measurement to be taken in cubic meters.

13. Pier caps

Pire caps over each pier shall have to be constructed as per approved detailed design and drawings are as per relevant IRC / IS code.

14. Abutment wall and wall cap: -

Abutment walls and wall cap shall have to be constructed as per detailed drawing using grades of concrete as provided for different components including providing seepage holes and placing filter media behind each hole for easy passage of seepage water including foundation excavation shuttering shoring bailing out of water etc. all complete within the rate quoted by the contractor as per IRC /IS code including labour& materials.

15. Steel / Tor steel reinforcement.

The relevant clause of the standard specification of steel for concrete reinforcement of IS: 432 —1960 and 456 — 2000I,e SAIL ,TATA TISCON or RINL sh all be applicable as per detailed drawings of each RCC work to be done for each components of the collector well, pile foundation, piers, abutment, superstructure of approach bridge, etc. including transporting, placing, assembling, tying with wires, cutting to sizes, hooking bending & embedding in concrete including cost of labour, materials and tools and plants. Fixing and binding of rods with 16-gauge wire shall from enough to keep in position during lying and vibrating. Adequate cover shall be maintained by using precast mortar blocks of appropriate size and mix. Measurement shall be taken on the basis of weight derived from length of MS bars actually placed with nos. of laps and hooks as per design and drawing approved by EI. Weight of binding wire shall not be counted for measurement for payment.

16. Earth filling behind abutment.

Earth filling shall be done with good earth available from borrow pits. Filling shall be done in layers not exceeding 30 cm and it will be watered adequately, all rammed and consolidated. No lumps, clods or rubbish are to be used. The cost of transportation of excavated earth, filling in layers, flooding with water, levelling, compacting etc. shall be included in his quoted rate amount.

17. Filter Media behind weep Holes of abutment:

The backside of the weep holes of abutments shall be filled with black, hard stone of 40 mm size as per drawing for easy draining of seepage water from the back fill. The cost shall be included in his quoted rate / amount.

18.0 Bearings of steel Bridge and steel super structure of approach Bridge.

The superstructure of the approach bridge shall be of simply supported steel trusses or R.S. Joists as required and shall rest over the piers on bearings as per standard method, approved detailed drawing and relevant IRC / IS code of practice. Hoisting, fixing, holding the truss / beams is to be done carefully with approved type of hoisting machine, and tools and plants for safe hosting and fixing. Once the trussis hoisted, it has to be fixed with holding down bolts and restrained by fixing with horizontal member of beams and bracings top and bottom to prevent any lateral movement thereafter. Any accident if caused due to negligence in proper hoisting arrangement and fixing in position, the contractor is liable to compensate the damage of structure or life of working men at site at his risk and cost. The execution of the steel superstructure has to be done as per approved detailed drawings and relevant IRC / IS code of practice.

The deck slab may be precast R.C.C. slab or cast in situ R.C.C. of adequate thickness and duly reinforced to carry the loads it has to sustain during transportation of pumps and other machineries and also day today dead and live load and other types of loads that may act upon it.

The quoted rate / amount should include all the cost of materials, labours and tools and plants needed for the execution of the work.

Straightening.

All structural steel members and parts shall have straight edges. All straightening, shaping and levelling etc. shall be done by pressure only and not by hammering. All joggles and knees shall be formed by pressure and where practicable in making these, the metal shall not be cut and welded.

Cutting:

All structural steel parts where required shall be sheared, roped, sawn or flame cut and ground accurately to the required dimension and shape.

Bolt Hole:

The diameter of bolt holes shall be 1.5 to 2 mm. larger dimensional diameter of bolts. All holes or bolt shall be drilled unless permitted by engineer in Charge (EIC) for punching the holes. Care shall be takenthat surrounding materials is not deformed or damaged in case punching the hole is allowed.

Welding:

Welding of steel conforming to relevant I.S specification shall be in accordance with general requirements of metal and welding. In addition to general requirements, the following care should be taken.

a) The welding shall be positioned for down wards whenever practicable.
b) The welding current shall conform with respect of voltage and amperage to the

recommendation of the manufacturer of electrodes being used. The length arc voltage and amperage shall be situated to the thickness of materials, the type of grooves and other circumstances required for the works.

c) The surface to be welded and the surrounding materials for a distance of at least 155 mm. shall be free from scale, dirt, grease, paints, heavy rust or other surface deposit.

d) Members to be welded shall be held in correct position by holes, clamps, wedges, jigs or other suitable devices or by tack welding until welding has been completed. Such fastening may be used shall be adequate to ensure safety. Suitable allowance shall be made for warpage and shrinkage.

e) Tacks welds located where the final welds will latter be made shall be subjected to same quality requirement as final welds, defective and broken tacks weld shall be removed before final welding.

f) Fusion faces shall be cut by shearing, chipping or machining or by gas cutting.
g) Exposed faces of weld shall be made reasonably smooth and regular so as to conform as closely As practicable to design requirement and shall not be of less than required cross section.

h) Welds showing slag or lack of proper penetration shall be cut out or rewelded.

i) Finished welds and adjacent parts shall be protected with clean boiled linseed oil after all slag has been removed.
Safety precaution:

a) Operators of welding and cutting equipments shall be protected from the rays of arc flame by glovesand by helmets, and hand shields or google's equipped with suitable filter lenses.

b) Closed space shall be ventilated properly while welding or cutting is being done therein.

c) Welders should be provided with such stages as will enable them to perform the welding operation. For site welding shelter to be provided to protect the welders and the parts to be welded from weathers. The contractor shall employ a competent welding supervisor to ensure that the standard of workmanship and the quality of materials comply with requirements laid in this specification.

The contractor shall provide free access to the representative of EIC / consulting engineers to the work being carried out at all reasonable times and facilities shall be provided so that during the courses of welding he may be able to inspect any layer or weld to metals. He shall be at liberty to reject any materials that does not conform to the terms of the specifications and to require any defective welds to be cut out and rewelded. The representative of the EIC / consulting Engineer shall be notified inadvance of any welding operation. Inspection and testing of welds shall be done as laid down in IS 822 and IS 1024.No welder shall be employed in any position except those who are fully qualified to weld. Qualification for welders shall be as laid down in I.S. 817.

Joints:

All steel work intended to be bolted together must be in contact over the whole surface. Joints which haveto compressive stresses and the ends of all stiffeners shall meet truly over the whole of the huffingsurface and bear tightly top & bottom.

19.0 Drilling operation for radial slotted pipes.

The nonreturn sand valve is to be first welded to the first joint and then welded to the bullet head. The compressed air pipe with an air valve is then pushed through a plate fitted inside one end of the pipe through the sand valve into the bullet head. Two electrically operated jacks, carefully aligned in line and led into the stainless steel. port hole are now operated to push the pipe, when about 600 mm of the pipe is stillin the well a second pipe is welded. Another entire pieces of compressed air pipe is screwed on and jacks are realigned in the second pipe to push it. The bullet head punctures the timber plate previously fixed and 50 mm concrete cover and comes out into the aquifer. Now compressed air is forced into aquifer through big holes in the bullet head agitating the aquifer. As the air is switched off and the air valve is opened at the well end, the built-up pressure around the bullet head forces pipes in reverse in the compressed air pipe and they came out into well. A small push of 75 mm is again applied by the jacks and the process is repeated with compressed air until about 0.3 cm3of materials is removed with a push of1 m or until the same stops coming into the well whichever is earlier.

The process serves two purpose (i) to facilitate pushing the pipes due to loosening of aquifer and a filter is created around the pipes for free flow of water through the loosen aquifer. As each piece of pipe is pushed another piece having next serial no. and of same length is welded to continue the processuntil a radial length of about 40 m. (slotted) + 10 m (blind) =50 m is reached through each port hole.

In order to know the strata through which the radius passes, the contractor will have to make 4 test boresof 100 mm dia. around the periphery of the well and at a radial distance of 20 m.

The bore shall be drilled to the proposed depth of radials manually and not by machine. The materials extracted from the bores shall be collected at every meter depth and preserved in small plastic bags weighing approximate 2(two) Kg. A slip of paper showing the number of the test bore and the depth at which the sample was gathered shall be placed in the bag.

The writing shall be in indelible ink. These bags with materials duty labelled shall be handed over to the EIC in 3 sets. The second one for the client and the third for the contractor. The cost of these four test bores shall be included in the rate of per meter of driving the stainless steel lateral and no separate payment will be made on this account. Payment for driving shall be made for exact length of pipe driven from inside the well to the front tip of the bullet head.

20.Fabricating, supplying and welding non-return sand valves in the front end of first slotted pipe:
This one-way valve prevents sand coming through the big holes in the bullet head. The circular plate must be so welded at right angle to the slots of slotted pipes that the flap of the valve open towards the bullet head and when the compressed air pipe is withdrawn from the bullet head, the flap automatically close preventing sand from going further into the slotted pipe and then into the well. The flap must move freely around the pin and the whole assembly must be accurately fabricated as shown in the designed drawing submitted by the tenderer and approved by the EIC. The cost of this work including materials and labour shall be inclusive in his quoted rate under proper item in the schedule.

21.0 Supplying fitting 400 mm dia. sluice valves etc.

These valves are fitted on the flange inside the well of the M.S. port holes for facility of closing or opening of any specific or all at a time whenever it is so required. They must conform to class — I of ISS 2906 of 1969 with double flanges with non-rising forged high tensile bronze spindle. They must have SI certification mark and shall be perfectly water tight, when closed under working condition. The rate will include stock head on operating platform and hand wheel, long connecting (extended spindle) rod connecting the head stock down to the sluice valve supplying fitting fixing of clamps, bushes and universal couplings etc. for smooth operation of the valve from an intermediate platform about 2.00 meterbelowthe pump house floor. The cost of materials and labour should be included under proper item of theschedule. No separate payment shall be made.

Executive Officer
Burdwan Municipality

SECTION – F

TECHNICAL SPECIFICATIONS FOR ELECTRICAL MOTOR WORKS

1.0 GENERAL:

The specification covers the design, manufacture, testing, supply erection and commissioning of the electrical motor for the Pump House Of Infiltration gallery used in pumping station at Intake system etc. of Burdwan at Purba Burdwan. The equipment shall be designed and manufacture and tested in accordance with latest I.S specification and code of practice published by the Bureau of I.S whenever available. The Electrical equipment shall also conform to latest I.E Rules as regard safety, earthing etc.

System particulars:

- Voltage 415 Volt ± 10%
- Frequency 50 Hz ±3%
- Climatic condition Tropicalized, Humid & Dusty
- Max Ambient Temp. 45 degree centigrade
- Annual Rainfall 100 mm (approx.)
- Elevation within 81 M MSL

2.0 MOTORS

2.1 This specification covers the general requirements of the drive motors.

2.2 Motor shall be furnished in accordance with both this general specification and the accompanying driven equipment specification.

2.3 In case of any discrepancy, the driven equipment specification shall be given.

3.0 STANDARDS

3.1 All motors shall conform to the latest applicable IS/BS/DIN publications. All the motors should be of ESF-1 category with an efficiency range of 96% and above.

3.2 The Motor shall be suitable for operation is hot humid, tropical atmosphere in polluted area.

3.3 Motors shall be deemed to be installed outdoor and exposed to 100% humidity constantly. The effect therefore shall be considered in the determination of the design.

3.4 The drive electrical motors shall be of squirrel cage induction type horizontal/Vertical axis to suit the size of the pump and shall be able to drive the pumps. The rating of the motor shall not be less than (for horizontal pumping unit 10-15 % of the pump BHP, for vertical pumping unit 20 – 30 % 0f the pump BHP) of 415 V±10%, 3 phase, 50 Hz±3 %, designed RPM (Synchronised) and also suitable for drive the pumping units.

3.5 All the motors shall be rated for continuous Duty operation (Duty:S1 as specified in IS 325 1978).However, due to the operational schedule of the pumping station , the pump motor unit may demand for 8/10 start and stop in a day with minimum time gap of 20 minutes for one stop after prolong operation and restart the same. The motor shall also be capable of one immediate hot restart and three equi-space starts per hour. The motor shall also be suitable for long period of inactivity.

The motor characteristic shall match the requirements of the driven equipment so that adequate starting torque, accelerating, pull up, break down and full load torques are available for the intended service. It shall be drip and splash proof protected and well ventilated/ Totally enclosed fan cooled

3.6 The motors shall be capable of working satisfactorily at full load for 5 minutes without injurious heating at 75% rated voltage at motor terminals.

3.7 Motor shall be designed for Autotransformer/Star-Delta/Direct on line starting device of 60% or 85% of full voltage. Starting current shall not exceed 2 to 3 times full load current for all auxiliaries subject to tolerance (IS)

3.8 Motor shall be designed for Star-Delta starting device of 57.7% of full voltage. Starting current shall not exceed 3 to 4 times full load current for all auxiliaries subject to I S tolerance.

3.9 Motor shall start with rated load and accelerate to full speed with rated voltage and accelerating time of the motor should not be more than 2 to 3 second.

3.10 The locked motor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 sec .

3.11 All motor enclosures shall be screen protected (SPDP)/ Totally enclosed fan cooled (TEFC) and conform to the degree of protection IP55

3.12 The stator windings shall be of class F insulation to ensure trouble free operation in an atmosphere where the relative humidity shall consistently be near to at 100%.The stator windings should have uniform machine wound single/ double layer formed coils with electrolytic grade copper conductors (99.9%)

3.13 The stator core is to be built up on low loss cold rolled dynamic grade laminated steel sheet insulated from one another by a thin layers of high heat resistant varnish-ventilated are to be provided to increase the cooling efficiency in the core protection.

3.14 Two numbers of axial fans are used and proper gap at the top and bottom of the motors for easy air exist. The motors are to be dynamically balanced with all the fans and with full key in the shaft extension, if required.

3.15 Motors shall be provided with antifriction bearings grease lubricated at both ends. Bearings shall be provided with seal to prevent leakage of lubricants or entrance of foreign matters like dirt water etc. in to the bearings area.

3.16 Grease lubricated bearings shall be pre-lubricated and shall have provisions for in service positive lubrication with drain to guard against over lubrication. Lubrication shall not detoriate under all service conditions. The lubricants shall be limited to normally available type IOC or equivalent.

3.17 The motors (above than 75 KW) are to be provided with 10 nos.+2 nos. platinum type resistance temperature detector PT100 type. The leads of this RTD's and BTD's are to be brought out in a separate terminal box. Over voltage fuses are to be provided for each RTD' & BTD terminals for connecting the alarm & trip connection.

3.18 The noise level shall not exceed 5 micron at 1.5 M away from the motor in full load condition. The peak amplitude of the vibration shall be within IS specification (IS: 11724) limit.

3.19 Motor terminals box shall be detachable type and located in accordance with IS. It should be suitable for terminating 2 nos. 1.1 KV grade PVC (AL) conductor armoured cable along with the lead cable for P.F improving capacitor may be connected, if required. No compound should be used in terminals box for easy handling. The terminals box shall be capable of withstanding maximum system fault current for duration of ¼ th. Cycle. The terminal box shall be clearly identified by phase markings with corresponding direction of rotation marked on the non-driving end of the motor.

3.20 The motor should have provided with ratchet mechanism to prevent reverse direction of rotation.

3.21 The frame of (higher rating as per IS motor) Motor shall be provided with space heater suitably located for easy removal or replacement. The space heater shall be rated 240 Volt single phase 50 Hz and size to maintain the motor internal temperature above dew point when the motor is idle.

3.22 The frame of each motor shall be provided with separate and distinct grounding pads complete withtappedhole, GI bolts & washer. The grounding connection shall be suitable for accommodation of ground conductor 50 X 6 or 25X 3 mm GI flat.

3.23 Motor shall have drain plug so located that they will drain the water, resulting from the condensation or other cause from all pockets of the motor casing.

3.24 Motor shall be provided with eye bolts or other adequate provision of lifting.

3.25 The motor frame shall be designed to permit easy access for drilling holes through motor feet or mounting flange for installation of dowels pin after final alignment of the motor and driven equipment.

3.26 The rating plate of the motor should be containing clearly output in KW, stator voltage, stator connection, stator current, frequency, RPM, at full load temperature rise, type of motor name & year of manufacturing, name of manufacture, numbers of pole, slip, and weight of the motor etc.

3.27 Motor including fan shall be painted with corrosion proof paint.

4.0 CHECK LIST OF THE MOTORS BEING OFFERED

(To be submitted by the successful bidder before issuing the work order)

General

1.	Manufacture	:
2.	Rated output in KW /HP	:
3.	Numbers of pole	:
4.	Speed	:
5.	Numbers offered	:
6.	Approx. weight of the motor	:
7.	Painting	:
8.	Earth terminal lifting lug provided	: Yes / No
9.	Type of enclosure	:
10.	Installation	: Horizontal / Vertical
11.	Shaft orientation and mounting	:
12.	Degree of Protection	:
13.	Technical leaflet /literature provide	: Yes / No
14.	Type of duty & duty designation	:
15.	Whether the motor is capable for Operation after one hot restart And/ or equi-space hourly restart	: Yes. /No

Supply condition

16.	Rated Voltage (Volts)	:
17.	Allowable Variation of voltage (%)	:
18.	Frequency (Hz)	:
19.	Allowable Variation of frequency (%)	:
20.	Number of phases	:
21.	Stator connection	:

Currents

22.	Full load current	:
20.	No load current	:
24.	Starting current (%) of full load current	:

Efficiency

25.	Full Load Efficiency	:
26.	Efficiency at 75 % of load	:
27.	Efficiency at 50 % of load	:

Power Factor

28.	Full load power factor	:
29.	No load power factor	:
30.	Power factor at 75 % load	:
31.	Power factor at 50 % load	:

Method of starting

32.	Direct on line start	:
33.	Star-Delta start	:
34.	Auto-transformer start	:

Torque

35.	Starting Torque (% of full load Torque)	:
36.	Maximum Torque (% of full load Torque)	:

Acceleration time (Second) from dead stop

37. with 100% Terminal voltage :
38. with 85% Terminal voltage :
39. Safe stall time :

Class of insulation

40. Reference Temperature (Ambient) Degree Centigrade
41. Temperature rise in Degree Centigrade by Resistance method & class in which limited:

Space Heaters (Present or Not)

42. Number
43. Rating (watt)
44. Voltage, phase& frequency
45. Whether separate terminal box provided for:

Bearings

46. Driving end
47. Non Driving end
48. Anticipated life (hours)
49. Recommended lubricants & Qty.
50. Whether separate lubricant nipple provided
51. Interval of lubricant hours

Winding &Bearing Temperature Decoder

52. Whether separate Terminals box provided or not

5.0 DRAWINGS, DATA& MANULS

After award of the contact for approval:-

- Dimensional general arrangement drawings.
- Foundation plan and loading
- Cable end box details
- Space requirement for rotor removal.
- Thermal withstand curve hot & cold.
- Starting and speed characteristics curve at 80% & 100% voltage.
- Complete motor data.
- Erection and maintenance manual.

6.0 TESTS

Testing at factory:

Upon completion, each motor shall be subjected to standard routine tests as per IS .In addition, type test of at least 50% of order number and as per choice of the consumer, shall be performed. Further any special tests called for in the driven equipment specification shall be performed. The manufacture/Tenderer has to bear all expense for such testing to witness the test for maximum two representatives (not bellow the rank of SAE) of the dept. to the manufacturer premises within shortest possible time. Six (6) copies of routine and type test certificate shall be submitted for approval prior to despatch of the motors from the manufacturer factory.

Checking before installation

Check clean and dry
Air gap check
Tightness of fastener (nuts, bolts, locking clips)
All safety guard

Earth connection lead

Lubrication points
Paint finish
Ventilation path fitters etc. are to be checked.
Correctness of name plate and diagram plate
Motor terminal box
Coupling and driving unit.
BTD and RTD Terminal box check.

This specification covers total Motor unit used in the Intake Pump station.

Executive Officer
Burdwan Municipality

SECTION – G

TECHNICAL SPECIFICATION OF PUMPS

1.0 SCOPE

The wet pit raw water pumping station is to be designed for feeding the ongoing water treatment plant. The pumping units of the single root will have to be single common delivery manifold. From common manifold the delivery line connected with rising main after placing a butter-fly valve and a temper proof kinetic air release valve. Three nos.(2W+1S) pumping units shall have to be installed in the pumping station of individual capacity 660 M^3/hr and head decided by the bidder as per actual length & dia. of pipe, Level difference etc.

System particulars:

- Water — Raw water mixed with river sediments
- Temperature — 25 degree to 30 degree
- Sp. Gravity — 1.005
- Elevation — within 81 M MSL

2.0 Standard

The specification covers the design, manufacture, testing, supply erection and commissioning of the Vertical Turbine pumping unit for the Infiltration Gallery pumping station of Burdwan at Purba Burdwan District. The equipment shall be designed and manufacture and tested in accordance with latest I.S specification and code of practice published by the Bureau of I.S whenever available.

1.0. VERTICAL TURBINE (VT) PUMP

The Infiltration Gallery pumping station is to be designed three (3) pumps normally two (2) pumps will be working while the remaining pump will serve as standby. Delivery of all pumps of pumping station is to be fed to a common delivery manifold.

3.0 DESIGN

The design, manufacturing, performance of the vertical execution pumps as specified hereinafter shall comply with the requirements of applicable codes, the latest applicable Indian/ British/ American/ DIN standards, in particular and in that order of application, the following IS15 Vertical turbine for raw, cold water

3.1. The materials of the various components shall be as per data sheet or equivalent material conforming to applicable IS/ BS/ ASTM/ DIN Standards in that order of application.

3.2. In case of any contradiction between the aforesaid standards and the stipulations as per the technical specification as specified hereinafter, the stipulations of the technical specification shall prevail.

3.3. In case of contradiction between this specification and the pump data specification sheets enclosed, stipulations of the data specification sheets shall prevail.

4.0. PERFORMANCE REQUIREMENTS

4.1. The pump shall be designed to have best efficiency at the specified duty point. The Pump set shall be suitable for continuous operation at any point within the 'Range of Operation', so as to match with the system resistance curve.

4.2. Pumps shall have continuously rising head capacity characteristics from the specified duty point towards shut off point, the maximum being at shut off.

4.3. Pumps of each category shall be suitable for parallel operation. The head vs. capacity, the B.H.P vs. Capacity characteristics, etc., shall match to ensure equal load sharing and trouble free operation throughout the range. In the event of tripping of one of the operation pumps, the operated pumps shall be capable of passing the maximum

flow through it as dictated by the system resistance corresponding to both maximum and minimum water level of River Damadar.

4.4. The pump motor set shall be designed in such a way that there is no damage on account of any reverse flow through the pump which may occur due to any mal operation of the system.

4.5. Where reverse flow through the pump is specified in data specification sheets, the drive motor shall be capable of bringing the pump to its rated speed in the normal direction from the point of maximum possible reverse speed without injurious heating, when power to the motor is restored with a minimum voltage of 90% at the motor terminal.

4.6. External head that may be imposed on the pump under reverse flow condition is to be decided by the Bidder after analysing the complete system and the particular abnormal condition of run. However, any specific requirement as mentioned in the Pump Data Sheet shall be adhered to Torque-speed curve for pump and motor for such reverse flow condition shall have to be submitted along with the offer.

5.0. PUMP (SELF LUBRICATED)

Bowl assembly: The Bronze bowl shall be flanged type construction of closed grained materials conform to latest I.S.S. They shall be free from sand holes, blowholes, or other fault and must be accurately machined and fitted to the close tolerance. The shall be capable of withstanding a hydrostatic pressure equal to twice the pressure at rated flow or 1.5 times shut of head which will be greater. The intermediate bowls shall have enamel or epoxy lined waterways for maximum efficacy and wear protection. All intermediate bowl shall be of identical design for interchange ability. A discharge bowl shall be used to connect the bowl assembly to the discharge column. All the bowls (include the discharge bowl) shall be fitted with sleeve type bearings of bronze alloy.

Impeller: The impeller shall be constructed from ASTMB584 silicon bronze and shall be the enclosed (or semi open) type. They shall be free from defects and must accurately cast, machined and filed for optimum performance and minimum vibration. Impeller shall be balanced to grade G6.3 of ISO 1940 as minimum. They shall be securely fastened to the bowl shaft with taper locks of C1018 steel.

Suction: The suction bowl shall be provided with non-soluble grease packed bronze packed bronze bearing from abrasives in the pumping fluids. The bearing housing shall have sufficient opening at the bottom for easy removal of the bearing.

Shaft: The bowl shaft shall be constructed from ASTM 582 type 416 SS. It shall be precision ground and polished with surface finish better than 40 RMS.

6.0. COLUMN ASSEMBLY-WATER LUBRICATED FOR VT PUMP

Column Pipe: The column pipe shall be furnished in section not exceeding a normal length 3.10 Meter (10 Ft) and shall be connected by threaded-sleeve couplings. Pump speeds between 1450 rpm shall have intermediate column length and bearing spacing no greater than 1.5 Meter (5 Ft). The pipe shall be of MSERW and weight shall be not less than schedule 30. The end of the pipe shall be with 8 threads per inch with 3/16" tapper per foot thread and faced parallel to butt centring spiders .The inside of the such that minimum head loss occur as per IS Specification.

Line Shaft: The line shaft shall be of stain less steel, ground and polished with surface finish as per standard specification. They shall be furnished in interchange ability facility and shall be coupled with threaded steel couplings machined from solid steel bar. It shall have left hand thread to tighten during pump operation condition. The shaft shall be provided with stainless steel sleeve to act as journal at each bearing location. The sleeve shall be placed on a full size shaft without under cutting and secured in position by a suitable adhesive.

Bearing: Bearing shall be fluted rubber retained in the cantering spider by a shoulder on each end on the bearing.

7.0. DISCHARGE HEAD ASSEMBLY – WATER LUBRICATED (SELF)

Discharge Head: It shall be of the high profile type to allow shaft coupled above stuffing box and provide for mounting the driver and support the column pipe and bowl assembly. It shall be of high grade cast iron or fabricated steel. It shall have a NTP (½") connection for a pressure gauge.

Stuffing box: The stuffing box shall be cast iron and shall contain a minimum of five rings packing. It shall have pressure relief connection. The packing gland shall be a split type secured in place with non-corrosive studs and nuts. Rubber slingers shall be secured to the shaft above the packing gland.

Head shaft: The head shaft goes through the stuffing box shall be stainless steel. It shall be precision ground and polished with surface finish as per standard practice.

Suction bell mouth & strainer: The suction bell mouth shall be sufficient length and shall have a minimum inside diameter and weight larger than the discharge column pipe. A suitable cone strainer of galvanised steel shall be provided having a free area at least four times of the flow area of the suction pipe.

8.0. TEST

8.1. GENERAL

a) All pressure parts shall be subject to hydraulic testing at a pressure of 150% of shut off head or 0% of rated head (effective head) whichever is higher, for a period not less than 30 minutes.

b) Performance-test is to be conducted to cover the entire range of operation of the pumps. These shall be carried out to a span of at least 125% of rated capacity up to pump shut off condition. A minimum of five combinations of head and capacity are to be achieved during testing to establish the performance curves including the design capacity points and the two extremities of the Range of operation specified. For range of operation, stipulation relevant in Clause is applicable.

c) Tests shall preferably be conducted with actual drive motors furnished.

d) Reports and test certificates of the above tests shall he submitted to the Engineer-in-charge for approval of the employer.

e) All rotating components of the pumps shall be subjected to dynamic balancing tests, if specified, in Data Sheets.

6.0 Test

a. All pressure parts shall be subject to hydraulic testing at a pressure of 150% of shut off head or 200% of rated head (effective head) whichever is higher, for a period not less than 30 minutes.
b. Performance-test is to be conducted to cover the entire range of operation of the pumps. These shall be carried out to a span of at least 125% of rated capacity up to pump shut off condition. A minimum of five combinations of head and capacity are to be achieved during testing to establish the performance curves including the design capacity points and the two extremities of the Range of operation specified. For range of operation, stipulation relevant in Clause is applicable.
c. Tests shall preferably be conducted with actual drive motors furnished.
d. Reports and test certificates of the above tests shall he submitted to the Engineer-in-charge for approval of the employer.
e. All rotating components of the pumps shall be subjected to dynamic balancing tests, if specified, in Data Sheets,

7.0 Technical Requirements and Calculations

a. The Pumping Station will be installed 3 nos. Pump sets (2W+1S) pumping sets of 1150 M^3/Hr. at the lowest water level condition (Positive/flooded suction) of the UGR sump at a system head demand to be determined by the bidder.

b. Tenderer are required to furnish the following technical particulars by the lowest tender without fail after issuing the work order.

c. Detailed system head calculations including H-Q, P-Q, Efficiency-Q, NPSH-Q etc. curves at various level conditions in solo and parallel condition superimposed on the system resistance curve, the printed family curve of the pump model offered shall be furnished along with offer.

d. Detailed calculations showing adequacy of NPSHA having at least 0.5m margin over NPSHR even at lowest water level condition as has been asked for in the technical specifications of the pumps elsewhere.

Note : <u>To work out the system head on Hazen-William's formula to arrive out the pipe frictional losses taking 'C' value as 90 for all CI Piping shall be considered (This is completely arbitrary – it is must be fixed after testing the pipe lines) and for C value of DI as 140. The following 'K' values for valves, specials shall be considered as follows</u>

Sluice Valve: 0.4 Non Return Valves: 2.5 Butterfly Valve: 0.35

Other specials: Guideline as per CPHEEO Manual

Note: Units used for the curves/data shall be as follows (Language shall be in English)

Flow Rate: 660 M^3/Hr

Head, NPSH: ---------MWC

Power: ----------KW

Efficiency: ----------%

e. The following flow velocities shall be maintained for the pump suction and delivery branches:

Pipe diameter	Suction Side	Delivery Side
Up to DN 150 mm.	0.6 to 1.0 m/s	1.0 to 1.7 m/s
DN 200 mm. to DN450 mm.	0.8 to 1.2 m/s	1.7 to 1.9 m/s
DN500 mm. to DN1000 mm.	1.0 to 1.5 m/s	1.7 to 2.2 m/s

f. The following pipe specification shall be followed to determine frictional losses in pipelines:

i) For sizes up to DN150, ERW black pipes to IS: 1209 Part-I (Hvy) and IS: 1209 Part-II (Hvy) fittings to be followed.

ii) For sizes DN200 to DN350, ERW black pipes to IS: 3589 having wall thickness 7.1 mm. and 7.9 mm. for sizes DN400 to DN500. Fittings shall be fabricated from parent pipes.

g. Obligatory Data & Information to the tenderer to work out the system head for feeding the OHRs. For the purpose of working out the detailed engineering on various system requirements, the following data and information shall be applied.

For the purpose of working out the detailed engineering on various system requirements, the following data and information shall be applied.

Sl. No.	Description of item	Data to be Considered for Design Purpose
1	Average ground level of site above MSL	±81.00 M
2	Liquid to be handled for pumping	Clear Water
3	Turbidity	Up to 5 NTU
4	Temperature	12 ºC to 37 ºC
5	Specific Gravity	1.01
6	No. of Pump Motor set to be installed	2 W + 1 S (3) , 660M^3/hr each
7	Likely supply voltage at plant premises	415V ± 10%, 50Hz. ± 3%, 3 phase
8	Discharge station flow at duty point	660 m^3/hr. at a head to be determined by the bidder
9.	Delivery common manifold	according to head & discharge
10	After awarding the job the mechanical drawings shall have to be submitted with details hydraulics calculation	For approval

h. While calculating the pump TDH the tenderer must explicitly specify the length and diameter of pipes and specials they have selected while taking into account the velocity considerations given earlier in this NIT. The rates quoted by the tenderer in the BOQ / Price Schedule shall be assumed to be for that particular diameter of pipes, specials

i.

j.

k. & valves etc. This calculation sheet along with table of pipes and specials should be given after issuing the work order.

The battery limit of the work is the start from receiving of electrical power and end is the outer flange of the butterfly valve on common delivery header with

8.0 Test at shop floor

a. Each pump shall have to be tested to determine the performance curves of the pumps. These tests are to be conducted, in presence of Employer or his representative, as per the requirements of the Hydraulic Institute Standard/ASME Power Test Code PTE 8, 2/BS-599/I.S.S., latest edition.

b. The Contractor shall conduct necessary sump model test for establishing optimum sump dimensions/flow correcting devices and establish the suitability of suction conditions.

c. The Employer or his authorized representative shall be given full access to all tests, Prior to performance tests, the Contractor shall intimate the Owner allowing adequate time so that if the Employer so desires, his representatives can witness the test.

d. The Bidder shall guarantee the effective head at the specified designed capacity and also the corresponding pump efficiency, pump input power, unless otherwise mentioned, the Bidder shall specify the allowable tolerance considered by him on the guaranteed performance.

e. The tenderer shall indicate the guaranteed efficiency of the pumps offered by him. While carrying out shop performance tests, the permissible limits of errors in measurement shall be in conformity with Class-B of BS: 599 without any penalty whatsoever. Apart from that a negative tolerance of maximum (-) 3% on quoted efficiency shall be acceptable only with penalty. Variation more than (-) 3% will render the pump liable to rejection, If the shop performance tests indicate any failure of the pump to achieve the guaranteed efficiency, the Contractor will be given a time, to be decided by the Owner, to make up the deficiency at his cost by incorporating necessary modification, alteration and replacement.

f. The manufacturers shall conduct all tests required to ensure that the equipment furnished shall conform the requirements of this specification and in compliance with requirements of applicable Codes and Standards. The particulars of the proposed tests and the procedures for the tests shall be submitted to the Employer for approval before conducting the tests. The pump is to be tested on the test bed at contractors' workshop in presence of the Administrator Authority representatives of one.

g. Where stage inspection is to be witnessed by Employer in addition to above, the bidder shall submit to the Employer at the initiation of the contract, the deadline of PERT-CHART showing the manufacturing progress and indicating the periods where inspection of the Employer or his authorized inspection agency is required at the manufacturer’s premises.

h. Since stage inspection is to be witnessed by Employer, the various stages of inspection, together with the Program shall be submitted to the Employer. The inspection and test procedures shall also be submitted for Employer's approval.

9.0 Painting

a. Surface of all parts shall be cleaned to remove scale, dirt, oil, water, grease and other foreign objects prior to final assembly of the equipment. All openings shall be covered to guard against damage and entry of foreign objects.
b. All surfaces shall thoroughly be cleaned in a manner approved by the manufacturer for necessary paint coating to be applied on the surface, In case of any prevalent Standard/Codes on selection and application of painting/coating, the same shall be strictly adhered to. The colour code for finished painting on the external surface shall be subject to Employer's approval. Necessary finish paintings including touch up paints, if not applied at shop, shall be done by the Contractor from sealed containers for site application.
c. All parts shall be properly boxed, created or otherwise protected for transportation to suit the mode of transportation. Exposed finished surfaces shall be thoroughly greased before transportation.

10.0 Tools & Tackles

a. The Tenderer shall quote separately for a complete and unused set of all special tools, wrenches, etc. including toolboxes, specifying the quantum of requirement, for erection, maintenance, overhaul or complete replacement of equipment under this specification. A complete list of tools necessary shall be enclosed with the Proposal.
b. The Price quoted for tools shall not be considered for evaluation of Tender.

11.0 Spare Parts

a. The tenderer is to supply spare parts as per list enclosed vide list of spare parts.
b. The spare parts as mentioned are to be supplied within the completion period of the contract.
c. Cost of spare parts as above arc to be mentioned separately.
d. Replacement of spare parts during contract period would be borne by the Tenderer at their own cost. The tenderer is required to provide a list of spare parts for a period of two years for further maintenance.

12.0 Delivery

a. The schedule of the project demands early delivery of the equipment's
b. The delivery date shall be indicated by the Tenderer in the Progress Schedule showing the time required for different phases of the work under the scope of this specification taking the date of issue of Letter of Intent as datum.
c. The Tenderer shall guarantee the delivery date subject to penalty.

13.0 Design & Characteristic curves

a. Characteristic curves of pumps showing effective head pump input power, efficiency, and submergence/NPSH, against capacity ranging from shut off condition to at least 125% of rated capacity.
b. Speed Vs. torque curve of the pump corresponding to recommended mode of pump starting, superimposed on speed Vs. torque curves of the motor, corresponding to 85%, 90%, 100% rated voltage and also extending over quadrant I & Quadrant II covering reverse flow conditions, if applicable.
c. Diagram showing the type of lubrication system, etc.
d. Complete descriptive and illustrated literature on the equipment and accessories being offered.
e. Experience list for the similar type of equipment supplied, which should indicate name of customer, date of ordering, and value of order date of commissioning, pump parameters and number.
f. A comprehensive write up or brochure on the details of manufacturing and test rig facilities in the shop of the manufacturer.
g. The successful bidder shall furnish the following drawings/data for Employer's approval after award of the contract.
h. All data furnished during bidding stage including details furnished above shall be treated as final and binding on the Contractor if, however, any, minor change is essential during detail design stage for any improvement Il1 the system, such changes shall be carried out only after obtaining approval of the Employer.
i. The G.D2 valves of the impeller of the pump and Rotor of the motor at 1000 R.P.M. (syn.) are to be supplied.

14.0 Instruction Manual

a. The instruction manual shall present the following basic categories of information in a comprehensive manner prepared for use by operating and/or maintenance personnel:
b. Instruction of Erection
c. Instruction for pre-commissioning check-up, operation, abnormal conditions, maintenance and repair.
d. Write up on Controls and interlocks provided.
e. Recommended inspection points and periods of inspections.
f. Schedule of preventive maintenance.
g. Ordering information for all replacement parts.
h. Recommendation for type of lubricants, lubricating points, frequency of lubrication and lubricant changing schedule.
i. The information shall be organized in a logical and orderly sequence. A general description of the equipment including significant technical characteristics shall be included to familiarize operating and maintenance personnel with the equipment.
j. Necessary drawings and/or other illustrations shall be included or copies of appropriate finial drawings shall be bound in the manual. Test, adjustment and calibration information as appropriate shall be included and shall be identified to the specific equipment. Safety and other warning notices and installations, maintenance and operating cautions shall be emphasized.

k. A parts list shall be included showing part nomenclature, manufacture's part number and/ or other information necessary for accurate identification and ordering of replacement parts.

l. Instruction manual shall be securely bound in durable folder.

m. If a standard manual is furnished covering more than the specific equipment purchased, the applicable model (or other identification) number, parts number and other information for the specific equipment purchased shall be clearly identified and highlighted. Sectional drawing to suitable scale and characteristic curves for the particular equipment supplied must be included in the Instruction manual.

n. The Instruction Manual shall include the list of spare parts that are required for 2 years normal operation and maintenance for equipment. It shall also include list of all special tools and tackle furnished with complete drawings and instructions for use of such tools and tackles.

o. The instruction manual shall need approval of Employer in the same fashion as that for drawings.

15.0 Deviation

a. The Tenderer is required to submit with his proposal a detailed list of any and all exceptions taken to this specification by filling up the Deviations Sheet. In absence of such a list it will be understood and agreed that Bidder's proposal is based on strict conformance to the specification in all respects. These requirements, however, are not intended to prohibit Bidders from offering alternate quotation for equipment which they consider to be equal or superior to that specified for the intended service and for which he believes he can show economic and/or technical advantages, provided that he is not allowed to add to the Vendors list and is confined to items not appearing therein.

16.0 Proposal Data

a. To complete the proposal, the Tenderer must fill up the following from sheets as per instructions given in the Tender Documents.

b. Each Tenderer shall supply the data requested in Proposal Data paragraph as above by typing in appropriate places on each page. These filled in data sheets must be properly signed by authorized representative of the Tenderer or Manufacturer as verification of the data submitted. These signed pages in their entirely shall be returned with and shall be part of the Bidder's formal proposal. The successful bidder shall completely fill in the above information required for each of the above-mentioned sheets after issuing the work order.

17.0 Data sheet/ Check List of the Pumps being offered

1. Manufacturer
2. Model Number
3. Type of Pump :

4. Non Pullout : Yes/No
5. Impeller Type : Closed/Semi Open/open
6. No. of Pumps offered :
7. Efficiency of Pump at peak flow condition :
8. Efficiency of Pump at medium flow condition :
9. Efficiency of Pump at lean flow condition :

Performance

1. Guaranteed capacity - M3/hr. in peak flow without tolerance in single operation & parallel operation :
2. Guaranteed head (total bowl head) - MWC at peak flow discharge, without tolerance in single operation& parallel operation. :
3. Guaranteed Pump efficiency, without in single operation& parallel operation tolerance in peak head/flow :
4. Input to the Pump (KW) in peak head/flow in single operation & parallel operation without tolerance :

5. Pump input power at worst operating condition on the range of operation (without positive tolerance) :
6. Pump input power at shut off :
7. Range of operation of Pump :
8. Recommended Motor KW :
9. Pump rated speed (RPM) :
10. Pump specific speed of particular trim at D.P. :
11. Pump shut off head :
12. Minimum submergence required in MWC at Worst flow condition :
13. Are the pumps suitable for parallel operation :
14. Whether non-Reserve Ratchet is provided in pump or not :
15. Type of lubrication for pump :
16. Whether pre lubrication arrangement provided :

Pump NPSHR

1. -do- at highest water level condition :
2. -do- at lowest water level condition :
3. -do- in the operating range, without positive Tolerance :
4. Pump duty: continuous intermittent :
5. Pump shut off head :

Flexible Joints & Shaft

1. Flexible Coupling :
2. Type :
3. Make :
4. Factor of Safety adopted :
5. Degree of Flexibility :
6. Extent of Play allowed :
7. Shaft diameter (Extension if required) :
8. Material :
9. Factor of Safety adopted :

Thrust Bearing

1. Type :
2. whether separate thrust bearing for pump: motor provided or not
3. Method of lubrication :
4. Whether the thrust bearing is capable for worst loading of both phases :
5. Axial thrust at duty point (kg) approx. :
6. Whether thrust bearing temperature detector provided :

Material of construction

1. Impeller :
2. Casing :
3. Casing Ring :
4. Pump shaft :
5. Coupling for pump Motor :
6. Shaft Sleeve :
7. Sole Plate :

8. Impeller Ring
9. Seal Ring :

18.0. Checking before installation

Check clean
Tightness of fastener (nuts, bolts, locking clips)
Eye bolt, lifting lug present or not
Cooling arrangement damaged or not
Base plate, Sole plate, Foundation Bolts, nuts, sleeve etc present or not
Flexible couplings present or not.
Vent and drain with isolation valves present or not.
Correctness of name plate
Paint finish

19.0. Installation of pump motor set

a. Pumps and motors are normally despatched to the site in dismantled condition, sole plate, rotating element and all other equipment's like shaft couplings and housing, stool etc. Are packed separately. After receiving the materials at site all boxes should be opened and materials checked against respective packing. The protective coatings and wrappings should be removed before erection-if necessary.
b. Checking /preparation of foundation block if necessary should be done..
c. The pump assembly, including the solo plate should be level up by using Engineer's sprit level about 0-05 mm type in 254 mm and "I" beam type straight edge placed on the mechanical surface of the solo plate and adjust the thickness of the packing by simming until the assembly is levelled.
d. When the solo plate is levelled and positioned with find datum, levels foundation bolts may be grouted.
e. Once the solo plate is levelled the pump half casing may be lowered on solo plate accurately in holding bolts and tighten the nuts.
f. Fix another pump half of flexible coupling on driving end side. Recheck the level on pump half coupling .Any adjustment, if necessary, can be made by shimming between solo plate and packer plate.
g. The motor unit are placed and coupled with pumping unit and check the alignment by dial gauge.
h. Following variation which can be tolerated. Angular alignment – 1-0.07 and Radial alignment not to exceed-0.1 mm

Executive Officer
Burdwan Municipality

SECTION – H

M E C H A N I C A L W O R K

1. O MECHNICAL WORKS

The specification covers the design, manufacture, testing, supply erection and commissioning of the horizontal/ vertical pumping unit at Intake pump house of Burdwan. The equipment shall be designed and manufacture and tested in accordance with latest I.S specification and code of practice published by the Bureau of I.S whenever available.

2.0 SLUICE VALVES

Shall generally conform to IS 14846, with length over flanges as per PD of IS 14846 in CI construction having metal seating (IS 318 Gr. LTB 2).

Component	Material of construction
Body / Door / Dome	CAST IRON IS 210 Gr. FG 260
Spindle	Non rising; Stainless Steel AISI 410
Body seat / Door face	Gun metal: IS 318 Gr. LTB 2 ((rings to be press fitted and riveted; no screws allowed)
Rivets	Soft annealed brass
Spindle Nut	Gun metal: IS 318 Gr. LTB 2
Stem seal	Greased Hemp
Fasteners	Carbon steel
Flange Drilling	IS 1538 Table 4 & 6
PN	10 / 16
Accessories (400 mm and above)	Ball thrust bearings to be housed above the wet chamber ie. above the gland. Enclosed Spur Gear Box for ease of operation. Air Plug
Painting / Coating	Inside & Outside epoxy liquid coated; DFT minimum 250 micron, shade RAL 5005 / 5015 (BLUE)
Hydro-test (Open Ended only)	Seat: 10 / 16 Kg/cm^2; Body: 15 / 24 Kg/cm^2

3.0 BUTTERFLY VALVES

Up to 200 mm Dia.

Flangeless wafer butterfly valve meeting the following

- Bi – directional shut off valve
- PN 10 / 16
- Cast Iron body with fully vulcanized liner seat preventing corrosion between liner and body
- Disc in SS CF8
- For manual operation: Lever upto 200 ø; above with Worm Gear box
- Suitable for easy installation between all kinds of flanges – IS, BS

- No need of separate gasket for installation
- Motorised operation with Single / Three Phase electrical actuator.

250 and above

The butterfly valves shall generally conform to BS EN 593, with length over flanges as per Double flanged Short (BS EN 593 / BS EN 558 / ISO 5752 Basic Series 13).

Component	**Material of construction**
Body / Disc	CAST IRON IS 210 Gr. FG 260
Stub Shafts	SS AISI 431
Bearings	Steel backed Teflon (co-efficient of bearing friction not more than 0.1)
Body seat	Integral (Monel 60) Ni – Cu alloy weld deposited, micro finished
Disc seal	EPDM
Disc seal retainer	SS 304 / Ductile iron
Shaft seal	Halprene
Internal Fasteners	SS
Flange Drilling	IS 1538 Table 4 & 6
PN	10 / 16

Mandatory accessories:	
Enclosed worm gear box with additional spur gear boxes, if required	Required: CI/DI with IP 54 protection; Make - MASTERGEAR INDIA / AUMA
Mechanical Position Indicator	Yes
Limit stops	Yes
Operation	Manual operation by hand wheel. Motorised operation by means of electrical actuator.

C. PAINTING & COATING: Inside and outside quoted with liquid epoxy; DFT not less than 250 microns. Shade: RAL 5005 / 5015 (Blue)

General

A. Hydro – testing:

	PN 1.0	**PN 1.6**	**Criterion**
Seat test (Kg/cm²)	10	16	Drop - tight
Body test (Kg/cm²)	15	24	No leakage and deformation

B. Torque / Operating effort / Operating time: Manufacturer to furnish data and if required supporting calculation for review / approval.

C. **Actuator-** Electrically operated valves to be complete with AUMA / ROTORK make electrical actuators complete with integral/panel mounted reversing contactor starter, push button station, local – off – remote selector switch, potentiometer, space heater and continuous local indicator. Only the Sluice valves at suction lines of the pumping units & interconnection with the rising main will be Hand operated non rising type.

4.0 NON RETURN VALVE/CHECK VALVE

Valves up to 600 mm dia. shall conform to IS 5312 Part 1 & above to IS 5312 Part 2. Valves shall be in graded CI with metal to metal (IS 318 Gr. LTB 2) seating, preferably slanted (and not perpendicular) vis-à-vis horizontal axis; SS AISI 410 stub pins & slant seat design. Valves above ø600 mm must be of multi – door design with doors having minimum two integral lugs for hinging of the door. Valves shall be rated PN 1.0 / PN 1.6 (as per final design & BOQ) and flanges faced and drilled as per IS 1538 Table 4 & 6. Shall be coated internally and externally with epoxy liquid coating (minimum DFT 250 micron) – Shade: BLUE (RAL 5005/ 5015)

Component	**Material of construction**
Body / Door (& Diaphragm)	CAST IRON IS 210 Gr. FG 260
Hinge pin (single door) / Stub pin (multidoor type)	SS AISI 410
Seat & Face rings	Gun metal : IS 318 Gr. LTB 2
Rivets	Soft annealed brass
Fasteners	Carbon steel
Flange Drilling	IS 1538 Table 4
PN	10 / 16
By – pass arrangement	Optional
Painting / Coating	Inside & Outside epoxy liquid coated; DFT minimum 250 micron, shade RAL 5005 / 5015 (BLUE)
Hydro-test	Seat: 10 / 16 Kg/cm^2; Body: 15 / 24 Kg/cm^2

5.0 DISMANTLING JOINT / RUBBER EXPANSION JOINT

One dismantling joints of diameter equal to diameter of the delivery line of each individual pumping unit shall be incorporated for easy removal of the valves etc.

6.0 PUMP DELIVERY PIPING AND COMMON DELIVERY MANIFOLD

The delivery piping may be selected one size higher than the nominal delivery size of the pump. Alternatively the delivery pipe should of such size that the velocity shall be as specified earlier. The delivery piping connection to the common manifold should be connected by a radial tee or by 30 or 45 degree bends. The diameter of the common delivery line will be in such a fashion that no head loss will be occurred for parallel operation of the pumping unit alternatively 2 to 2.5 times of the pump delivery line.

The pump individual delivery piping shall be of suitable diameter made from M.S. of not less than 8 mm thick plates painted both inside and outside by anticorrosive epoxy paints. The pipes shall be of welded joints and shall consist of necessary

companion flanges so as to connect the piping with the Valves/Special of the individual pump delivery branch. The pump individual delivery side piping shall be connected to the common delivery manifold as per the layout. Necessary gaskets of suitable thickness shall have to be provided to all flange Joints complete with all necessary nuts, bolts, washers etc. The length shall be ascertained from the layout and the exact dimensions of the valves/specials. The Bidder should also provide the necessary arrangements to encounter the horizontal back thrust and the details as per the pump manufacture's recommendation shall be clearly indicated in the layout drawing.

The common delivery manifold shall be of requisite diameter and shall be of S. W. M.S. of not less than 6 mm thick. The common manifold shall have blank flange on both sides/one sides with adequate stiffening. The length of the manifold must be extended at least one meter on both sides after the interconnections with the delivery pipe lines from the pumps at the two extreme ends. The maximum distance of the manifold from the outer wall of the pump house would be within 3m.

The common delivery manifold shall be provided with one no. Temper proof kinetic air release valve (double throat) suitably placed. The pipe shall be laid underground and shall be painted with anticorrosive paints at the inside and outside shall be wrapped and coated with corporate of not less than 4mm thick so as to prevent the pipes from corrosion.
(Necessary surface finish for proper painting and wrapping coating shall be made by the contractor and careful laying shall be done so as to prevent damages during laying).

7.0 HAND OPERATED OVERHEAD CRANE AT PUMPING STATION

Provisions have to be made for a 5.0 M.T. capacity Hand Operated Travelling Crane (H.O.T.) suitable for inching operation with a lift up to motor floor level and cross travel of 12 M for handing pump, motor and other accessories. They shall be of reputed make as per vendor list and as approved by Engineer-in-Charge. Suitable type of crane rails, girders and all other accessories as necessary for installation and operation of the crane are to be designed and provided by the contractor within the lump sum pipe quoted. The two travels and two hoists i.e. long cross & main Auxiliary etc. must be mechanical operation. The buffers must be spring-loaded operation. Suitable vertical clearance is to be provided over the rail level to the bottom of the roof beam

8.0 STEEL STRUCTURE

All steel structure shall conform to IS: 226-1962 except for M.S steel plate over 20 mm thickness which shall conform to IS: 2062-1962. Rails will be carbon or medium manganese steel, conforming to latest IRS-T-12 or IRS-T-18 specification. For detailing and construction of welded connections all provisions of IS: 816 (latest) shall apply. All rivets and bolts are to be generally of 20 mm or 22 mm dia. except where otherwise required or noted. Where no load is shown in the trusses, bracing or latticed members, minimum 2 nos. 20 mm dia. rivets or equivalent welding to be provided. Bolted connections shall be provided at temporary sides and ends where extensions are indicated. All connections are to be riveted, welted or fitted with high strength friction grip bolts except for hand rails and cat walkways which may be bolted (Black bolts). Unless otherwise stated, all bolts under different tension are to be provided with one spring washer.

9.0 BOLTS AND NUTS

M.S bolts and nuts shall conform to IS: 1363, 1364 and 1367(latest). All nuts and bolts and washers coming in contact with shall be galvanized by a process which does not make the threaded uneven. All bolts, nuts and washer coming in contact with liquid or in corrosive atmosphere shall be made of S.S 316 or nylon depending upon the nature of the service.

10.0 OPEN THREAD MESH PLANTING

The contractor shall supply and install galvanized (hot dipped after fabrications) mild steel open thread mesh flooring at pipe trenches and of the rotating bridge decking including all kerbing. The planting shall be designed to withstand a maximum uniformity distributed shall be designed to withstand a maximum uniformity distributed load 1000 kg/sq m. The plating shall be divided into panels weighing not more than 50 kg and each complete with nosing all round. Cut outs shall be provided and trimmed so that the plating.

11.0 COUPLING

The bidder shall be provided the coupling for motors and pumps together with a suitable guard complying with BS: 1943 and BSC: 8004. The materials of the guard shall be of anti-spark types. Couplings shall incorporate all necessary flexibility for axial, lateral and tensional movements to deal with shock vibrator and driving equipment of the transmitted load.

12 .0 JOINING

The joining shall be made with compressible rubber IS : 638 of thickness 3 mm, bolts and nuts. The bolts and nuts shall be of mild steel and these shall conform to IS: 1362 and 1363 unless otherwise specified.

13.0 GROUNTING

The bidder shall include in his price all cost of labour and materials for grouting in all fixing ,piping and etc. at the time of construction. The contractor shall make arrangement for delivery of such items which will be grouted in the building work in time so that construction work can process smoothly without hampering of the construction work.

14.0 SUPPORT AND FIXING

All supports, fixing bolt, screws, and other fixings shall be provided by the contractor and its price be inclusive of such items.

15.0 DRIVING UNIT AND SUPPORT

Each driving unit shall be supported on a cast iron or fabricated steel frame on guide rails as appropriate. The fabricated frame shall be constructed to afford adequate access to the coupling between the driving motor and driving unit.

16.0 DISIMILAR METALS

Where metals of dissimilar character will required to be used in the construction, precautions should be taken to prevent deteriorations of the structure due to electrolytic action.

17.0 BEARINGS

Bearings shall be of type, size and construction to ensure that the plant and equipment of which they form part shall operate efficiently and continuously under normal operating conditions without overheating and with minimum inspection and attention. Housing and enclosure of bearing assembly shall be suitable for the worst condition in which they are required to work. All ball and roller bearing shall conform to the International Boundary Plant (ISO). Linear and bushes of plain bearing shall be easily renewable. Provisions shall be made for easy lubrications of all contact surfaces having relative movement. Contact surface of bearing and the lubricant shall be such that there is no corrosion, electrolytic action or excessive wear.

18.0 LUBRICATIONS

In designing the equipment, consideration shall be given to ensure the adequate lubrication is achieved with the minimum of attention. The central turntable assembly / wheel bearing shall be pre-packed with ample quantity of grease of appropriate grade and as for as practicable parts shall so designed that these are not required to be lubricated more frequently than once per month. Adequate provision shall be made for the lubrication of the bearings from convenient point on the bridge decking. All equipment pipelines and fittings for lubrications system shall be manufactured from corrosion resistance materials. Lubricant oil , grease and graphite packed and seals which requires manual repacking, shall be clearly visible and also easily accessible. Unit to be filled with oil shall be arrangement for easy filling without spillage. Protection shall be made to prevent excess lubricant dripping into floor or platform and floor, where connections have to break frequently and loss of oil is possible, connections shall be self-sealing. The grade, type and frequency of lubrications to be used shall be stated on metallic lubrication parts permanently attached to the plant. Lubricating oils and grease shall be designated by approved trade name or in terms of materials, vegetable, animal or blends of this basis together with their viscosity and flash point characteristics and not as “Light” or “Heavy”.

19.0 COUPLING, DRIVES, AND CLUTCHES

Coupling shall incorporate all necessary flexibility for axial, lateral and tensional movements to deal with the stock vibratory and driving equipment of the specified transmitted loads. All couplings of the male / female type, the male section shall be located at the driving end of the coupling. Flexible couplings exposed to dust shall be fitted with oil resisting muffs. Couplings used for connection of electric motor to drive machinery shall be of the flexible type. In cases where a break on the couplings is incorporated, this shall be located on the driven half on the couplings. Fluid couplings shall be incorporated with a fluid level indicator. Type of fluid required shall be indelible marked on the coupling casing. Plates clutch coupling shall be fully engaged and shall be steel bronze type running in oil or dry type with steel plates and dices with non-metallic

facings. All belts used on belts drives shall be sufficient for the transmitting load without slip or overheating. Tension on multi belts drive shall be uniform and facilities shall be provided to enable assessment to be made to ensure uniform tension without slip. Chain driven shall be of case hardened roller type and be simples, duplex of triplex as necessary for efficient and quite transmission of the specified loads. Wheels used on chain drive assemblies shall have precision machine out tooth. The assemblies shall incorporate facilities for chain adjustment to take up roller wear. All pinions wheels and coupling shall be passed on to the associated shaft and keys as necessary or made solid with the shaft.

.20.0 HAND WHEELS FOR VALVES/PENSTOCK

Hand wheels shall be cast iron and shall have cast on the upper site of the rim the mark "OPEN" and "SHUTT" with appropriate direction of valves and penstock installed outdoor. Indoor valves and penstocks shall be provided with brass direction indicator plants fixed at the centre of the hand wheels with G.M caps and nuts where hand wheels are not provided.

21.0 UNLOADING, HANDLING & STORAGE

The contractor shall be responsible for the delivery at site of all equipment, material and supplies required for the fulfilment of the contract up to handing over the plant to the ULB. The contractor shall at his own cost and responsibility transport or shift to plant site, all materials, equipment and other component furnished for the purpose of this contact. All movement of materials and equipment to and from storage shall be at the expense of the contractor. Space for storage facilities will be provided by the ULB at the site as workable. If contractor does not promptly shift and place for use in the premises, where is the work to be done, any materials, equipment or supplies delivered, the ULB may be do so, and charge all the cost thereof to the cost thereof the contractor and in any event the ULB shall not be responsible for any damages, arising out of, or in any connected with each shifting, or placing of the same. The bidder shall after further shifting or placing of the same. The contractor further after shifting, unpack the materials , verify the contents against invoice and notify storage or breakage to the engineer within one week of the receipt of materials and equipment at site, failing which the contractor held responsible for any consequence. If required by the engineer, the plan method of transportation of equipment shall be submitted to the Engineer for approval. This approval shall be submitted to the Engineer for approval. This approval shall not relive the Bidder of any responsibilities for the safety of the Equipment and personnel.

22.0 BIDDER OBLIGATIONS

Over and above the responsibilities of the contractor stipulated in the documents, following obligation fulfilled by the bidder.

The contractor shall satisfy the Engineer that adequate provision has been made

a. To carry out his instruction fully and with prompt attitude.
b. To ensure that parts required to be inspected before use are not use before inspection and to ensure that adequate supervision is provide at all stages of the work and each portion of the work and each portion of the work is checked before erection.

The contractor shall make necessary arrangement including provision of suitable space and facilities for testing, for inspection at any stage of manufacture of plant and equipment by the Engineer or his authorize representative as and when deemed necessary by the Engineer; the time schedule for any inspection will, however, follow the inspection scheduled suggested by the contractor and agreed upon by the Engineer during scrutiny of the delivery plain. Irrespective of any inspection and tests made by the Engineer the contractor shall be entirely responsible for the execution of the testing or inspection. At least 21 days' notice shall be required for the inspection to be carried out.

20.0 SHOP TEST

Shop test shall include all tests to be carried out at Bidder's work, works of his agent at manufactures works and at works where raw materials supplied for manufacture of equipment

The test to be carried out shall not be limited to the tests mentioned bellow:

a. Composition of all materials, casting, forgings etc.
b. Hydraulics test for pressure vessels, tanks, pumps casting etc.
c. Hydraulics test for valves, specials etc.

d. Test to check in faults in rubber lining as per IS: 4682 or its equivalent and painting.
e. Static and dynamic balancing of the impellers.
f. Performance test of (Head, Capacity, and BHP) pump (all type) and air blower.
g. Test on motors as per IS: 4029, IS: 325.
h. Other test that may be provided in different I.S.S
i. Other test provided elsewhere in the Bid.
j. Any other tests considered necessary by the Engineer.
k. All test certificate and reports shall be submitted to the S.E for approval. All test are normally carried out in presence of the Engineer or his Authorized Representative. However, waiver may be allowed in specific by the Engineer at his discretion.
l. The engineer or his Representative shall be given to full access to witness the test. The contractor shall inform the S.E allowing adequate time so that E.I.C or his Representative can witness the test. The manufacturer / Bidder has to bear relevant costs of such inspection by two Representatives of MED/ULB to the manufacturer's factory and arrange accommodation & to and fro return ticket (as per eligibility).
m. No component or equipment shall be despatched unless accompanied by approval & test certificate and report. The approval shall be given provided the corresponding drawings/ technical particulars are already approved and the Engineer or his Representative agents have witnessed the test or a letter of inspection waiver is issued by the E.I.C

24.0 SITE TEST

After erection at site, all components / equipment as described below shall be tested to prove satisfactorily performance and / or fulfilment of functional requirement without showing of defect as individual equipment and as well as a system. The bidder makes all arrangement for testing and informs the Engineer for witnessing the following tests, which again, are not exhaustive.

a. All pipes and fittings and valves, after installation will be tested hydraulically at a pressure (as per relevant IS), at least 1.5 times the maximum attainable pressure in the system, to check against leakage & tightness.
b. All manual operated valves /gates shall be operated throughout 100 %, of the travel and these should be function without any trouble.
c. All pump motor shall be run with the specified fluid from shut off conditions to valve wide open. During the test condition the pump motor set shall run without any production of undue vibration, leakage through gland, temperature rising in bearing part, noise, flow pulsation etc.
d. . Visual check on all structural components , welding , riveting rubber lining, FRP lining etc. and if doubt rise will be tested again.
e. All hoist and its components shall be subjected to double the full working load during all motions without showing any distress.
f. All test instrument and equipment duly calibrated shall be furnished by the bidder to the satisfaction of E.I.C

25.0 COMMISSIONING AND PERFORMANCE TESTS

The contractor shall undertake the complete responsibility for successful erection and commissioning of the plant and demonstrate successful performance test.

The commissioning of the plant shall be involve the following steps of operation

a. Testing of each unit on no load, to make complete to check complete check of its mechanical operation, alignment, clearance and rigidity and making necessary adjustment or alteration required to make such unit properly mechanically with tolerable vibration and sound levels, tolerance being reduced for no load operation.
b. After the mechanical check has been made, as stated above the equipment shall be energized and run progressively from no load to full load within limits of vibration and sound etc.
c. Therefore trial run of the plant under completion shall be taken at normal load operating condition for which the respective plant is designed for.
d. The initial performance test shall be carried out at least 24 hour continuous operation.

26.0 ELECTRICAL ACTUATOR

The delivery side butterfly valves shall be electrically operated auto / manual syncropak/syncroset type actuator with local remote control system and each shall be completed with suitable head stock, motor, starter with reversing control gear, limit switch, torque switch shall be fitted on an indicator board showing the exact amount of valve opening. They will also automatically cut off at the extreme end of valve gate travel. The valve shall also be provided with necessary arrangement for operating the valve manually in case of emergency. The safety interlock switch will automatically cut off the current in case the valve is operated manually. Self-powered local and remote digital display of percentage opening of the valves is to be incorporated.

DATA

- Make
- Type
- Capacity with rating of Motors
- Whether provided with limit & Torque Switches, if so, torque limit
- Protection Group (IP)
- Whether suitable for outdoor & temporary submergence duty/indoor type
- Whether equipped with suitable component & termination arrangement for transmitting signals for displaying valve opening % indicating in the valve opening indication meters.

I.S Standard to which it conforms

27.0 Temper proof Kinetic air release valve

Air valve for clean, cold potable water up to 50°C

PN 10 / 16

DN 80 – 200

Double chamber valve with twin float (Rubber / Vulcanite coated timber core / SS 304) - automatic operation with water.

Two-orifice venting system with 3 functions (supply and release of air as well as automatic venting during operation)

Flange connection dimensions to IS 1538 Table 4 & 6

Body and Cover made of CAST IRON IS 210 Gr. FG 260

Seal made of EPDM

Corrosion protection:

Inside and outside with liquid epoxy coating; thickness >250 µm, colour: RAL 5005 blue

Accessories: Must have a metal seated gate valves (description as above for Sluice Valves upto 800 mm) of same diameter for isolation purpose, complete with gasket and fasteners (steel galvanized)

Executive Officer
Burdwan Municipality

SECTION-I

MOTOR CONTROL PANEL AND POWER DISTRIBUTION PANEL

1.0. GENERAL

The motor control panel and power distribution board is intended to receive electrical power, effectively control the motor operation having facility both local manual operations of the motors at suitable places located nearer to the individual motors and remote operation of the motor from the composite remote control panel, providing against mal functioning of the motor as well as to protect downstream load from the system fault and to distribute power to the other areas of activities.

The design manufacture and testing commissioning of MCC and PDB with various components / equipment thereof covered by this specification shall comply with the latest issue of I S Specification and I.E Rules.

2.0. TECHNICAL SPECIFICATION OF MEDIUM VOLTAGE PANEL AT PUMP HOUSE

Medium voltage Panel is required to provide power to motor feeder, valve actuators, internal & external illumination purpose etc. The panel shall be suitable for 415 ± 10%, 50Hz ± 3%, 3 phase, 4-wire supply system and Degree of Protection IP-54& 50KA breaking capacity. The MV panel shall be 2 mm. CRCA sheet steel enclosed, floor mounted type, self-supporting, fully compartmentalized, dust proof, cubicle pattern draw out/ non draw out type and all the compartments would be interlocked in such a way ,the door could not be opened unless the switch is in OFF position. It shall be finished painted with powder-coated paint after necessary chemical treatment for rust free surfaces and application of anti-rust chemical coating. The base frame of the panel shall be made of ISMC-75 channel. The panel shall be dead-front type with concealed type hinged doors at front and bolted cavers at the rear. It shall have rear access and the cable termination arrangement shall be provided at the rear of the respective feeder modules where type undrilled cable gland plates would be provided for this purpose. The vertical dropper bus bars shall be placed in between two vertical aligned feeder modules. The bus for the panel shall be made of E91E graded Aluminium alloy insulated with 1.1 KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be below the 1000A then traditional System R Y B shall be adopted. Interleaved bus bar(R-Y-B-R-Y-B instead of RR-YY-BB) shall have to be provided for each phase and neutral at the top of the chamber continuous to avoid skin effect and proximity effect and also avoid unnecessary heat development, this system shall be adopted when the connected load 1000 amp onwards. The current density of the bus bars shall not exceed 1 Amp/Sq.mm The bus bars shall be supported on non-hygroscopic type resin modulated insulators and the distance between insulators shall be so designed to make the bus bar system capable of withstanding a short Circuit fault current of 50KA (r.m.s) far 1 Sec. Two cut out should be provided at the top bus chamber and covered with plate for future extension purpose. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bar to earth shall be as per I.S specifications. Incoming Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each incoming Breaker shall receive 4 nos. 1.1 KV 3.5 core not less than 400 mm armoured Al Cable. For outgoing feeder the cable allay shall have to be provided in such a fashion that the cable will be taken out easily. The control wiring of the panel shall be done with 1.1 kV made PVC insulated, 2.5 sq.mm flexible copper wires with finned copper lugs and ferule marking at each end. Wire bunches routed through horizontal and vertical wire ways which provide support and order. All hinged door shall be earthed with flexible copper wire. Lifting arrangement should be provided for lifting the panel at the top of the panel.2 nos. space heaters with rotary switch shall be provided in bottom of the panel board.

All sheet metal shall be thoroughly dilated for de-rusting, resealing and shall be painted with two coats of red oxide primer prior to final painting. Final painting would be done by synthetic enamel paint.

The Incoming side comprising the followings for each Air Circuit Breaker (ACB) (When accumulated load above 75 KW)

One (1) Number incomer will be as per Amps from where the supply source taken/ 2 to 2.5 times of the full load current of the motor current Hand operated draw-out /if above 800 A the ACB will be electrically operated draw out type 4 pole ACB breaking capacity 50KA and quick make break with trip free mechanism with the followings for each feeder.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs. (Breaker Amp/5 Amp)
- 1 no -96 sq. mm flushes mounted type 0-500 V Voltmeter with selector switch and protection fuses.
- 1 no -96 sq. mm flush mounted type Power factor Meter.
- 1 no -digital feeder protective relay with the function 3 phase over current & earth fault relay with high set
- 3 nos. - Universal Voltage LEDs indicator for breaker on.
- 1 no- Circuit identification label
- 1 no.- Universal voltage LEDs indicator for breaker trip & trip set reset button

Moulded case circuit breaker (MCCB) (When accumulated load factor bellow 75 KW)

One (1) number incomer of will be as per Amps from where the supply source taken, rotary handle Hand operated non draw-out type 4 pole MCCB breaking capacity 50KA and quick make break with trip free mechanism with thermal & under voltage release with the followings for each feeder.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs. (Breaker Amp/5 Amp)
- 1 no -96 sq. mm flushes mounted type 0-500 V Voltmeter with selector switch and protection fuses.
- 1 no -96 sq. mm flush mounted type Power factor Meter.

The outgoing side comprising with the followings for each (When the motor rating exceeding above 75 KW)

Air circuit Breaker (ACB)

Minimum 630 Amps / 2 to 2.5 times of rated current of the motor, Hand operated draw-out type 3 poles N- Linked ACB breaking capacity 50KA and quick make break with trip free mechanism for motor control purpose with the followings for each breaker unit.

- 1 no -digital motor protection relay with voltage input with the function IDMT feature
- 3 nos.- Universal voltage LEDs indicator for breaker on.
- 1 no.- Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label
- 1 no. 96 sq. mm flushes mounted type (higher the breaker Amp) Ammeter with selector switch and CTs. (Breaker Amp/5Amp)

Moulded case circuit breaker (MCCB) (When accumulated load below 75 KW)

One (1) no 2 to 2.5 times of rated current of the motor Amps, rotary handle Hand operated non draw-out type 4 pole MCCB breaking capacity 50KA and quick make break with trip free mechanism with thermal & under voltage release with the followings for each feeder.

- 1 no -96 sq. mm flushes mounted type (higher then breaker amp) Ammeter with selector switch and CTs. (Breaker Amp/5 Amp)
- 1 no. - Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label
- 3 nos.- Universal voltage LEDs indicator for breaker on.

Auto transformer starter (ATS) for each motor (when motor KW exceeding 50 KW)

Air break fully autotransformer starter shall be equipped with automatic contractor (rating of the contractor selection – utilization category-AC-4and rating shall be 2 to 3 times of the motor full load current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) suitable for starting and running of the motor. Natural / oil cooled autotransformer, suitable for motor starting duty, 6 start per hour with 65%,75%and 85% tapping with first filling of oil. 3-12 second time delay timer for automatic change over from reduced voltage to full voltage by adopting "watch dog circuit" theory. 3-20 second time delay timer for the protection if the changeover not occurred. Start stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop. . Suitable rated control fuses. CT operated thermal over load relay. Relay for single phase, under and over voltage, phase reversal protection. Universal voltage LEDs indicating lamp for start stop and trip. Set reset push button. Suitable rating Ammeter with selector switch.. Temperature scanner/recorder connection with BTD &RTD motor 10+2 + spare channel with tripping device which trip the motor.

Another set of contractor(rating of the contractor selection – utilization category-AC-4 and rating shall be withstand heavy duty capacitor surge current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall be provided for inter connecting the capacitor bank. The hold on coil of the contactor shall be connected with the timer circuit in such a manner that the capacitor will be on covering the accelerating time of the motor.

The heavy duty capacitor bank shall be in house / outside with the panel board after considering site condition and as per direction of EIC.

Motor Protection Circuit Breaker (MPCB)/ Moulded case circuit breaker (MCCB) for each motor feeder (bellow 50 KW)

2 to 2.5 times of motor full load Amp.3 pole N-linked MPCB with short circuit & over load protection (Rotary Knob Type) of breaking capacity 50KA with trip indicating auxiliary contact with universal voltage LED indicating lamp with under voltage release 200V AC and door coupling handle including shaft with front mounting type auxiliary contact 1NO+1NC.for motor control purpose with the followings for each breaker unit. The capacitor bank shall be in house / outside with the panel board after considering site condition and as per direction of EIC.

- 3 nos. - Universal voltage LEDs indicator lamp for on of the motor protection breaker (MPCB).
- 1 no.- 96 sq. mm flushes mounted type (higher than the breaker rating) Ammeter with selector switch and CTs.(breaker Amp/5 amp)
- 1 no. - Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label

Fully Automatic Star-Delta starter (FASD) (when motor KW bellow 30 KW) for each motor

Three (3) nos. air break contactor (rating of the contractor selection – utilization category-AC-4 and rating shall be 2 to 3 times of the motor full load current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall have to be connected with the 6 nos. lead of the motor terminals for forming the star-delta starter suitable for motor starting duty, 6 start per hour. 3-12 second time delay timer for automatic change over from star connection to delta connection. Start stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop. Suitable rated control fuses. Suitable thermal over load relay range with 1 OFF and reset type, Relay for single phase, under and over voltage, phase reversal protection shall have to be incorporated in the circuit. Universal voltage LEDs indicating lamp for start stop and trip. Set reset push button.

Another set of contractor(rating of the contractor selection – utilization category-AC-4 and rating shall be withstand capacitor surge current with necessary potential free auxiliary contractor and hold on coil voltage 220/240 volt.) shall be provided for inter connecting the capacitor bank. The hold on coil of the contactor shall be connected with the timer circuit in such a manner that the capacitor will be on covering the accelerating time of the motor.

The heavy deuty capacitor bank shall be in house / outside with the panel board after considering site condition and as per direction of EIC.

Moulded case circuit breaker (MCCB)/ Motor protection circuit breaker (MPCB) for each Motor feeder motor Rating bellow 3KW

2to 2.5 times full load current of the motor Amp.3 pole N-linked MCCB with short circuit & over load protection(Rotary Knob Type) of breaking capacity 50 KA with microprocessor based release with auxiliary NO+NC contact, under voltage release240V AC door coupling rotary handle with extension shaft with the followings for each MCCB

- 3 nos.- Universal voltage LEDs indicator lamp for ON (MCCB).
- 1 no. 96 sq. mm flushes mounted type (higher the breaker rating) Ammeter with selector switch
- 1 nos.- Universal voltage LEDs indicator for breaker trip& trip set reset button.
- 1 no- Circuit identification label

Direct on line starter (DOL) for each motor

Direct on line starter with single phase protection feature and also thermal overload relay range of ON/ OFF and reset type. The contractor rating will be such a manner that have to withstand the full load current of the motor as well as starting current 7 to 8 times of the full load current of the motor and starting duty 6 start per hour. Start- stop push button will be interlocked in such a fashion that the start push button shall not be functioned at running condition of the motor until unless motor stop .

Switch Fuse unit (SFU) for different feeder

Number and Amp (calculated according site condition) 3 pole N-linked AC-20A utilization category Switch fuse unit for illumination and spare with the followings for each unit.

- 3 nos.- Universal voltage LEDs indicator lamp for on .
- 1 no. 96 sq. mm flushes mounted type 50 Ammeter with selector switch
- 1 no- Circuit identification label

3.0. Checklist of Medium voltage panel being offered (Submitted by the successful bidder after issuing the work order)

A.	Make	:
B.	Rated voltage / Rated current	: 415Volt Amp
C.	Short circuit current withstand Capacity In KA	: 50 KA
D.	Sheet Steel Thickness	:
E.	Degree of Protection.	: IP-54
F.	Busbar Rating &Breaking Capacity 50 KA	: ------ Amp.
G.	Busbar type :	

Incomer

H.	Incomer Type	: ACB / MCCB
I.	Rating of the incomer	: -------- volt, ------- amp.
J.	Number of Incomer	: One / Two

Relay

J.	Protective relay Type	: Draw out / Non draw out type
K.	Relay voltage :	
L.	Relay feature (O.C & E.F)	: Yes /no
M.	Used in feeder Incomer/ motor	: yes / no

Bus coupler

N. Rating of the bus coupler : ------- amp.

Outgoing feeder

O. Outgoing Type : ACB / MCCB /MPCB
P. Nos. of outgoing :
Q. Rating of the outgoing : -------- volt, ------- amp
R. Starting device in built or not : No / Yes (if yes)
S. Type of starter : Star-Delta / ATS / DOL
T. Protective relay Type (Motor) :
U. Capacitor reactor bank (Motor) : Individual / Bank
V. Switch fuse unit Number rating :
W. Cable alley Number & Position :
X. Size Length Breadth Width in mm :

4.0. Testing (In presence of Dept. Eng,)

- Visual inspection for checking the panel components its voltage, current rating breaking capacity etc. as per approved drawing.
- The insulation test as Indian Electricity Rule
- The Relay tripping test as per specification
- The contractor shall supply 6 copies of certified copies of test report (factory)

5.0. INSTALLATION

5.1. Transport of materials from store to erection site

5.2. After opening the packing case, inspection of materials is required, if any damaged is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

5.3. All alignment levelling grouting anchoring and adjustment including inter panel locking as necessary in accordance with manufactures Any chipping / levelling insertion of packing plates minor attendance of board internals etc, as necessary for the above is in bidder scope.

5.4. Retightening the busbar and rechecking of the control panel wiring are in the bidder scope.

6.0. NUMBER OF PANEL

The MCC shall be provided with spare outgoing feeder as detailed bellow of followed the above technical specification and feed from the PDB.

Probable number panels are given bellow- (Minimise the number will be as per site condition)

1. Flash Mixture 1 No.
2. Alum agitator 1 No.
3. Clarifier bridge 1 no.
4. Chlorination 1 no.
5. Sludge Pumping 1 no.
6. Back washing 1no.
7. Air blower 1 no.

The above mentioned MCC panel feed from a PDB panel shall be placed in a convenient position of the filter bed. The caballing / earthing of the individual panel is in the bidder scope. The receiving of the power from PDB through cabling from any position HT substation of the plant is in the bidder scope.

8. The clear water pumping panel 1 no.

.

The receiving of the power through cabling from any position HT substation of the plant is in the bidder scope.

7.0 CABLING

7.1. GENERAL

At the time of designing the HT cable the short ckt. Current of the 350 MVA system fault level shall have to be considered. The voltage grade of the cable will be 11 KV grade stranded aluminium conductor PVC insulated armoured. All LT Cable power cable shall be 1.1 KV grade stranded aluminium conductor PVC insulated armoured and the control cable shall be of copper conductor, PVC insulated, armoured/XLPE insulated armoured. All power cable and control cable shall be laid neatly in covered masonry trench, fabricated cable trays. While selecting the cable size suitable de-rating factor shall be considered. Tenderer shall furnish a cable lamination plan giving type, size and length of the cable proposed to be used.
Cables used for clarifier power supply shall have at least one spare cable shall have to be draw. Both the free end of the cable shall be properly sealed protection against damaged.
All cables within buildings shall be laid neatly on wall or on trays as the case may be and shall be readily accessible for inspection or replacement.
The LT control cable shall be of 671 volt grade, PVC 1.5/2.5 sq.mm multi stranded, multi-core screened cable of electrolytic copper conductor. Two spare cores shall have to left for future provision

7.2. Cables and laying

The cables shall be 1.1 KV grade for LT 3.5/3 2/1 core XLPE AL conductor cable of suitable size and length as per requirement for electrical loading. The selection of the size of the cable will be considering voltage drop, 1.5-2 times of the normal current drawl by the load and de-rate factor of the cable when laid in ground, cable spacing and temperature of the ambient. All cable should as per relevant ISS specification. The cable will be ,if, necessary laid in underground trenches dimension for trench must be 450 mm width x 760 mm average depth, with brick protection on the top of the cable with 16 nos. bricks per meter and filling up the trenches with shifted soil, levelling up and restoring the surface to the satisfaction of the Engineer-in-Charge. Where cable is laid in masonry trench/metal trays, the cable trenches (when applicable) shall be filled up with sand or covered with chequered plate/RCC slab according to the direction of Engineer-in-Charge. Where necessary cables shall be supported on clamps of approved type and shall be properly protected with G.I. conduit or other protective covering as per direction of Engineer-in-Charge. Length of each type of cable should be assessed from G.A. drawing as well as physical verification from site.

7.3. GLAND& SOCKETS

7.3.1. For weather proof entry of armoured power & control cable through plain holes on equipment gland plate (Minimum threaded length 12 mm) threaded (ET) holes on equipment body / casing heavy duty brass machine finished & tined , double compression (as per BS 6121) thickness of plating not less than 10 mm. All washers and hard wares will be on tin plated brass. Rubber components shall be of neoprene tested quality.

7.3.2. The socket shall be Dowell (Mumbai) make solder less crimping type tubular / sockets ring / fork ring / pin type tinned copper for power cable termination . Nylon straps, aluminium cable tags, plastic ferrules (Yellow with black engraving) coloured insulation sleeves and tapes and all other necessary termination accessories, hardware's and consumable will have to be provided.

7.3.3. The socketing can be done by hydraulic punching machine and gland plate hole shall have to be made by drilling machine.

8.0. WIRE MATERIALS OF ELECTRIFICATION

The wire for electrification indoor & outdoor should be PVC aluminium fire proof & weather proof sheathed wire. PVC conduit wiring should be done for electrification the pump house, control room, blower room, filter bed illumination in such a manner that illumination level will be suitable for night maintenance work i.e. 120-200 lux. The ceiling fan (48 inch,52 inch) with electronic regulator , exhaust fan of 450mm size , man cooler fan for each motor and other luminaries should be provided as per direction of E.I.C. The wiring should be done by using distribution box and loading of one circuit never greater than 8

points as per I.E rules. Necessary power plug point shall have to be provided as per direction of E.I.C. All luminaries' fittings shall be industrial corrosion proof. The wiring of chlorination room should be done gas proof, arc proof and fittings will be gas proof and arc proof.

Industrial type florescent lamps with vitreous enamelled reflector of complete with chokes , starters etc. of renowned and approved make shall be used in all places of the plant except in control room, laboratory, entrance hall where decorative light fittings with diffuser shall be used. In chlorination room non corrosive type fittings shall be used. In Clarifier Bridge Deck industrial type dispersive reflector, vitreous enamel finish shall be used. 250 Watt mercury vapour lamp shall be provided at the following places such as entrance to chemical house, filter annex building, filter house and clear water pumping station, sludge pumping station etc.

9.0. CURRENT COLLECTOR ON CALIRIFIER BRIDGE

Current collector rings shall be constructed from phosphor bronze (or equal approved materials) of ample cross section and shall be widely spaced to facility maintenance and against flash over.

They shall be contained in brush holder fitted with adjustable springs for applying the correct tension on the brushes throughout the life. The brush gear must be designed so that no current is carrying by the spring. The whole brush assembly shall be continuously rated and capable of removal as a unit without disturbing the collector rings. The current collector ring assembly shall be properly insulated and housed in a dust and weather and splash proof enclosure and shall be securely fixed with central pivot/turntable as appropriate. The enclosure shall be through anti rusting treatment. The central rotating member shall have ball bearings at both ends.

10.0. EARTHING

The total electrical installation shall be effectively earthed by providing earthing arrangement. Each earthing station shall consists of 2 (two)G.I pipe of 40 mm dia. and 3.50 meter length sufficiently deep from the ground level and 2 meter away from the any civil structure and shall be acceptable any front side of the buildings and minimum distance between two the earthing station shall be maintained 3meter. The nos. of earthing station shall have to be done until unless the earth resistance value bellow 1 ohms.

Preparation of earth pit with necessary excavation and ground compaction/ foundation work with required masonry / bricks works including precast removable pit cover & necessary supply of coke breeze or charcoal, salt bricks, cement aggregates, gravels& sand. Making required hole in pit and wall for conductor with necessary hardware non corrosive type clamp nuts bolts etc. shall be provided.

After preparations of the pit underground horizontal counter poise (40mm MS rod) to be laid of a depth generally 1500 mm bellow the ground level or a greater depth as may be encounter to suit the site condition. Necessary drilling / digging for installation of UG vertical electrode and connection with horizontal counter poise to be done at four sides of the pump house.The riser pig tail from ground grid shall consists of one no 40 mm dia. rod / GI flat and shall be projected 800 mm above the ground level for location . All ground conductor connection below ground level shall be made of electric arc welding of 25 mm X 6 mm copper flat (necessary equivalent G.I flat as use of copper is restricted by G.O.I) All UG welded joints shall be treated with red led paint and afterwards should be coated with bituminous paint to prevent corrosion.

After installation of UG earthing network, back filling with suitable soil up to required level and compaction to be done. Back filling soil may be required to carry from nearly place / excavated soil.

Chipping / Floor finishing as necessary to ensure that over ground earthing conductor is bellow finished floor already exists.

All the electrical equipment shall have to be two separate earthing connection from the Ring main by 25 mm X 3 mm copper flat (necessary equivalent G.I flat as use of copper is restricted by G.O.I)

A separate neutral earthing of transformer arrangement shall have to be provided by the bidder.

11.0 TUBE LIGHT FITTINGS (LED)

The tube light fittings should be industrial corrosion proof with lamp and their fittings and fixing wiring should be done as per direction of EIC .Tube light fittings shall be single tube light. Each room shall be illuminated minimum 4 nos. Tube light fittings but 12 nos. of twin tube light fittings shall be provided for illuminating the pump room.

12.0 YARD LIGHTING FOR Sub Station & Pump House

For yard lighting arrangement 120W street light LED fittings 9 M swan neck MS pole placing 9 M along the 5 M width road and post top lantern type light fittings shall be use where road width below the 5 M. Post top lantern type LED fittings shall be of Philips fittings or Crompton make post top lantern/ decorative light fitting. All post top lantern shall be mounted on 76Nb GI medium pipe poles 7 M which shall be installed all along the roads at an average interval of 7 M. Pipe poles shall

be buried in the ground with proper solid PCC foundation. Each pole shall be securely earthed with one 40mm dia. GI pipe earth electrode and 7/14 SWG GI wire. Junction box with rewritable fuse for pipe pole shall be mounted above HFL.
For Annex Building entrance area 4 Nos. Bollard type LED light fittings equivalent to Philips/ Crompton shall be used. For main entrance gate 2 Nos. Globe type light fittings equivalent to Philips type HPC 106/125 HPF LED shall be used. One/ two No. outdoor type feeder pillar made of 2 mm thick sheet steel powder coating finish painted equipped with time switch, contactor, MCBs etc. shall be installed at suitable location for distribution of power to poles. The power supply for the feeder pillar shall be available from the LT PCC at sub-station. The cable for LT PCC to feeder pillar shall be 4C x 25 sq.mm. Al. conductor, XLPE insulated armoured cable and from feeder pillar to poles and gate lights the cable shall be 4C x 10 sq.mm. Al. conductor, XLPE insulated armoured cable. 4 nos. metal halide lamp fixture with 1000 W lamp shall have to be placed for beautification of the buildings. An artificial fountain shall have to be installed and enlightened by submerged colour lighting. The yard lighting will be operated auto manual system providing main switch with timer in parallel operation.

13.0 TESTING COMMISSIONING

After completion of erection work test shall be conducted as per relevant applicable rules and regulations and as per instruction of EIC. Temporary arrangement of electrical connection if necessary for the test shall be provided by the contractor including required instruments, tools & tackles, supervisory personnel and labour, the contractor shall record and furnish the test result in agreed format as per direction of EIC.

a) Mugger Test
b) HV Test
c) Primary & secondary current injection test

14.0 CEILING FAN

Minimum 2 Nos. 1200 mm sweep ceiling fans are to be provided with electronic regulator and necessary wirings and clamps and down rod etc. In each room 4 Nos. man cooler fans shall be provided in the clear water pump house.

15.0 EXHAUST FAN

The exhaust fan should be of 450 mm with the louvers with necessary wiring etc as per direction of EIC. Necessary holes are required to be done. Minimum 2 Nos. Exhaust fan are to be provided in each room minimum 6 Nos. fan for pumping station.

16.0 FIRE EXTINGUSHER

Fire extinguisher (Dry type) of 4 numbers with same sand bucket shall be provided in each panel room for fire management purpose and shock treatment chart

17.0 Main power distribution board (PDB)

Medium voltage Power Distribution board is required to receive power from the pre construction bus-bar of L.T. PDB of high lift pump house and provide ACB as incomer and ACB as outgoing feeders to feed motor control centre at utility loads at Intake well LT substation. The PDB shall be suitable for 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-54. The PDB shall be 2mm CRCA sheet steel enclosed, floor mounted type, self- supporting, fully compartmentalized , cubicle pattern and all the compartment door would be interlocked in such a way, the door cannot be open unless the switch is in off position. It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating. The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear. It shall have rear access and the cable termination arrangement shall be provided at the rear of respective feeder modules where detachable type undrilled cable gland plates shall be provided for this purpose. The vertical dropper bus bars through bus- coupler shall be placed in between two vertical aligned feeder modules. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 2 to 2.5 times of the full load current of low voltage side of the transformer. The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin moulded fibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of

withstanding a short circuit fault current of 50KA (r.m.s.) for 1 Sec. Two cut outs shall be provided at the top bus chamber and covered with plate for future extension purpose. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification. Air Circuit Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each Breaker shall receive 4 nos. 1.1KV 3.5 core not less than required 400 Sq. mm. armoured Al. Cable. For other outgoing feeders the cable alley shall have to be provided in such a fashion that the cable will be taken out easily. The control wiring of the panel shall be done with 1.1 KV grades PVC insulated flexible copper wires with tinned copper lugs and ferrule marking at each end. Wire bunches routed through horizontal and vertical wire ways which provide support and order. All hinged doors shall be earthed with flexible copper wires. Lifting arrangement shall be provided for lifting at the top of the panel. 2 Nos. space heaters with rotary switch shall be provided in bottom of the panel board.

18.0 The rating of the incomer will be full load current of LT side of the transformer:-

Incoming Feeders each consists of followings devices:

a) 2 (two) Nos. 1600 amps electrically draw out type microprocessor based 4 poles Air Circuit Breaker for two transformer with the following feature such as breaking capacity 50KA, rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage- 12 KV with quick make break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock.

b. 1 No. flush mounted type Voltmeter (0-500V) with selector switch for each ACB.

c. 1 No. flush mounted type Ammeter 0-(breaker rating) A with selector switch and CT for each ACB.

d. 3 nos. Universal Voltage LED for indication of Breaker on / off/ trip for each ACB.

e. Current Transformer of ratio 1500 / 5A, Class: 1.0, 15 VA 3 Nos for each ACB.

f. Current Transformer of ratio 1500 / 5A, Class: 5P10, 15 VA 3 Nos for each ACB.

g. Red, Yellow, Blue phase indicating lamp 3 Nos for each ACB.

h. CB ON / OFF / TRIP / Spring Charged / Trip Circuit Health DC Fail Indicating Lamp 6 Nos.

i. TNC Breaker Control Switch 1 No.

j. 1 No. Non Directional IDMT Relay with high instantaneous element for over current & earth fault protection type.

k. 1 No. flush mounted Multifunction meter with Power factor indication.

Outgoing Feeders

A. For feeding main panel of the pumping station

a) 1 no 1250 A for feeding the main pumping station panel electrically draw out type microprocessor based 4 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA, rated operational voltage – 690 V AC, rated insulation voltage 1000 V AC and impulse withstand voltage- 12 KV with quick make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital feeder protection relay with 3 phase over current & earth fault element each with high set unit for feeding theIGLR pumping station panel.

b. 1 No. 96 Sq. mm. flush mounted type Ammeter 0-1200 A with selector switch and CT

c.3 Nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

d.2 Nos. 63A TPN outgoing Feeders MCCB (for Yard Lighting + miscellaneous use)

e. 1 no 25 A TPN outgoing Feeders MCCB for house wiring purpose

f. 2Nos.1600 A for feeding the APFC panel placed in the substation electrically draw out type microprocessor based 3 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA, rated operational voltage – 690 V AC, rated insulation voltage 1000 V AC and impulse withstand voltage- 12 KV with quick make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital feeder protection relay with 3 phase over current & earth fault element.

g. 96 sq mm 0 – 400 A MISC. Ammeter with Selector Switch 1 No.

h. Current Transformer of ratio 400 / 5A, Class: 1.0, 15 VA 3 Nos.

i. TNC Breaker Control Switch 1 No.

j. CB ON / OFF / TRIP / Earth Fault Trip Indicating Lamp 4 Nos.

k. Spare 63 A MCCB -2 nos.

l. Spare for internal illumination & External illumination

Checklist for Medium Voltage Panel (PCC) (submitted by the successful bidder before issuing the work order)

A. Make :

B. Rated Voltage / Rated Current :

C. Short Circuit Withstand Capacity 50 KA : Yes / No.

D. Sheet Steel Thickness :

E. Degree of Protection IP – 54 : Yes / No.

F. Bus Bar Rating & Short time capacity : Amp / ……KA

G. Bus bar material / grade :

Incomer:

H. Incomer Type : ACB / MCCB / MPCB

I. Rating of the Incomer : --------Volt ….Amp…KA

Breaking Capacity ……No. of Pole

Relay:

J. Protective Relay Type : Draw out / Non draw out

K. Relay Voltage :Self/Separate……Voltage

L. Relay feature (O.C. & E.F.) : Yes / No.

M. Used in Incomer feeder : Yes / No.

Outgoing Feeder:

P. Outgoing Type : ACB / MCCB / MPCB

Q. Nos. of outgoing :

R. Rating of the outgoing breaking capacity : ------Volt ….Amp …….KA

…….No. of Pole

S. Protective relay Type (ACB Feeder) :

T. Switch Fuse Unit Number & Rating :

U. Size: Length x Breadth x Height in mm. :

V. Approximate weight in Kg. :

Testing

A. Visual inspection for checking the panel components, its voltage, current rating, breaking capacity etc. as per approved drawings.

B. The insulation Test as Indian Electricity Rules.

C. Operation test at site with load.

D. Relay Tripping Test as per specification at site.

Installation

A. Transport of materials from store to erection site

B. After opening the packing case, inspection of materials is required, if any damage is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

C. All alignment, levelling, grouting, anchoring and adjustment including Inter Panel locking as necessary in accordance with manufacturers. Any chipping/ levelling insertion of packing plate's minor attendance of board internals etc. as necessary for the above is in bidder scope.

D. Retightening of the bus bar and rechecking of the control panel wiring are in the bidder scope.

19.0 APFC panel (Automatic power factor correction panel)

The Medium voltage APFC panel is required to develop the power factor from 0.8 lag to 0.98 lag after providing 400 A TPN (four poles) ACB. The APFC panel shall be suitable for indoor type 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-40. The APFC panel shall be 2mm CRCA sheet steel enclosed, floor mounted type, self- supporting, fully compartmentalized, dust proof, cubicle pattern. It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating. The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear. It shall have rear access at respective feeder modules where Capacitor bank shall be provided. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 2 to 2.5 times of the full load current of the capacitor draw current. The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin moulded fibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of withstanding a short circuit fault current of 50KA (r.m.s.) for 1 Sec. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification.

The capacitors shall be of APP type. The capacitors shall conform to IS 2834 of latest amendments. The panel shall be suitable for minimum 250 KVAR rating (Exact KVAR rating should be calculated and submitted at the time of detail engineering) and complete in all respect with 4/6 (four/Six) stages of each 30 KVAR, 4/6 (four/six) stages of each 25 KVAR, 2 stages of each 10 KVAR, 2 stages of each 5 KVAR capacitor bank to generate 250 KVAR at 440 V as per requirement to improve P.F. as far as possible 0.95(in no condition the PF will be go to leading stage). The capacitors should come into line automatically with certain time delay for which contactors / relays / timers should be used. Suitable current transformer and potential transformer is to be used. There shall be also provision for manual push button operation in addition to the auto mode. Switches with HRC fuses should be provided for each current. P.F. meters in incoming & outgoing are to be placed along with one ammeter for displaying the improvement in P.F. achieved. The panel should be with all interconnection complete. The control wiring should be with 2.5 sq mm 'Cu' single core conductor of 1.1 KV grade cable.

The following components are to be incorporated with the panel.

a) All power contactor shall be Capacitor duty (with dumping resistance) for capacitor switching.

b) All individual feeders will be backed by suitable rated Power fuse base with link.

c) All individual bank should be suitable for Manual / Auto operation.

d) APFC relay will be 16 channels with microprocessor base system along with display.

20.0 Testing

A. Visual inspection for checking the panel components, its voltage, current rating, breaking capacity etc. as per approved drawings.

B. The insulation Test as Indian Electricity Rules.

C. Operation test at site with load.

D. Relay Tripping Test as per specification at site.

21.0 Installation

A. Transport of materials from store to erection site.

B. After opening the packing case, inspection of materials is required, if any damage is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

C. All alignment, levelling, grouting, anchoring and adjustment including Inter Panel locking as necessary in accordance with manufacturers. Any chipping/ levelling insertion of packing plate's minor attendance of board internals etc. as necessary for the above is in bidder scope.

D. Retightening of the bus bar and rechecking of the control panel wiring are in the bidder scope

Executive Officer
Burdwan Municipality

SECTION – J

DETAILED TECHNICAL SPECIFICATION FOR SUBSTATION PANELS

1.0 SCOPE OF WORK:

The scope of work of this specification covers selection of HT VCB panel for receiving of power from WBSEDCL and feeding the power transformer of one number 800 kVA as per requirement of load demand as well as smooth running of water intake system pumping station and other will be constructed near the vicinity of the river. The construction of building is the bidder scope (Specification of civil works as per Annexure II building of this Technical specification) and maintenance of the same as per Technical specification writes down in this specification. The arrangement of earthing, cabling, internal illumination system and fire extinguisher etc shall have to be constructed/ lying as per specification details writes down in the Bid.

2.0 GENERAL

1. HT & LT Distribution Switchgear.
2. 5 (five)no 800 kVA capacity of transformer 11KV/ 0.433 KV at Intake site with Earthing of install
3. LT PDB Panel

3.0 HT 11 KV VCB PANEL

11000 Volt400/ 630 Amp three phase 50 Hz VCB switch board shall have to be provided for feeding 800 kVA transformers at indoor substation at Intake System near vicinity of the river Damadar.

3.1 Standards

The offered equipment should comply to IS: 13118,IS:3427,IS:2705,IS:3156,IS:613 up to the latest version. The VCB and Switchboard shall be complied the latest international standard. The VCB shall be type tested in accordance to IEC: 62271-100, whereas the cubical shall be type tested as per IEC: 62271-200 and to meet stringent safety norms, the cubical shall be subjected to internal arc test at 40 KA 1 sec. The switchgear shall be subjected to climate aging tests accordance to IEC 60932,and proven to design class 2 (the highest class).The switch gear shall be designed and tested to ensure the safety of the operator in the event of any fault. Arc vents shall be provided in the bus-bar, cable and VCB compartments.

3.2 HT VCB Panel

The each H.T switch board shall be suitable for three phase 11000 volt 50 Hz A.C main power supply and at least suitable for 350 MVA fault level of power supply. This shall be made of high grade pickled-&-oiled mild steel sheet cut & folded on numerical controlled machines. The cubical parts shall be riveted / bolted together to form a rigid enclosure with fully segregated bus-bar compartment, circuit compartment, VCB compartment and low voltage compartment. The construction shall be complied fully with the requirement of a metal clad enclosure as defined in IEC 62271-200. Standard protection grade shall be IP-45as per IEC-60529.

The bus bar chamber shall be housed of the main bus bar system. The bus bar shall be provided with the insulation along the complete length and the joints will be provided with removable shrouds and shall be garneted no leakage current shall not be flowed in the long run. The main bus bar shall be 630 amps and made of electrolytic grade copper and shall be vertically placed one after another. The bus bar should be air insulated and must be covered with by special heat shrink PVC insulating sleeve / epoxy insulation coating and follow the colour code R-Y-B for easy identification of the phases. The bush bar chamber shall be designed or placed in a position no live parts should not be easily accessible. The earth bus bar also should be Electrolytic grade copper. The bus bar system shall be single bus bar type. The VCB chamber shall be housed the VCB truck. The movement of the VCB truck shall be interlocked with the VCB and the VCB door to provide complete safety. The automatic metal shutters shall be provided to prevent access to live parts when VCB is isolated or withdrawn. This metallic shutter shall be spring operated and the mechanism is, in turn, linked to the movement of the circuit breaker truck. The mechanism shall not be acceptable if it is gravity control. The above mechanism shall be adopted at when the voltage transformer (potential transformer) is withdrawn from the circuit. The VCB comportment shall be fitted with a padlock able front door. The operation of the VCB and the earthing switch shall be carried out with the door closed.

The followings interlocks shall be provided in the panel for safety Measure:-

- All operation shall be carried behind closed door.
- VCB shall not be engaged or withdrawn unless it is in open position.
- VCB shall not be operated unless it is in the engaged or test position.
- Earthing switch shall not be closed when VCB in engaged position.
- VCB shall not be engaged when the earthing switch is closed.
- The rear door shall not be opened unless the breaker is in test position and the earthing switch is closed.
- VCB shall not be racked unless the plug is lifted.

The VCB cubical and parts shall be painted by an epoxy base powder coating paint. The breaker shall be vacuum break with integral truck design and horizontal isolation and horizontal draw out type. It shall have a motor/hand charged spring, stored energy manual or electrical release. The spring charging shall be O-C-O cycle. The VCB should be of single break design and have one interrupter per phase. The vacuum interrupter should not be pinch tube type design, it should be sealed by brazing in a vacuum oven and all the vacuum interrupter must be segregated in cast resin housing. The minimum expected operational life of the vacuum interrupter should be 80000 thousand mechanical, 10000 electrical at rated current & 100 at rated short circuit. The VCB mechanism shall be minimal maintenance. The breaker should have minimum auxiliary switch of 6 NO +6 NC. The VCB shall be tested as per latest international standard IEC: 62271-100.

The low voltage compartment shall have in the cubical for housing mounting terminals, fuses, MCB, relays, meter etc for any standard scheme. An additional chamber should be mounted, if, necessary, for complex protection and control scheme. Wire bunches should be routed through, horizontal and vertical wire ways which provide order and support.
The cable termination height shall be more than 600 mm above floor level and generous space will be provided for terminating the power cables. This will be ensures a higher bending radius as well as reduces tension on terminals. The cable chamber shall be housed CT and the earthing switches. Circuit earthing switch shall be affected by a fault make earthing switch interlocked with the VCB. The switch will be tested to make and carry the rated short circuit for 2 seconds. Earthing by means of integral earthing switch is proven to be safe, simple and reliable. Bus bar earthing will be effected by a bus bar earthing switch usually mounted at the bus section panel. Earthing trucks for cable earthing and bus earthing trucks shall be provided for safety management.

The dual core double ratio current transformer shall be mounted of 50-25/5+5 amp current capacity of bushing type CT and mounting arrangement ensures higher degree of safety. The class of CT will be 5P10 of class 0.5 per phase for protection & class-1 for metering respectively. The burden of the CT should not less than 15VA.

The voltage (potential) transformer (PT) shall be draw out type and shall be mounted rear side and upper half of the cubical. The potential transformer should have the HRC fuse protection both the primary and secondary side. There should be provision for replacing the fuses both the sides when the circuit is in live condition. The P.T cast resin moulded and insulated type encapsulated and 3 phase type with Y-Y connection. It should be class of 1.0 for industrial metering and class 5.00 for relay co-ordination with over voltage factor 1.2 continuous for a solidly grounded system.
The rectifier / stored energy power pack unit shall be provided in the panel for closing and operating mechanism the AC source will be voltage transformer. The one no universal voltage LED indicating lamp shall be included in the power pack unit in input and output side that indicates system is healthy.

The name plate, lifting arrangement and the designation label should be provided for each panel.

3.3 Technical Data.

1.	Rated voltage at 50 Hz	up to 12 KV
2.	Impulse withstand voltage	75 k Vp
3.	One minute power frequency withstand voltage	28 kV
4.	Transient recovery voltage	20.6 k Vp
5.	Normal current	630 Amp.
6.	Short circuit breaking current	25 kA
7.	Short circuit making current	50 KA
8.	Duration of short circuit	3 sec
9.	Degree of protection	IP 45
10.	Operating sequence	0-0.3 sec-CO-3 min-CO

11.	Operating time (in msec)	35
12.	Breaking time	< 3 cycle
13.	Full load switching life	10,000
14.	Closing voltage / Tripping voltage	24V-220V
15.	Spring charging voltage	24 V-220 V DC / 110 V-200 V AC
16.	DC source	Rectifier /stored energy power pack.

3.4 Components for each feeder

1. 1 set mechanical ON& OFF indicator
2. 1 set of universal voltage LED indicating lamp for On & OFF ,Trip, Spring charged, Trip circuit Healthy, DC fail indication of the VCB
3. Shunt trip coil of rated DC voltage
4. 1 space heater with ON & OFF switches with thermostatic arrangement.
5. Panel illumination lamp with door switch
6. 1 no 96 sq mm (0-14 KV) voltmeter with selector switch with protection fuses.
7. 1no 96 sq mm (0-75A) ammeters with selector switch.
8. 1 no Local remote switch
9. TNC breaker control switch with Pistol handle.

3.5 Relay details. For Incomer feeder & Outgoing feeder with Transformer protection

The Digital microprocessor based feeder protection relay shall be provided for incomer panel. The IDMT characteristics shall have to be incorporated in the relay with the feature 3 phase over current with Earth fault protection with current setting from 50 to 200% of normal current in 7 steps in case of over current and 10 to 40% of normal current in 7 steps in case of earth fault with self / without self-supervision feature- if without self-supervision - supervision relay shall be incorporated separately .The relay shall have self / without high speed tripping device-if without high speed tripping device – high speed tripping device or serial port shall have to be incorporated. The rating of the relay will be 5 Amp or 1 Amp as per rating of the CT. The auxiliary supply will be 20 – 110 V DC as per output of the rectifier/ stored energy power pack and the rating of shunt/ under voltage relay tripping device. The construction of the relay shall have to draw out type in such a manner when relay will be taken out that CT Circuit must have the short circuited.

Trip circuit Supervision relay VAX 31 / Eqv. – 1 no
High speeds Master Trip relay VAJH 13 /Eqv. - 1 no.
Auxiliary relay for Transformer faults- VAA33- 2 nos.
8 Window Annunciator – 1 No

3.6 Testing

The fully assembled switchboard shall be offered for Routine Testing as per provision of IS Standard and witnessed by the Dept. engineer. The Travelling cost boarding and fooding cost bear by the agency. The movement of the Eng. Personnel should be least path and minimum time. The following tests are carried out

a. Insulation Resistance measurement.
b. High voltage test with breaker close and open.
c. Contact resistance measurement of the breaker
d. High voltage test of the breaker.

The manufacturer/ bidder should be submitted 6 copies all test report at the time of billing.

3.6 Installation

The preparation of foundation should be according to the foundation plan. Enough space should be provided nearly 1.7 M from the front and 0.1000 m from the rear. Foundation bolts, cable trenches should be prepared as per approved submitted drawing. The erection should be carried out as per manufacturer instruction manual.

4.0 POWER TRANSFORMER

The rating of the indoor type 800 kVA Transformer shall be 11000 volt in primary side and 433 volt in secondary side. The transformer is to be required for feeding the total electrical loading of the intake System pumping station.

4.1 General

Power Transformer shall have to two sets of winding (suitable size of the electrolytic grade copper conductor) wound in a common magnetic core. The core of the windings shall be enclosed in a tank filled with Transformer oil. The property of Transformer oil shall be in accordance with recent modified IS and the colour of the oil pale yellow colour. The Terminals of the windings shall be connected to the end of the internal bushing ends. The bushing shall be supported by the Transformer tank body. A tap changer shall be provided in the Low voltage side and it is off load tap changing type of scale ±2.5% and 5 % in accordance with vector group DY-11 and N brought out. The oil filed transformer shall have a conservator tank / corrugated tank without conservator with / without level gauge placed slightly higher of the Transformer tank with/ without a breather filled by silica jell which allow the air to the conservator tank without moisture. A Buchholz relay / DMCR protection relay shall be placed – it protects the transformer when gases are generated in oil due to small discharge or arc. An explosion vent shall have to be provided for protecting the Transformer from firing. The transformer will be run continuously so the efficient cooling system shall be provided by radiator fins type arrangement/ in transformer core tank. The fins / extended core tank shall be jointed in such a fashion no leakage of transformer oil will not be acceptable. A winding Temperature indicator with alarm and trip contact placed in the Transformer tank with time delay setting (i) Alarm- 95degree centigrade (ii) Trip- 120 degree centigrade. The followings safety devices will be accompanied with the transformer.

The Transformer loss shall be as per recent modified IS level 1 i.e. at 50% load the losses shall be 3.0 kW & at 100% loading 9.0 KW (MAX) with a percentage impedance 5%.

- Fluid Level gauge.
- Bushing for termination of cables
- Explosion Vent
- Cooling system
- Hot spot Temperature indicator
- Buchholz Relay/ DMRC protection relay
- Silica gel dehydration breather (obligatory)
- Oil filter valve
- Transformer tank drain valve one upper and one lower
- Bi-directional roller
- Two earthing Terminals
- Air release valve
- Lifting Lugs
- Off load tap changer at low voltage side with padlock arrangement
- Rating plate with diagram
- Oil for first filling of oil.

4.2 Check List Filled by the bidder (before issuing of the Work order)

1.	Name of the manufacturer	:
2.	Service	: Continuous / Short time;
3.	Rated KVA	:
4.	Rated voltage at H.V & LV side	:
5.	Rated Frequency	: --------- Hz
6.	Temperature rise of oil	: ----- Degree centigrade
7.	Temperature rise of winding by	
	Resistance method	: ------- Degree centigrade
8.	Number of phases	:
9.	Connection	: HV------- - LV------
10.	Vector Group	: ---------
11.	Tapings	: LV: --------- Per cent
12.	No load current at rated voltage &	
	At rated frequency	: HV-----Amp. LV----Amp.
13.	No load loss at rated voltage &	
	At rated frequency	: ---------- KW
14.	Load loss at rated current& 75	

	Degree centigrade	: ---------Percent
15.	Impedance at rated current& 75	
	`Degree centigrade	: ---------Percent
16.	Reactance at rated current & frequency	: ---------Percent
17.	Efficiency at 75 Degree centigrade at	
	Unity power factor:	
	At full load	: ---------Percent
	At ¾ th.full load	: ---------Percent
	At ½ full load	: ---------Percent
18.	Efficiency at 75 Degree centigrade at	
	0.8 lag power factor:	
	At full load	: ---------Percent
	At ¾ th.full load	: ---------Percent
	At ½ full load	: ---------Percent
19.	Regulation at full load at 1000C	
	At unity power factor	: ---------Percent
	At o.8 power factor lag	: ---------Percent
20.	Core & Windings weight	: ----------kg
21.	Tank with fittings	: ---------- kg
22.	Total Weight	: ----------kg
20.	Quantity of oil	: ---------- Litre
24.	Overall dimension	: Length --------mm
	Width ----------mm	
	Breadth --------mm	
25.	Terminals arrangement at HV & LV	:
26.	Terminals Markings	:

4.3 Testing (Factory)

The following routine test shall be performed at factory in presence of the dept. engineer not bellow the rank of SAE. The Travelling cost boarding and food cost bear by the agency. The movement of the Eng. Personnel should be least path and minimum time. The following tests are

a. Ratio and polarity test
b. Load losses test
c. Impedance measurement test
d. Insulation test
e. Resistance of windings
f. No load loss
g. No load current
h. Voltage test- windings (i) Separate source (ii) Induced Voltage
i. Core insulation voltage Test
j. Efficiency calculation submitted by the bidder in presence of the Dept. Testing Eng.
If the efficiency bellow the 98 % the transformer will not be acceptable.

4.4 Installation

The preparation of foundation should be according to the foundation plan. Enough space should be provided nearly 1.7 M from the front and 0.1000 m from the rear. Foundation bolts, cable trenches should be prepared as per approved submitted drawing. The first filling of oil shall be done by using oil filtration machine and record the break down voltage of the oil by using H.V oil testing machine. The erection should be carried out as per manufacturer instruction manual

5.0 Main power distribution board (PDB)

Medium voltage Power Distribution board is required to receive power from 800 kVA capacity Transformers and provide ACBs as incomer and ACB as outgoing feeders to feed Motor Control Centre at utility loads for Pump House at Burdwan. The PDB shall be suitable for 415V ± 10%, 50Hz ± 3%, 3 phase, 4 wire supply system and Degree of Protection IP-54. The PDB shall be 2mm CRCA sheet steel enclosed, floor mounted type, self- supporting, fully compartmentalized , cubicle

pattern and all the compartment door would be interlocked in such a way, the door cannot be open unless the switch is in Off position. It shall be finish painted with powder coated paint after necessary chemical treatment for rust free surfaces and application of anti rust chemical coating. The base frame of the panel shall be made of ISMC – 75 channels. The panel shall be dead front type with concealed hinged doors at front and bolted covers at the rear. It shall have rear access and the cable termination arrangement shall be provided at the rear of respective feeder modules where detachable type undrilled cable gland plates shall be provided for this purpose. The vertical dropper bus bars shall be placed in between two vertical aligned feeder modules. The bus of the panel shall be made of E91E grade of Aluminium alloy insulated with 1.1KV grade heat shrink type PVC colour coded sleeve. The rating of the bus bar shall be 2 to 2.5 times of the full load current of low voltage side of the transformer. The current density of the bus bars shall not exceed 1Amp / Sq. mm. The bus bars shall be supported on non-hygroscopic resin moulded fibre glass supports / insulators and the distance between supports/insulators shall be so designed to make the bus bar system capable of withstanding a short circuit fault current of 50KA (r.m.s.) for 1 Sec. Two cut outs shall be provided at the top bus chamber and covered with plate for future extension purpose. The front bus bar chamber shall be fully shrouded to avoid accidental contact with the live bus bars. The minimum clearance between bus bars and bus bars to earth shall be as per I.S. Specification. Air Circuit Breaker termination shall be done with extended bus bar arrangement. The cable termination chamber shall be provided with cable supporting clamps. Each Breaker shall receive

4 nos. 1.1KV 3.5 core not less than required 240 Sq. mm. armoured Al. Cable. For other outgoing feeders the cable alley shall have to be provided in such a fashion that the cable will be taken out easily. The control wiring of the panel shall be done with 1.1 KV grades PVC insulated flexible copper wires with tinned copper lugs and ferrule marking at each end. Wire bunches routed through horizontal and vertical wire ways which provide support and order. All hinged doors shall be earthed with flexible copper wires. Lifting arrangement shall be provided for lifting at the top of the panel. 2 Nos. space heaters with rotary switch shall be provided in bottom of the panel board.

The rating of the incomer will be full load current of LT side of the transformer.

Incoming Feeders each consists of followings devices:

a. 1(one) No. 800 amps electrically draw out type microprocessor based 4 poles Air Circuit Breaker with the following feature such as breaking capacity 50KA, rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage- 12 KV with quick make break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock.

b. 1 No. flush mounted type Voltmeter (0-500V) with selector switch.

c. 1 No. flush mounted type Ammeter 0-(breaker rating) A with selector switch and CT

d. 3 nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

e. Current Transformer of ratio 800 / 5A, Class: 1.0, 15 VA 3 Nos.

f. Current Transformer of ratio 800 / 5A, Class: 5P10, 15 VA 3 Nos.

g. Red, Yellow, Blue phase indicating lamp 3 Nos.

h. CB ON / OFF / TRIP / Spring Charged / Trip Circuit Health DC Fail Indicating Lamp 6 Nos.

i. TNC Breaker Control Switch 1 No.

j. 1 No. Non Directional IDMT Relay with high instantaneous element for over current & earth fault protection type

k. 1 No. flush mounted Multifunction meter with Power factor indication.

Outgoing Feeders

For feeding main panel of the Filter bed & clear water pumping station

A 2 nos. 630 A (for Intake pumping station) for feeding the main pumping stations panel electrically draw out type microprocessor based 4 pole Air Circuit Breaker with the following feature such as breaking capacity 50 KA,

rated operational voltage – 690 V AC, rated insulation voltage – 1000 V AC and impulse withstand voltage- 12 KV with quick make quick break trip free mechanism and provided with over load and short circuit trip release, shunt trip coil, safety shutters, castle lock with Digital feeder protection relay with 3 phase over current & earth fault element each with high set unit for feeding the IGLR pumping station panel.

a. 1 No. 96 Sq. mm. flush mounted type Ammeter 0-1200 A with selector switch and CT

b. 3 Nos. Universal Voltage LED for indication of Breaker On/Off/Trip.

B. 2 Nos. 63A TPN outgoing Feeders MCCB (for Yard Lighting + miscellaneous use)

C. 1 no 25 A DPN outgoing Feeders MCCB for house wiring purpose

Checklist for Medium Voltage Panel (PCC) (submitted by the successful bidder before issuing the work order)

A.	Make	:	
B.	Rated Voltage / Rated Current	:	
C.	Short Circuit Withstand Capacity 50 KA	:	Yes / No.
D.	Sheet Steel Thickness	:	
E.	Degree of Protection IP – 54	:	Yes / No.
F.	Bus Bar Rating & Short time capacity	…	Amp / ……KA
G.	Bus bar material / grade	:	

Incomer:

H.	Incomer Type	:	ACB / MCCB / MPCB
I.	Rating of the Incomer	:	--------Volt ….Amp…KA
	Breaking Capacity ……No. of Pole		

Relay:

J.	Protective Relay Type	:	Draw out / Non draw out
K.	Relay Voltage	:	Self / Separate……Voltage
L.	Relay feature (O.C. & E.F.)	:	Yes / No.
M.	Used in Incomer feeder	:	Yes / No.

Outgoing Feeder:

P.	Outgoing Type	:	ACB / MCCB / MPCB
Q.	Nos. of outgoing	:	
R.	Rating of the outgoing	:	--------Volt …….Amp ……..KA
	Breaking Capacity		……No. of Pole
S.	Protective relay Type (ACB Feeder)	:	
T.	Switch Fuse Unit Number & Rating	:	
U.	Size: Length x Breadth x Height in mm.	:	
V.	Approximate weight in Kg.	:	

Testing

A. Visual inspection for checking the panel components, its voltage, current rating, breaking capacity etc. as per approved drawings.
B. The insulation Test as Indian Electricity Rules.
C. Operation test at site with load.
D. Relay Tripping Test as per specification at site.

Installation

A. Transport of materials from store to erection site
B. After opening the packing case, inspection of materials is required, if any damage is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

C. All alignment, levelling, grouting, anchoring and adjustment including Inter Panel locking as necessary in accordance with manufacturers. Any chipping/ levelling insertion of packing plate's minor attendance of board internals etc. as necessary for the above is in bidder scope.

D. Retightening of the bus bar and rechecking of the control panel wiring are in the bidder scope.

6.0 Testing

A. Visual inspection for checking the panel components, its voltage, current rating, breaking capacity etc. as per approved drawings.

B. The insulation Test as Indian Electricity Rules.

C. Operation test at site with load.

D. Relay Tripping Test as per specification at site.

7.0 Installation

A. Transport of materials from store to erection site.

B. After opening the packing case, inspection of materials is required, if any damage is occurred during transportation necessary rectification is to be done, if require touch up paint should be done where necessary.

C. All alignment, levelling, grouting, anchoring and adjustment including Inter Panel locking as necessary in accordance with manufacturers. Any chipping/ levelling insertion of packing plate's minor attendance of board internals etc. as necessary for the above is in bidder scope.

D. Retightening of the bus bar and rechecking of the control panel wiring are in the bidder scope

Executive Officer
Burdwan Municipality

SECTION –K

ANNEXURE – I

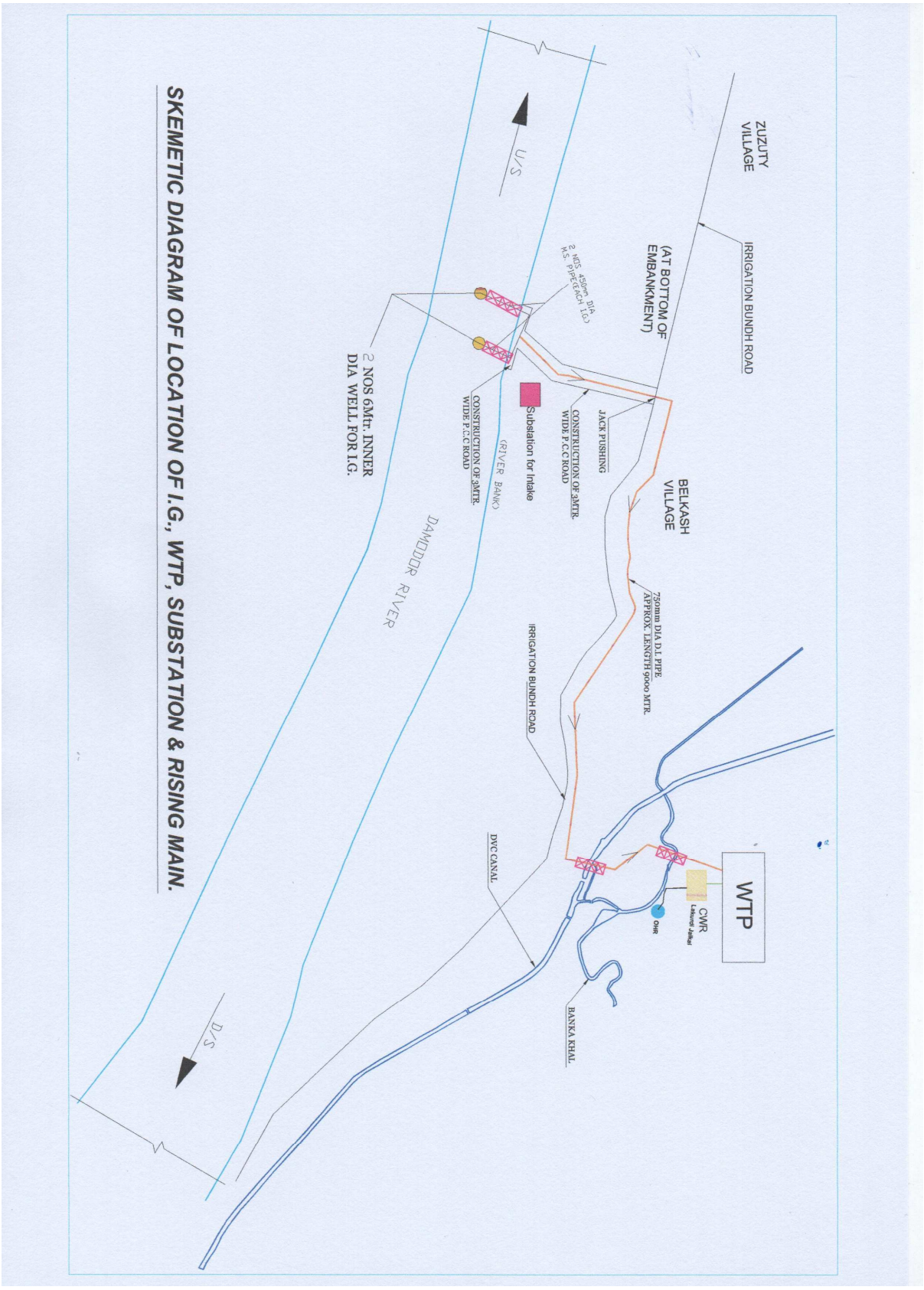
SOIL INVESTIGATION REPORT

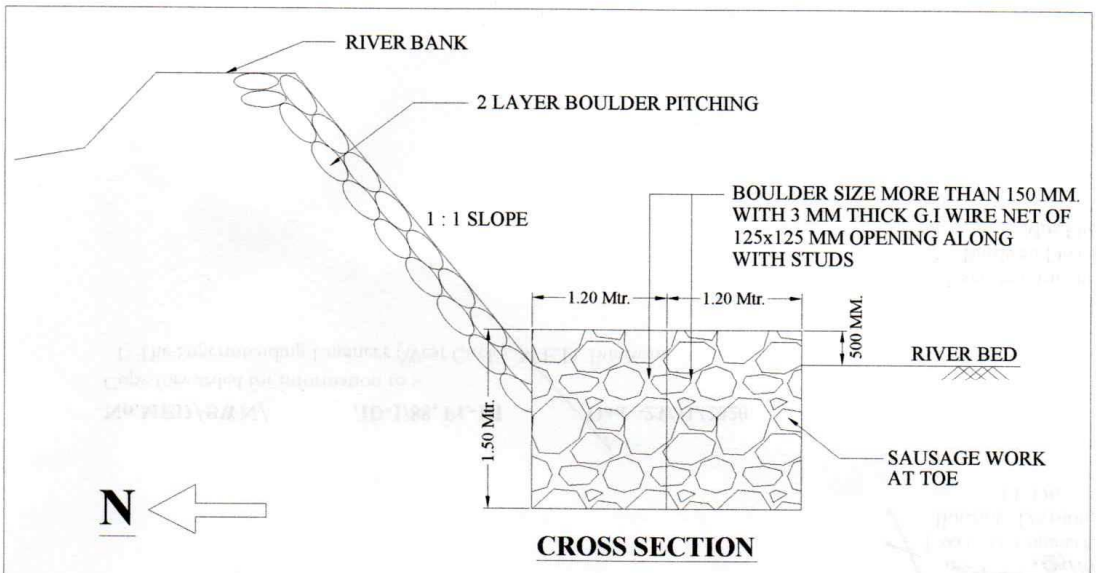
Soil Investigation Report is to be done by the bidder and submit to concern EIC for approval.

Executive Officer
Burdwan Municipality

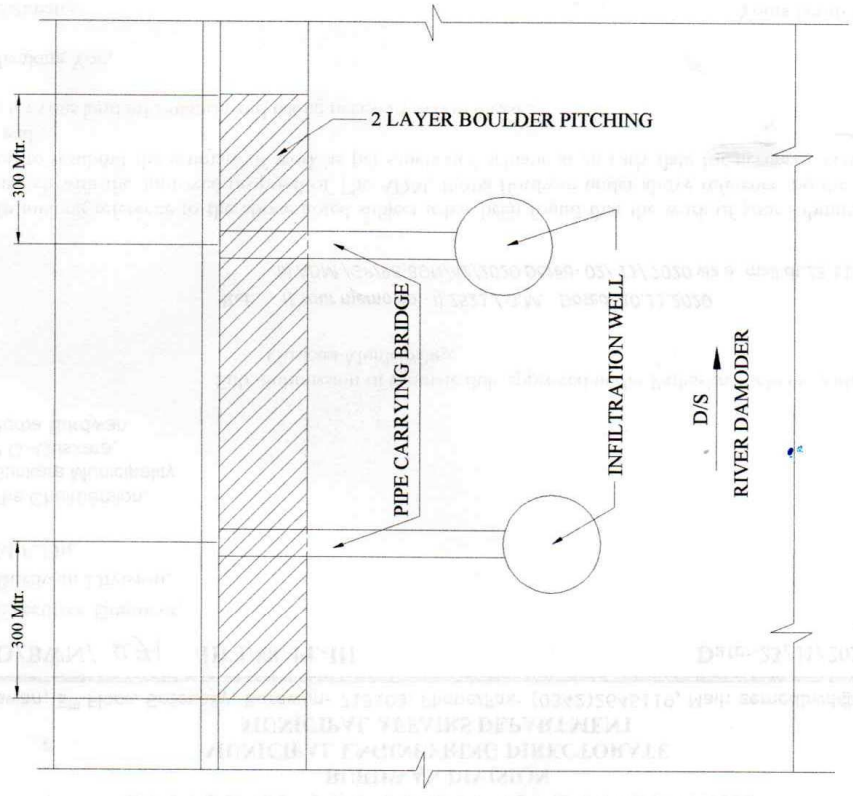
ANNEXURE –II

SCHEMATIC DIAGRAM



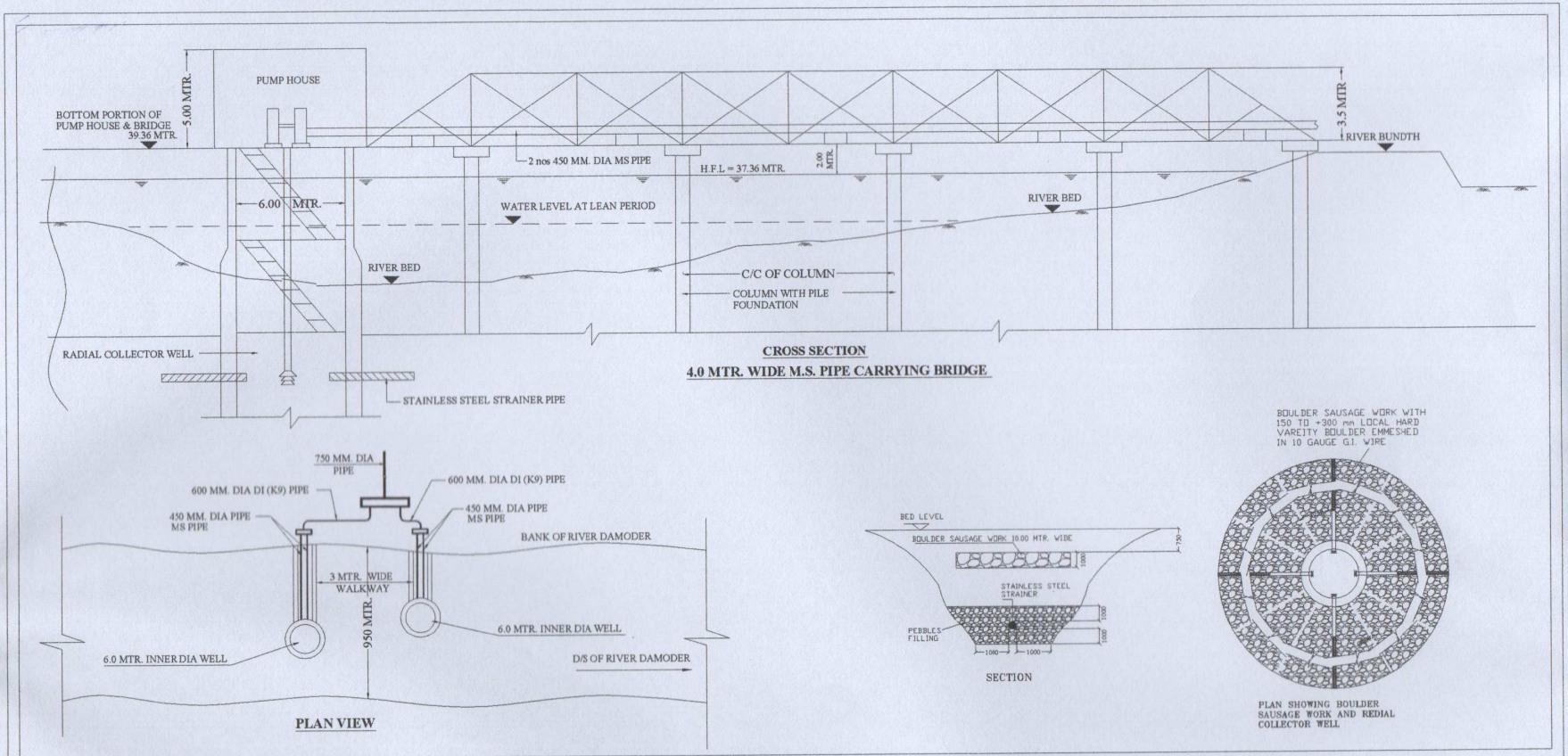


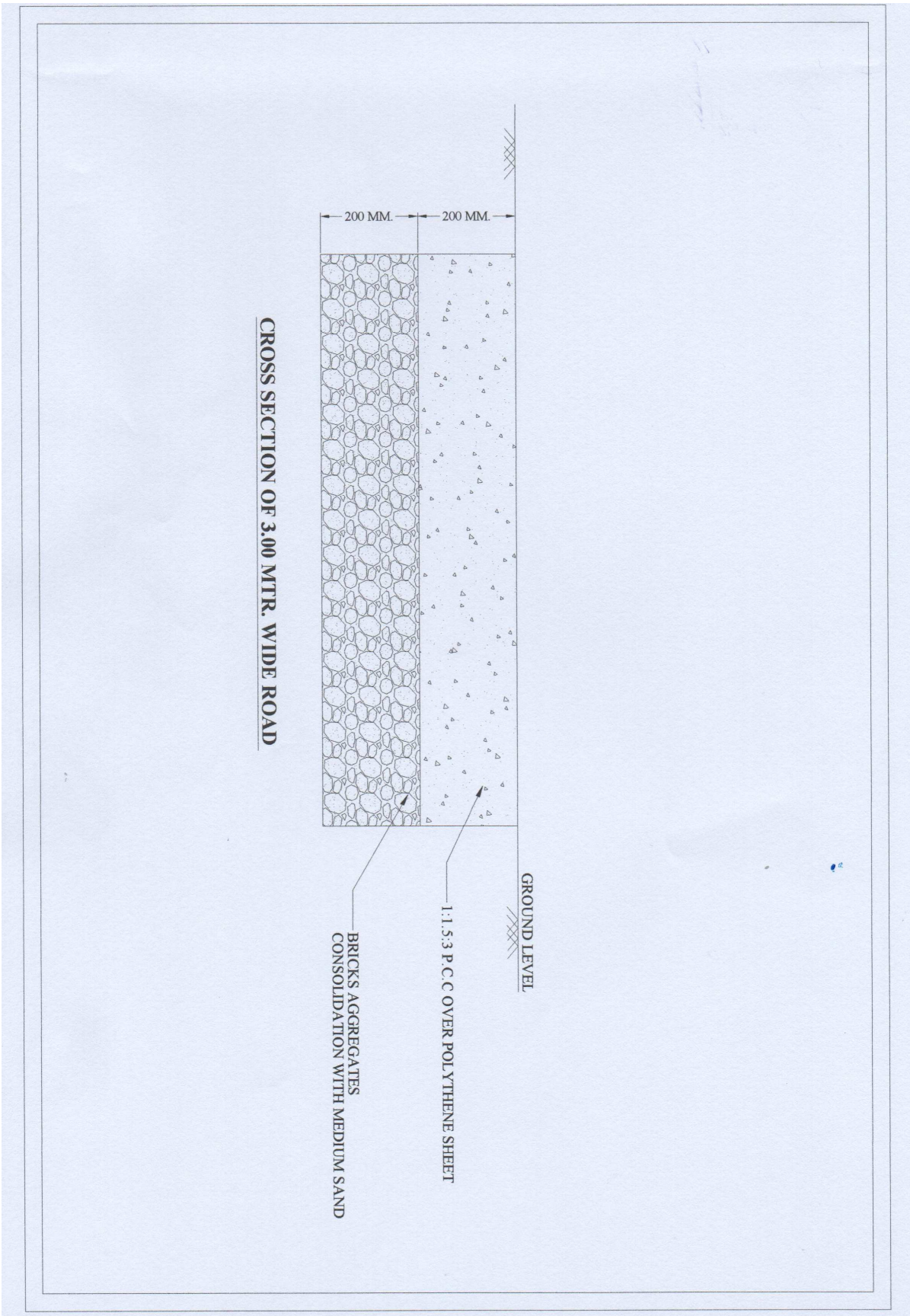
CROSS SECTION



PLAN VIEW

SCHEMATIC DIAGRAM OF CROSS SECTION OF RIVER BANK PRORECTION WORK


PUMP HOUSE
5.00 MTR.
BOTTOM PORTION OF PUMP HOUSE & BRIDGE 39.36 MTR.
2 nos 450 MM. DIA MS PIPE
H.F.L = 37.36 MTR.
2.00 MTR.
3.5 MTR
RIVER BUNDTH
6.00 MTR.
WATER LEVEL AT LEAN PERIOD
RIVER BED
RIVER BED
C/C OF COLUMN
COLUMN WITH PILE FOUNDATION
RADIAL COLLECTOR WELL
STAINLESS STEEL STRAINER PIPE
CROSS SECTION
4.0 MTR. WIDE M.S. PIPE CARRYING BRIDGE
750 MM. DIA PIPE
600 MM. DIA DI (K9) PIPE
600 MM. DIA DI (K9) PIPE
450 MM. DIA PIPE MS PIPE
450 MM. DIA PIPE MS PIPE
BANK OF RIVER DAMODER
3 MTR. WIDE WALKWAY
950 MTR.
6.0 MTR. INNER DIA WELL
6.0 MTR. INNER DIA WELL
D/S OF RIVER DAMODER
PLAN VIEW
BED LEVEL
BOULDER SAUSAGE WORK 10.00 MTR. WIDE
750
1000
STAINLESS STEEL STRAINER
PEBBLES FILLING
1000
1000
1000
1000
SECTION
BOULDER SAUSAGE WORK WITH 150 TO +300 mm LOCAL HARD VAREITY BOULDER EMMESHED IN 10 GAUGE G.I. WIRE
PLAN SHOWING BOULDER SAUSAGE WORK AND REDIAL COLLECTOR WELL



CROSS SECTION OF 3.00 MTR. WIDE ROAD

ANNEXURE – III

LIST OF VENDORS (FOR INTAKE WATER PUMPING STATION)

SL No.	Equipment / Instrument	Make
(1)	(2)	(3)
1	PUMP	KIRLOSKAR/ MATHER & PLANT/ WPIL
2	M.V. MOTOR	KBL/CROMPTON/ABB/MARATHONE/SIEMENS
3	H.T. SWITCHGEAR	BIECCOLAWREE /ELECTROTECKNICA/SCHINDER
4	CONTROL DESK/L.T. BOARD	SELLWIN/POSITRONICS/RNR
5	ACB/MCCB	L&T/SIEMENS/LEGRAND/ABB
6	SWITCHES	L&T/LEGRAND/SIEMENS/ABB
7	BREAKER CONTROL SWITCH	L&T/LEGRAND/SIEMENS/ABB
8	RELAYS	L&T/LEGRAND/SIEMENS/ABB
9	CONTACTOR	L&T/LEGRAND/SIEMENS/ABB
10	METERS	AE/IMP/ENERCON
11	CABLE:	NICCO / UNIVERSAL / FINOLEX
12	L.T. CABLE/SIGNAL CABLE	NICCO / UNIVERSAL / FINOLEX
13	CONTROL CABLE	KDK / FINOLEX / L&T
14	PRESSURE TRANSMITTERS	BELLS/ TAYLLORS /MICRO CONTROL
15	DIGITAL INDICATORS	MICRO CONTROL/ MECO
16	TEMPERATURE SCANNER	JYOTI/INDUSTRIAL EQUIPMENT/PECOR/MICRO CONTROL/LAXON/CHINNO/MASUKA INSTRUMENTS PVT. LTD.
17	LEVEL SWITCHES(CAPACITANCE TYPE)	NIRO CONTROLS
18	FLOW METER & RECORDER INDICATOR, TANTALIZER	SCHLUMBERGCRLKROHNE/ AQUA / ABB / MECO
19	CONTROL FUSES	GE/SIEMENS
20	CURRENT TRANSFORMER	KAPPA/JAWS
21	CAPACITOR	NCEF/ UNISTAR / CROMPTON /L& T
22	REACTOR	KAPASELS/ UNISTAR / CROMPTON /L& T /G E
20	BUTTERFLY VALVES	KSB/IVC /AUDCO/M&P /KIRLOSKER
24	SLUICE VALVES	KSB/IVC /AUDCO/KIRLOSKAR/ MATHER & PLATT
25	M.S. DISMANTLING JOINTS	BHARAT MATA/ORIENT RUBBER
26	PUDDLE CALLER	BHARAT MATA/ORIENT RUBBER
27	VALVE ACTUATORS	BEACON / ROTORK / AUMA
28	PRESSURE GAUGES	BELL/TAYLORS/ H. GURU/MANOMETER INDIA
29	BATTERY	NIL
30	BATTERY CHARGER	NIL
31	FIRE EXTINGUISHERS	SUREX / MINIMAX /CEASE FIRE
32	SUBMERSIBLE PUMP	KSB/CALAMA/MBH
33	AIR CONDITIONER	CARRIER/ LG / VOLTAS
34	LIGHTING SYSTEM	PHILIPS/CROMPTON
35	WIRE	FINOLEX / KDK /HAVELLES
36	SWITCHES	ANCHOR /HAVELLES
37	VENTILATION SYSTEM	P.N. CHAKRABORTY& CO. / UNIVERSAL AIR SYSTEM
38	TEMPER PROOF AIR RELEASE VALVE	KBL/IVC
39	Valves (Sluice/Butter fly)	VAG/IVC/FOURESS/KIRLOSKAR /AUDCO
40	Electrical Actuator	AUMA/ ROTORCK/BECON
41	Flow Meters	BELLS/TAYLOR INSTRUMENTS/TOSHNIWAL BROS/ROCKWIN FLOW METER (I) PVT LTD/ RELIABLE EQUIPMENT.
42	Ammeter, Voltmeter	AE / IMP/ L&T
43	Control Switches	SIEMENS / L&T / ABB
44	Air Circuit Breakers	GE/L & T/ ALSTOM/LEGRAND/ABB/SIEMENS
45	Power Cable (Aluminium)	INCAB/UNIVERSAL/GLOSTER/NICCO/FINOLEX
46	Control Cable (Copper)	INCAB/ UNIVERSAL/ NICCO/ FINOLEX
47	Overload Relays	SIEMENS/GE/LARSEN & TOUBRO/AVK-SEG & CONTROLS (I) LTD/CUTLER HAMMER

48	Local Start/Stop Puch Button Station	SWITCHGEAR AND ACCESSORIES/SIEMENS/L&T
49	Current Transformers	CROMPTON/BHARAT BIJLEE/EMCO/KAPPA
50	VCB HT	ABB/SCHINDER/ SEIMENSE/CG/VOLT AMP/ ANDRULE/ STELMEC
51	Power Transformer	BHEL/KEC/CG/SCHINDER/VOLTAMP/ RPG REYCHEM/ ANDRULE
52	OCEF & Under voltage Relays	EE/LARSEN & TOUBRO
53	Capacitor	CROMPTON/KHATAU JUNDER/NCEF/UNISTAR
54	Light Fitting including Lamps & Tubes	PHILIPS/BAJAJ/CROMPTON
55	Ceiling Fans & Cabin Fans	SCHINDER/ CROMPTON/RALLI
56	Exhaust Fans	SCHINDER/CROMPON/ BAJAJ
57	Paints	ICICI/JONSON & NICHOLSON/ASIAN/BERGER
58	Full bore Flow Metre	ABB/SEIMENCE/ EH/ KONE MARSHAL
59	Temper proof air release valve	KBL/IVC

Executive Officer
Burdwan Municipality

ANNEXURE – IV

CONSTRUCTION MATERIALS

1	Cement (Premium Grade)	ACC / ULTRATECH / AMBUJA /JSW
2	Reinforcing Steel -	TATA / SAIL/RINL
3	Structural Steel -	SAIL / JINDAL / TATA
4	Plasticiser / Water Proofing Compound -	SIKA / CICO/ DR. FIX IT
5	Stone chips -	PAKUR / CHANDIL/PANCHAMI VARIETY
B	**EQUIPMENT, VALVES, PIPES & FITTINGS**	
1	G. I. Pipe -	TATA/JINDAL /BANSAL
2	M.S Pipes	SAIL / TATA/JINDAL
3	DI pipe -	ELECTRO STEEL / TATA METALICS/ JINDAL
5	UPVC Pipe -	EMCO / ORIPLAST / LONG LAST / SUPREME / SIMPLEX
6	S. W. Pipe -	SONALI CERAMIC PVT. LTD. / SANJOY STONEWARE PIPES / BENGAL STOREWARE PRODUCT
7	NP2 & NP3 Concrete Pipe -	CALCUTTA SPUN PIPES & INDUSTRIES, ARAVINDA SPUN PIPES INDUSTRIES, BHAGIRATHI ENGINEERING
8	Rubber Gasket -	POPULAR RUBBER PRODUCTS / DURABLE POLYMER PRODUCTS (P) LTD/PAUL RUBBER INDUSTRIES.
9	D.I.D.F. Pipe and Fittings -	ELECTRO STEEL CASTING LTD./ KEJRIWAL CASTING / KISWOK
10	DI SPECIALS -	ELECTRO STEEL CASTING LTD./ KEJRIWAL CASTING / KISWOK

Executive Officer
Burdwan Municipality