

OFFICE OF THE BOARD OF COUNCILLORS MAL MUNICIPALITY, P.O. MAL, DISTRICT- JALPAIGURI

PIN: - 735221, WEST BENGAL

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Enquiry Section:9475210685 J.N Dubey(Asstt.Engineer,M.E.Dte,Jal Divn

Memo No.:- MM/C/PHE/552/2018-2019

Dated: 27.07.2018

NOTICE INVITING e-BID

BID NO: - 3 of 2018-2019 [2nd.CALL] (WATER SUPPLY SCHEME STATE PLAN)

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

1.	Name of Work:	Survey, Design, Drawing , Construction, and Commissioning of 5.41 MLD (Approx. – 236 M3/hr. with 23 Hr. Operation) Capacity Surface Water Treatment Plant (with tolerance of 25% over loading) & 780 Cum. Capacity Clear Water Reservoir (TWL of CWR will be 0.50 meter above H.F.L.) cum Pumping Station and 315 KVA HT Sub-Station along with all other allied works (Civil & Electro-mechanical work & others, if any) at Mal Municipal town (including 3 months trial run and necessary training to maintenance staff & thereafter (subsequently) one year operation and maintenance of the Plant) on Turnkey Basis.
2.	Scope of Work	Survey, Design, Drawing , Construction, and Commissioning of 5.41 MLD (Approx. – 236 M3/hr. with 23 Hr. Operation) Capacity Surface Water Treatment Plant (with tolerance of 25% loading) & 780 Cum. Capacity Clear Water Reservoir (TWL of CWR will be 0.50 meter above H.F.L.) cum Pumping Station and 315 KVA HT Sub-Station along with all other allied works (Civil & Electro-mechanical work & others, if any) at Mal town (including 3 months trial run and necessary training to maintenance staff & thereafter (subsequently) one year operation and maintenance of the Plant) on Turnkey Basis.
3.	Location of Work:	Plot No.82, JL no- 44 , Mouza-Mal, Sheet No. 02, Ward- 02, P.S:-Mal, Dist.:-Jalpaiguri (W.B.)
4.	Eligibility to participate in the Bid	Having experience and technical acumen in design ,Execution, Construction & Completion of <u>Surface water based Water Treatment Plant</u> of minimum 1.90 MLD capacity along with 190 kVA HT Sub Station including its civil & electro- mechanical works for both WTP & Sub Station in a single contract during last five financial years in any Government Department/Board/Semi-Govt./Corporation/Statutory Authority/Undertaking etc. AND

			<p>Having sufficient qualified technical personnel (to be employed under the firm for at least 2 consecutive years) with sound knowledge and experience in design & execution of similar nature of works.</p> <p style="text-align: center;">AND</p> <p>Having annual turnover of at least Rs. 2.50 Crore or above in any one year of last three Financial years.</p> <p style="text-align: center;">AND</p> <p style="text-align: center;">Having valid electrical license(Both HT & LT), GSTIN, P.Tax clearance Certificates, PAN Card, PF & ESI registration and Electrical supervisory license etc.</p>
			<p>Note:</p> <p>a) <i>Only completed similar nature of work, in all respect (depicted above) will be treated as credential.</i></p>
5.	Documents to be produced in support of Credential for Bid Part-I (Prequalification Documents)		<p>A successful performance and completion certificate supplemented with work order along with payment certificate 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:</p> <p>Particulars of ownership or partnership or Board of Directors pertaining to the Organization/Company/Firm.</p> <p>Copies of valid PAN Card, GST Registration, GSTIN, ITR (2017-18) Electrical Supervisory license Certificate, Professional Tax clearance Certificate, Valid Electrical License (HT & LT) and E.S.I. registration with staff list.</p> <p>Bank solvency Certificate not less than Rs 1.00 cores w.e.f date of this eNIB.</p> <p>Valid documents in support of annual Turnover.</p> <p>List of machines and equipments necessary for field as well as laboratory test for all materials.</p> <p>Experience and address, fax & telephone nos. , mobile no., & E-mail ID nos. of the firm.</p> <p><u>All documents in original to be produced in due course of time as & when asked by the Bid inviting authority.</u></p>
6.	Earnest Money		<p>2% of the Quoted Bid price in two parts, vice</p> <p>Rs. 2,50,000.00 (Rupees Two Lakh Fifty Thousand only) as an initial Earnest Money Deposit shall accompany with Bid Proposal, in the form as depicted below</p> <p>Earnest Money Deposit i.e. 2% of bid amount beyond Rs. 2,50,000.00 (Rupees Two Lakh Fifty Thousand only) (if any) shall have to be deposited after acceptance of Bid Proposal.</p> <p>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 publishing of NIEB. Any Bid without such Transfer of EMD (Except exemption as per G.O.) shall be treated as informal and shall automatically be cancelled. Online transfer of Earnest Money receipt (Scanned copy) shall be uploaded as Statutory document.</p>
7.	Cost price of Bid documents		NIL

8.	Date and Time Schedule :-		<table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Particulars</th> <th>Date and Time</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Date of uploading of NIEB. and Bid Documents online) (Publishing Date)</td> <td>28.07.2018</td> </tr> <tr> <td>b)</td> <td>Documents download/sell start date (Online)</td> <td>28.07.2018 from 17:00 Hrs.</td> </tr> <tr> <td>c)</td> <td>Date of Pre Bid Meeting with the intending bidders In the office of the Superintending Engineer, North Circle, and Municipal Engineering Directorate. 116 Ashutosh Mukharjee Road (2nd floor),college para . Siliguri-734001. Phone-0353-2433954 Email id- supernc.med@gmail.com</td> <td>08.08.2018 at 2.00 PM</td> </tr> <tr> <td>d)</td> <td>Bid submission start date (On line)</td> <td>10.08.2018 from 12.00 Hrs.</td> </tr> <tr> <td>e)</td> <td>Bid Submission closing (On line)</td> <td>21.08.2018 upto 17:00 Hrs.</td> </tr> <tr> <td>f)</td> <td>Bid opening date for Technical Proposals (Online)</td> <td>24.08.2018 at 11:00 Hrs.</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 later.</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> </tbody> </table>	Sl. No.	Particulars	Date and Time	a)	Date of uploading of NIEB. and Bid Documents online) (Publishing Date)	28.07.2018	b)	Documents download/sell start date (Online)	28.07.2018 from 17:00 Hrs.	c)	Date of Pre Bid Meeting with the intending bidders In the office of the Superintending Engineer, North Circle, and Municipal Engineering Directorate. 116 Ashutosh Mukharjee Road (2 nd floor),college para . Siliguri-734001. Phone-0353-2433954 Email id- supernc.med@gmail.com	08.08.2018 at 2.00 PM	d)	Bid submission start date (On line)	10.08.2018 from 12.00 Hrs.	e)	Bid Submission closing (On line)	21.08.2018 upto 17:00 Hrs.	f)	Bid opening date for Technical Proposals (Online)	24.08.2018 at 11:00 Hrs.	g)	Date of uploading list for Technically Qualified Bidders (online)	To be notified later	h)	Date and Place for opening of Financial Proposal (Online)	To be notified later.	i)	Date of uploading of list of qualified bidders along with the offer rates through (on line),	To be notified later.	j)	Also if necessary for further negotiation Through offline for final rate.	To be notified later.
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9.	Time of completion		Time of completion of the Contract is 365 (Three Hundred Sixty Five) calendar days from the date of issue of Work Order.																																	
10	Site inspection & general information		Intending Bidders to inspect the site of the Project with particular reference of 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. They should be 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, approach road to work site, 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 and to keep all structures safe against unforeseen natural calamity throughout life period. The head and rating of the pump & motor will be designed on the basis of actual distance, levels and location of overhead & clear water reservoirs irrespective of data given in this bid document. The Key Plan is attached with this Bid Document. The Bidder may take up their own survey if he is not satisfied with any data given in this Bid document.																																	

11	Bid documents	<p>A full set of Bid documents consists of 2 Parts. These are</p> <p>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.</p> <p>And</p> <p><u>Section A</u>: Description of the Project. <u>Section B</u>: Conditions & requirements for e-Bidding. <u>Section C</u>: General conditions of the Contract. <u>Section D</u>: Special Provisions <u>Section E</u>: General Specification of workmanship and material for civil works. <u>Section F</u>: General Technical Specification <u>Section G</u>: Detailed Technical Specification for Civil works <u>Section H</u>: Scope of works and Technical Specification for Electro-Mechanical works & <u>Section I</u>: ANNEXURES Annexure under Section N : I. Soil Investigation Report II. Physio Chemical and Bacteriological characteristics of Raw Water. III. List of Instruments. IV. List of Tools of Electrical Instruments V. List of Vendors (For Treatment Plant) VI. List of Laboratory instrument supplied by the Bidder for Laboratory. VII. List Of drawing etc. to be furnished by the Successful Bidder. VIII. Site Plans with Levels IX. Key Plans showing position of OHR's X. Laboratory equipments/ Instruments and chemicals to be supplied. XI. Tentative Layout of Substation building. & PART II :-Containing the Following Document. Bid Price / Price Schedule.(.xls format)</p>
12	Validity of Bid	<p>A Bid submitted shall remain valid for a period of 180calendar 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.</p>
13	Withdrawal of Bid	<p>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.</p>
14	Acceptance of Bid	<p>The "Chairman, Mal Municipality" will accept the Bid. He /She 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.</p>
15	Intimation	<p>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 in appropriate "MUNICIPAL 'K' FORM or FORM 2911(ii) or any other Govt. form as recommended by SE(North Circle) " with the "The Chairman, Mal Municipality, "and fulfill all his obligations as required by the Contract.</p>

			<p>After the Bid is provisionally accepted, the Bidder shall submit detail Design, Drawing including GA Drawing and working specifications phase wise based on existing site condition & proposed levels at site. If it is found technically correct and acceptable with proper examination by the Superintending Engineer, North Circle, M.E. Directorate, 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.</p> <p>Eventually, all the parts, Design, Drawings etc. of the successful Bidder shall be taken as a part of the agreement.</p>
16	Escalation of Cost		There will be no escalation in cost for materials or labour and the contract price mentioned in the contract & remains 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		<p>Executive Engineer, Jalpaiguri Division, Municipal Engineering Directorate, Department of U.D. & M.A., Govt. of West Bengal,, Vivekananda Mini Market (1st floor), Race-Course Para, Jalpaiguri-735101, Dist: - Jalpaiguri Pin- 735101 WEST BENGAL.</p> <p>Phone & Fax: - 03561230578</p> <p>E-mail ID – ee.med.jpg@gmail.com</p>
18	Execution of Work		The Contractor is liable to execute the whole work as per direction and instruction of the Executive Engineer, Jalpaiguri Division of Municipal Engineering Directorate who is the "Engineer in Charge" of the work after due approval of "Superintending Engineer, North Circle, M.E. Directorate."
19	Payment		Payment will be made to the successful Bidder by the "Chairman, Mal Municipality" periodically only on receipt of written recommendation from the Executive Engineer, Jalpaiguri Division of Municipal Engineering Directorate. Payment for all Electro-mechanical works will be recommended by the Technical Advisor (E/M) or concerned Engineers of M.E.Dte. /KMDA under UD&MA Deptt. Govt. of West Bengal.
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 Chairman, Mal 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 Chairman, Mal 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.
23.	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 Chairman, Mal Municipality".
26.	In case of any dispute arising from any clauses of similar nature between bid documents and municipal Form "K" or Govt. Form, the decision of the Superintending Engineer, North Circle, M.E. Directorate, will be final and binding. Even If there is similar technical criteria for analysis & design specified in different IS codes or Manuals, The decision of the Superintending Engineer, North Circle, M.E. Directorate, will be final and binding.
27.	Rate should be quoted including all taxes like GST, Lab. Cess etc. 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.	In the event of e-Filing intending bidder may download the Bid document from the website http://wb.tender.gov.in directly by the help of Digital Signature Certificate & necessary cost of Bid document (if any) may be remitted through demand draft/ pay order issued from any nationalized bank in favour of "The Chairman, Mal Municipality", payable at Mal & same may be documented along with earnest money Deposit through e-Filing, (scanned copy to be submitted)(Details of which has been narrated in "Instruction to Bidders"). Technical Bid & Financial Bid both will be submitted concurrently duly digitally signed in the Website http://etender.wb.nic.in . Bid document may be downloaded from website & submission of Technical Bid/Financial Bid as per Bid Schedule.
30.	Any Bid without Earnest Money, as specified in this NIEB (Except exemption as per G.O.) shall be treated as informal and shall be automatically cancelled. In case of exemption proper document has to be uploaded.
31.	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.
32.	Prospective applicants are advised to note carefully the minimum qualification criteria as Mentioned in 'Instructions to Bidders' before bidding.
33.	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.
34.	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 manufactured or false, in that case, L.O.A./work order will not be issued in favour of the bidder under any circumstances.
35.	If any discrepancy arises between two similar clauses on different notifications, the decision of "Superintending Engineer, North Circle, M.E.Dte." is final & binding.
36.	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.
37.	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.
38.	Any legal matter will be settled within the jurisdiction of Hon'ble District Judges Court at Jalpaiguri , Dist.- Jalpaiguri , West Bengal.
39.	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.
40.	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.
41.	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 in all respect as per clause 57 of section C after full satisfaction of E.I.C.
42.	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 before acceptance of bid which will be treated as part of the bid document. Later Break up Payment Schedule will have to submit by the Contractor on the basis of this estimate. The Breakup Payment Schedule will be approved by SE(North Circle) and the decision regarding this will be final and binding.
43.	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 or in bid document weather it is Major or Minor in nature, but required for successful completion and commissioning of the project will be in the scope of Bidder. The Bidders are requested to quote their rate considering all adverse conditions which are required for successful completion of the project and no extra cost in this respect in any circumstances will be entertained.
44.	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 in order to assess the value of Work done and make payment thereof before acceptance of bid against each item of work. In case of any dispute arising in the breakup and analysis thereof, decision of Superintending Engineer, North circle, M.E. Dte. Will be binding and final.



**Chairman
Mal Municipality**

INSTRUCTION TO BIDDERS/BIDDERS
SECTION – A-I

1. General guidance for e-Bidding

Instructions/ Guidelines for bidders for electronic submission of the Bids have been annexed for assisting them to participate in e-Bidding.

2. Registration of Bidder

Any Bidder willing to take part in the process of e-Bidding 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-Bidding 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. Scanned Copy online Transaction of earnest money (EMD) as prescribed in the NIEB against each of the serial of work in favour of **"The Chairman, Mal Municipality," payable at Mal, Dist. – Jalpaiguri.**

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.
- vi. Annexure V & Annexure X

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, GST Registration Certificate, GSTIN (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) supported by ESI registered staff list.
- 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 Category	Document Master	Sub	
Sl. No.	Category Name	Sub Category Name	Sub Category Description
A	CERTIFICATES		
		A1. CERTIFICATES	1. West Bengal GST Registration / GSTIN/ P.F/PAN / P. Tax Clearance Certificate

			2. Income Tax Acknowledgement Receipt (last five years) 3. Valid Electrical License 4. P.F. & E.S.I Registration Certificate with staff list.
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 SI No. 4 of NleB)
D	EQUIPMENT		
		D1. LABOURTARY	1. List of Machineries and equipment necessary for field as well as laboratory test of all materials as per NleB
		D2. CIVIL MACHINERIES	
		D2. ELECTRICAL MACHINERIES	
		D2. MECHNANICAL MACHINERIES	
		D2. MISCELLENEOUS MACHINERIES	
E	FINANCIAL INFO		
		E1. P/L & BALANCE SHEET 2015-16,2016-17	P/L & BALANCE SHEET (As per NleB)
		E2. PAYMENT CERTIFICATE 1	Payment Certificate in support of valid credential only to be submitted(as per NleB)
		E3. PAYMENT CERTIFICATE 2	
F	MANPOWER		
		F1. TECHNICAL PERSONNEL	1. List of sufficiently qualified technical person (as per SI No 4 of NleB)
		F2. TECHNICAL PERSONNEL ON CONTRACT	1. List of technical personnel employed under the organisation (or on contract basis) in details with name, qualification, experience and, address with contact number.
G	DECLARATION	DECLARATION 1	1. Bank Solvency Certificate (As per NleB)

		DECLARATION 2	2. Valid Document in support of annual turnover (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 Cl. 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 Urban Dev. & 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 Govt. norms and guidelines under UIDSSMT programme.

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. 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 by fund. This letter of guarantee should be addressed to the Bid Inviting/ Accepting Authority and the guarantee should be duly specified with 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.

. 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.



Chairman

Mal Municipality

SECTION – B

FORM –I

PRE-QUALIFICATION APPLICATION

To
The Chairman,
Mal Municipality,
PO:- Mal , Dist:- Jalpaiguri,
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.

Enclose:- 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 over draft)					
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. 2016	As on 31.03. 2015	As on 31.03. 2014	As on 31.03. 2013	As on 31.3.2 0112	As on 31.03. 2011

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.

..... / 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	M ake	T ype	Cap acity	Motor / Engine No.	Mac hine No.	Possession Status		Date of release If Engaged
						I dle	Enga ged	

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.

Copy forwarded for information and wide publication to :-

1. The Principal Secretary,UD & MA Dept.Nagarayan,DF-Block,6th.Floor,Salt Lake,Kolkata
2. The District Magistrate, Jalpaiguri .
3. The Chief Engineer, M.E. Directorate, BikashBhawan, Salt Lake City, Kol- 700091.
4. The Director, SUDA, ILGUS Bhawan, Salt Lake City, Kolkata.
5. The Addl. Chief Engineer, North, 11, Mukunda Das Road, Milan Pally, Siliguri.
6. The Superintending Engineer(North Circle), M.E.Dte., Ashutosh Mukherjee Rd. Siliguri
7. The Media Officer, Department of Information and Cultural Affairs, Writers Buildings, Kolkata- 700001.
8. The Executive Engineer, Jalpaiguri Division, M.E.Dte. , Vivekananda Mini Market, Race-Course Para, Jalpaiguri.
9. The Executive Engineer, Jalpaiguri Division, PHE.Dte. Club Road, Jalpaiguri.
10. The Executive Officer, Mal Municipality.
11. The Vice-Chairperson, Mal Municipality.
12. Sri Samar Kr.Das, Convenor, PWD Sub -Committee, Mal Municipality
13. Sri Bani Kr.Santra, Assistant Engineer, Mal Municipality.
14. Sri Subhrendu Nandy, S.A.E Mal Municipality.
15. Notice Board.
16. Respective File.



**Chairman
Mal Municipality**

SECTION - A
DESCRIPTION OF THE PROJECT

1.0 GENERAL

The work involves surveying, planning, designing, drawing, supplying of materials and equipment and construction of Surface Water Treatment Plant including necessary arrangement for receiving of Raw Water of required capacity from River Neora (Intake under process and not in the scope of the work) and capable of producing **236 m³/hr.** (Approx.-1.19 MGD) of treated water with 25% overloading, **780 Cum. Capacity Clear Water Reservoir** (TWL of the reservoir will be 0.5 meter above H.F.L.) and wet pit clear water pumping station (both civil and Electro-Mechanical work), **315 KVA HT Substation** for WTP including its civil works, erection, commissioning, 3 months trial run & thereafter **one year operation and maintenance of WTP**, clear water pumping station inclusive of pumps, motors, HT substation and other allied / correlated machineries. The High Flood Level (HFL) will be considered 2.00M above the EGL. The Finished Ground level (FGL) will be 0.50 m above Existing ground level (EGL).

2.0 LOCATION

The site of proposed Water Treatment Plant and Clear Water Pumping Station (CWPS) is at Plot no. 82 , sheet No. 02, JL no- 44, Mouza-Mal , Ward No. 02 within Mal Municipality P.S:- Mal, Dist.:-Jalpaiguri (W.B.)

3.0. TREATMENT PROCEDURE TO BE ADOPTED

The different water treatment processes which will in general be taken up for treating the raw river water are:

- a) A bypass arrangement of Inlet well after placing parallel BF valves
- b) Inlet Well / channel with Parshall Flume, Flow meter, Alum dosing system
- c) Chemical House including storing, feeding and thorough mixing of chemicals with raw water.
- d) Rapid Flash Mixer
- e) Clariflocculator
- f) Rapid sand gravity filtration.
- g) Back washing through Over Head Reservoir of Minimum 150 Cum. Capacity and as per CPHEEO manual placed on the roof of the Filter Bed (covered by RCC roof)/Chemical House. The whole filter bed must be covered by RCC roof and wall with windows and doors system. The whole water after backwash will go to a sludge well/Sludge sump (Capacity will be designed by Bidder but of minimum 50 cubic meter effective capacity) from where the sludge will be carried out to two chambered Sludge Pond. Clear water will be carried out to inlet well from sludge pond by pumping. The Sludge Pond will be designed with minimum 6 Month cleaning period.
- h) Sludge drainage & disposal including sludge well, the TWL of which will be above FGL.
- i) All Electro-Mechanical works complete in all respect related to water treatment process with supply & Installation are in the scope of the work.
- j) Pre & Post-Chlorination by Gaseous chlorine arrangement.
- k) Filtered water conveying main to underground reservoir (UGR).

l) Wet pit clear water pumping station with Pumps, motors & other electromechanical works with 2.0 MT HOT crane.

m) 780 cum. capacity Clear Water Reservoir with two compartments, the TWL of which will be 500 mm above HFL.

n) Inter Plant Piping and plant road facilities within WTP compound.

o) Plant Wastewater & Storm water management. - The entire overflow if occurs from Sludge pond, Sludge well/Sludge sump directly goes to the surface drain. The surface drain is to be covered by Pre cast slabs or under drainage system may be adopted.

p) Supply, Installation, commissioning of Instruments / Apparatus of approved quality for 1(one) No. laboratory (Physical & Chemical tests) including laboratory chemicals and reagents, safety equipment, fire fighting equipment's, etc.

q) Internal and yard lighting arrangement by providing sufficient nos. LED fitting fixture for adequate lighting of the whole plant and lightning arrestor arrangement.

r) There will be a habitable sentry room with toilet facility at the gate. Approach road to the main gate with gentle slope is to be constructed.

s) Planning, Design, Construction of Internal road (4.0 m wide) with Min. 80 mm thick Designer paver block. Plinth protection areas will be covered by 25 mm thick chequered tiles or 25 mm thick paver block. Surface drain all around premises for storm water and overflow along the WTP sites as per approved design, drawing and direction of E.I.C. The surface drain will be adequate to capture peak storm water in rainy season with a provision of its outfall.

t) Design, drawing, Construction, supply of E/M equipment's & Installation of 315kVA Sub Station as per I/E rules for supply of Power to WTP & other requirements.

u) Supply and installation of all Pipelines of different materials for clear water, wastewater and sludge line including pits within the Water Treatment Plant premises. The

pipe lines from the clear water pumping station shall have to be placed on the RCC structure for interconnecting the rising main.

v) All doors & windows to be provided anywhere in the project shall be reputed make Aluminum door and window.

w) The size & location of sump pump along with sump is to be designed in such a manner to evacuate the accumulated water from CWR floor from any source within maximum 10 minutes to eliminate the chance of inundation in any case or to clear all water from CWR for maintenance. Minimum 100% Standby for the sump pumps is to be provided. The locations of recirculation pump, sump pump will be at filter gallery, Pump house/CWR floor, back wash pumping area etc. Alternatively the pipe gallery leakage water directly feed to the recirculation pond.

x) All external walls will be painted with exterior weather coat paint of approved colour & quality (options may be given by EIC). For internal colour, Office room, operator room & Laboratory, wall putty with decorative paint have to be considered. All the external wall & internal wall will be painted in 2 coats of colour with primer. The scope of Work, supply and service of plants and equipment's may not be limited to the aforesaid items. The items though not specifically mentioned but needed to make the system complete in all respect and reliable for safe and smooth operation and guaranteed performance shall be included in the bid on Turnkey basis.

The contractor has the liberty of using alternative arrangement but the design parameters and technical specifications should strictly conform to latest relevant IS Codes & CPHEEO manual and upto the satisfaction of E.I.C.

4.0 Different levels of Water Treatment Plant compound

- i) Proposed ground level: - The proposed Finished Ground Level (FGL) shall be at R. L.(+) 0.50 M.
- ii) Proposed Plinth Level: - The proposed plinth level shall be at R. L. + 1.10 M.
- iii) Proposed top water level of Clear Water Reservoir: - The top water level (TWL) of the proposed Clear Water Reservoir shall be at least **E.G.L. + 2.80 M** and subject to taking precautionary measure in design against uplifting of structure concerned during flood/inundation. (HFL is assumed at nearby bundh +0.50M)
- iv) Proposed Plinth Level of Sub Station: - The proposed plinth level shall be at R. L. +1.80 M.
- v) Hydraulic design of the proposed Treatment Plant and clear water reservoir should be such that the tail water level of underground clear water reservoir will be of adequate gradient and vertical turbine Pumps to be installed in the clear water pumping station. Accordingly, hydraulic levels of all the other units of water treatment plant such as collecting well, flash mixer, Clariflocculator, Filter Beds, Clear water duct, inlet pipes of reservoir etc. are to be fixed to ascertain the gravity flow of filtered water with a discharge of 236 m³/hr. to the Clear Water Reservoir.

5.0 SCOPE OF WORK

- (i) The scope of work includes
 - a) For Civil Works: - Surveying, planning, design, drawing and construction of different civil structural works are including supply, carriage of all materials with foundation for the various units of the plant. The foundation for all the major structures such as Inlet well,

Parshall flume, Flash mixture, Clariflocculator, Chemical house, Annex building & filter house, Electrical Sub – Station and CWR cum pumping station have foundations as per soil investigation report attached as given in Annexure I. Clear water reservoir, Clariflocculator, pump house, Sludge well/Sludge sump, etc. will be designed as per Soil investigation report and has to be checked against uplift for empty conditions with respect of FGL.

- b) For Electro-mechanical works:- Planning, design, drawing, manufacture, supply, delivery at site, installation, fabrication and erection of all mechanical and electrical equipment including pipes, valves, pumps, motors as per detail technical specification & vendor list that may be necessary and specified herein to make the treatment plant complete in all respects to treat raw water delivering normal flow of **236 m³/hr of potable water** of quality (physical, chemical and bacteriological) as specified by relevant IS codes and World Health Organization. The Pump & motor will be designed on the basis of actual field data irrespective of the data given in the Bid document. Any additional data required to do so may be obtained from office of the Executive Engineer, Jalpaiguri Division, M.E.Dte.

The Clear water rising main is basically divided in two route, Route A – for OHR of Zone- I, 106m³/hr against a tentative head of 43 MWC (1no. working + 1no. Standby) and Route B – for OHR of Zone- II, 130 m³/hr against a tentative head of 40 MWC (1no. working + 1no. Standby), to be installed.

The Different Capacity Of OHR (Not in the scope of Bidder) are, Zone I – 460Cum. (existing) & Zone II – 700 Cum (ongoing)

The actual Length, dia. of pipe and discharge in each route may obtained from the Office Of the Executive Engineer, Jalpaiguri Division or agency may conduct his own survey and approved by EE, Jalpaiguri Division, M.E.Dte.(see annex –Rising Main)

- c) Commissioning & trial run: - The scope also includes Trial Run and Testing the Plant for three months after commissioning (72 Hours).
- d) Operation & maintenance: - Operation and maintenance of the same for a period of 12 (Twelve) months after the completion of specified period of Successful Trial Run, under the overall supervision of the Employer / his representative and from the date of commissioning.
- e) Training: - This also include necessary training to employees of the ULB at WTP to run the plant effectively.
- f) The successful bidder has to initiate & pursue diligently for any approval required from the appropriate Authority on behalf of the Chairman, Mal Municipality.

The Bid comprises of following major works:

(A) Water Treatment Plant:

236 m³/hr. (5.41 MLD) capacity and running 23 hour water treatment plant with 25% overloading including the installation of following units:-

- a) Raw water inlet arrangement
- b) Raw water flow measurement
- c) Parshall Flume & Flash mixer
- d) Chemical house with solution preparation tank and feeding arrangement to the raw water channel and storage of chemicals/ Chlorine toners.
- e) Feed channel/pipes and stand wells
- f) Clariflocculator
- g) Rapid Gravity Filter with Annex building.

- h) Back washing system through OHR placed on the roof of the Filter Bed (covered by RCC roof).
 - i) Chlorination by gaseous chlorine for pre & post chlorination
 - k) Filter water conveyance main.
 - l) Plant sludge drainage & disposal including sludge well/Sludge sump, the TWL of which will be above the FGL.
 - m) Plant wastewater with recirculation pumping unit at Sludge pond.
 - n) Levelling and grading of site up to FGL including storm water drainage.
 - o) Inter plant piping and road facility together with levelling & Grading above FGL.
 - p) All Electro-Mechanical works pertaining to Water Treatment Plant.
 - q) Sub-Station Building for WTP inside the WTP compound, the tentative drawing attached as Annexure.
 - r) Internal, external and yard lighting/illumination of WTP inside the compound.
 - s) All sanitation & Plumbing works for operator room including construction of 10 user septic tank and 5 cum.(Minimum) Capacity water tank over Chemical house.
- (B) 780.00 Cum CAPACITY CLEAR WATER RESERVOIR & WET PIT PUMPING STATION:**
- (i) The Bid includes Surveying, designing, drawing and construction of clear water underground reservoir complete with inlet, overflow and scouring arrangement maintaining the levels as stated in clause 4.0. The full water depth should be at least 3.00 M to 4.00 M or more at the time of reservoir full condition. The foundation of pump house should have adequate strength to take load of uplift pressure due to subsoil or submerged water assumed at the FGL when the reservoir is empty and also for vertical loads, horizontal loads with surcharge & Seismic load for worst combination of load. While calculating the effective capacity of the

UGR, the volume of water in pumps sump up to height of 0.15 m above straight portioned (not sloped) Floor level of the sump and free board will not be taken into account in the effective volume calculation of CWR. The slope of the sloped portion connecting CWR floor and Pump house floor will be not greater than 15 degree.

- (ii) Designing, drawing and construction of a wet pit pump house building including machine foundation for **4 nos.(2W+2S)** for two route Vertical turbine pumping unit on the top roof of the UGR. **One 2.00 MT capacity HOT crane** shall have to be installed with gantry girder arrangement to handle pump/motor in the pump house for lifting and lowering the same.
- (iii) Designing, drawing and construction of approach/other connecting road, apron and Surface drains around the reservoir cum pump house & other units connecting the drainage system.
- (iv). The total civil work includes the construction of reservoir and pump sump with pump house.
- (v) The design of pump house has to be made on the basis of the Static load 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 pump motor sets.
- (vi). Site clearances and leveling of the area after development of site with carried earth up-to finished ground level, as proposed earlier.
- (vii) Minimum 6 nos. of overflow connections from the reservoir have to be provided in such fashions that over flow water drained to the surface drain surroundings of the reservoir.
- (viii) The Bidder, whose Bid is accepted in due course will have to furnish details of the design of the pump house in all levels, sump to connect the reservoir considering all the parameters as supplied by the pump manufacturer within the dimensions of the pumping station provided by them for housing the pumping machinery, electrical substation equipment/appliances etc.

- (ix) A tentative layout drawing (G.A.drawing) showing the shape, location and different levels of the reservoir and other units of treatment plant is to be provided by the bidder. The Bidder has to quote his rate for construction of underground clear water reservoir having 780.00 Cum. water capacity. Necessary Foundation of the CWR cum pump house and other units of treatment plants are to be provided on the basis of Soil Investigation Report with safety against uplifting during flood. No folded structure is allowed while designing water-retaining Structure. Minimum thickness of CWR wall shall be 200mm. While calculating the effective capacity of the CWR to attain 780.00 cum capacity, the volume of water in CWR floor up to height of 0.15 m above straight portioned (not sloped) and free board will not be taken into account in the effective volume calculation of CWR. The volume of R.C.C columns, baffle walls and all other obstruction will also be excluded in calculating effective capacity of reservoir.
- (x) The delivery line of the clear water pumping units placed on the RCC foundation for interconnecting the delivery rising mains.
- (C) **236 M³/HR CAPACITY WET PIT CLEAR WATER PUMPING STATION: (CONSIDERING 23 HRS. RUNNING OF PUMPING A DAY)**
- (i) The Bidder has to submit in due course the specific size and capacity of all machineries & equipment's 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.
- (ii) The vibration & noise should be within the acceptable limit as per I.S. Codes of latest edition or as per existing norms for all equipments.
- (iii) The dimension and centerline of pedestals for supporting the Pumps as well as the valves should strictly be in line for both Civil & Electromechanical works. If any of the delivery line of

the pumping unit above 350 mm dia. necessary stair case shall have to be erected for easy movement of the maintenance staff.

- (iv). The centre-to-centre distance of the pumps, clearance from wall for pumps should be as per I.S specifications.
- (v) The installation of all L.T. /H.T. electrical equipment should be strictly as per prevailing I.E. Rules IS specification.
- (vi). The minimum distance from the pump bell mouth to suction sump wall is to be maintained in such a level 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.
- (vii) The elevation of pump centre line should be designed in such a manner to maintain adequate clearance between the bell mouth and the floor of the suction sump to avoid clogging or vortex formation.
- (viii) 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. Pump selection should be based upon that. Family curves for individual and multiple operations at all possible consequences depending upon the variation in % opening of the butterfly valve are to be submitted.
- (ix) The total capacity of the pumping station will be 236 cubic meter per hr. at a designed head to be provided by the bidder with simultaneous operation of one pump of each group of pumps. There will be two roots of rising main at different head and capacity of the pumping unit. Each root will be feed two groups of pumping units consisting three numbers pumping units. Running hours of 23 Hrs. /day would yield to a supply of approx. **5.41 MLD** as per present requirement. The delivery manifold should be equipped with hand operated Butterfly valves, valve chamber, Temper proof air release valve, blank-flange if necessary (detail of

which is given in Technical Specification). All the design of the pipelines should be such that to ensure streamline flow.

- (xiii) The Bidder has to consider all sluice valves, butterfly valves, dismantling joints in individual delivery pipe lines as per detail technical specification.
- (xv) 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.
- (xvi) All the cabling work required to operate the equipment's at pump house, water treatment plant complex, substation etc. considering from suitable capacity of substation Transformer are within the scope of work. Power cable of all sizes must be 11000 V & 1100V, AL, 3 or 3.5 core (As required) armored XLPE cable for all motors.

D) 315 KVA Electrical Sub- Station : see annexure-G

E) Additional works

- i) The whole area has to be filled and developed up to finished ground level with proper compaction and leveling.
- ii) Arboriculture and Beautification of WTP sites. The whole area of the WTP shall be levelled and beautification plan shall be submitted before taking up the work.
- iii) Internal Roads, Pathways, Surface drains, at WTP site are to be provided with proper designed & planned way.
- iv) Installation of Laboratory with furniture & equipment and start-up reagents/chemicals.
- v) Loading and unloading way at sludge pond will be provided.
- vi) All units of WTP will be connected among themselves at first floor level with 1.0 m walkway so that one can move to any unit from the said level with MS structural railing or MS/GI hollow section pipe.
- vii) The successful bidder will provide a large size name plate of the project with specifying name of the work, project cost, name of the employee etc. as per direction of the EIC. Each unit will also to be named separately. After successful commissioning of the project a whole map plan have to be

fixed at gate and a 3 dimensional model will have to be kept at chemical house or Annex building as per direction of EIC.

ix) Extra connections of drinking water at different locations of the premises has to be installed for drinking and gardening purposes.

5.0 Recommended guide lines for physical and chemical parameters of portable water :-

a. Turbidity(NTU)	1.00 N.T.U
b. Test & order	Unobjectionable
c. PH	6.5 to 8.5
d. Total dissolve solid	500 mg/litter
e. Total Hardness(As Calcium Carbonate)	200 mg/litter
f. Chlorides	250 mg/litter
g. Sulphates	200 mg/litter
h. Iron	0.3 mg/litre
i. Total Alkalinity(As Calcium Carbonate)	200 mg/litre

6.0 Limit of Contract:

The limit of contract starts from maximum 10.0 meters ahead of the inlet well of the treatment plant after placing the Flow control valves with bypass arrangement to receive raw water to the inlet well . The common manifold of ERW-MS pipes of suitable diameter of clear water pump house wherein the individual delivery pipes of the clear water pumps will be terminated for a length of 5.0 meters beyond premises of WTP with one end blank flanged and other end provided with butterfly valves & air release valve after placing on the RCC structure. The limit of contract also includes laying CI/DI delivery pipe of requisite size from the sludge well up to sludge pond of suitable capacity with Y connection to two sludge ponds having adequate design depth with valves and also with a provision of bypassing/spilling the sludge to adjoining drains as to avoid unnecessary inundation of the surrounding area in case of overloading of sludge ponds. Sludge ponds (two nos.) are to be constructed by the Contractor with appropriate size so that to receive sludge for three months duration by either of one sludge-pond. This could be assessed by measuring the sludge concentration for using Ferric Alum as main flocculants and with full satisfaction of the Bid Accepting Authority.

The sources of Electric Power (11KV) would be taken from the WBSEDCL supply point to HTVCB panel and feed the indoor transformer and power distribution board by required cable size with earthing arrangement. 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 from substation to transformer , covering the cable trenches, insert plates, cable trays etc. also includes under this contract. All restoration works of the excavation site should be done with the full satisfaction of the Engineer in Charge. The delivery pipe with adequate valve and valve chamber arrangement will be laid up to the 5.0 m far with in the WTP premises and placed to RCC structure for inter connecting with the rising main.

SECTION - B
CONDITIONS & REQUIREMENTS FOR BIDDING

1. Submission of eBid document will not be allowed beyond the schedule time indicated in the eBidding.
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 Chairman, Mal 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 Jalpaiguri 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, North Circle, M.E.Dte." or his representatives of Municipal Engineering Directorate from time to time.
- (k) "Employer" means "The Chairman, Mal Municipality"
- (l) "Engineer in Charge" means the Executive Engineer, Jalpaiguri Division of Municipal Engineering Directorate.
- (m) "Engineer's Representatives" means any Assistant Engineer or Junior 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, North 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 (North Circle). In case of any ambiguity or completion of different schedule the decision of S.E (NC), 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 convey or 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 overhead costs whether on or off the Site.
- (5) Period of completion: The period of completion shall be 600 (Six hundred calendar 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, North 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, North 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, North Circle, Municipal Engineering Directorate, which shall not be unreasonably withhold and such consent, if given, shall not relieve the Contractor from 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, North Circle Municipal Engineering Directorate, in terms of the provisions in Clause B-2.3 of the Conditions and Requirements for Bidding (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, North 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, Jalpaiguri Division, Municipal Engineering Directorate, but one copy thereof shall be furnished to the Contractor free of charge. The Contractor 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, Jalpaiguri 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, North Circle Municipal Engineering Directorate, on recommendation of Executive Engineer Jalpaiguri 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, North 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 of 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, North 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 GUARANTEES

Until such time as the equipment or material installed and erected under the contract 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, North 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 North 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, North 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, North 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, North Circle Municipal Engineering Directorate,. Such authorized agent or representative shall receive, on behalf of the Contractor, direction and instruction from the Superintendent Engineer, North 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, North 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, Jalpaiguri 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, sign 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 effected 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 or 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 (l) 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 the amount stated 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 Chairman, Jalpaiguri Municipality the insurer will indemnify the Employer against such claims and any costs, charges and expenses in respect thereof.

23.0. 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 23 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 & 23 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 23 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. Giving of Notices and Payment of Fees:

(1) 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 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, North 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 neighborhood 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 of 1961) 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 1921) 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, North 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 in the Contract in sufficient detail to enable the 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 of view without the approval of the Superintending Engineer, North 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 it 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, North 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 (1) 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 with position of hooks at the under side 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 to 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, North 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 or 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 from 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 alternative 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 (1 %) 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 the 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 be 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 or 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 five years 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. ALTERATIONS, ADDITIONS AND OMISSIONS

(1) Variations: The Employer may make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be desirable, he shall have power to order the Contractor to do and the Contractor shall do any of the following:

- a) Increase or decrease the quantity of any work included in the contract.
- b) Omit any such work.
- c) Change the character or quality or kind of any such work.
- d) Change the levels, lines position and dimensions of any part of the Works and

e) Execute additional work of any kind necessary for the satisfactory completion of the works or for deriving satisfaction of the Employer. It is expressly provided that no such variation shall, in any way vitiate or invalidate the Contract, but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

(2) Orders for variations to be in writing: The Contractor shall make no such variations without an order in writing from the Employer. Provided that no order in writing shall be required for insignificant increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Schedule of prices. Provided also that if for any reason the Employer shall consider it desirable to give any such order verbally, the Contractor shall comply with such order and any confirmation in writing of such verbal order given by the Employer whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this Clause. Provided further that in the event of non-receipt of written confirmation from the Employer, the Contractor shall, within eleven days, confirm the same from his end in writing to the Employer, and If such confirmation is not contradicted in writing within fourteen days by the employer, it shall be deemed to be an order in writing by the Employer.

51.0. VALUATION

(1) Valuation of variations: All extra or additional work done or work omitted or substituted by order of the Employer shall be valued at the rates and prices set out in the Contract if, in the opinion of the Employer, the same shall be applicable as it is or with addition to or subtraction from an accepted item, if the contract does not contain any rates or prices applicable to the extra or additional work, then the rates or prices shall be obtained from the Applicable Circle, Public Works Department schedule of rates as was in vogue on the date of submission of the Bid. The same is being escalated to an extent determined by comparing the cost of a similar item appearing in the Schedule of Prices with those in PWD schedule. Where such rates are not available in P.W.D. schedule of rates, the market-analysed rate as approved by the Employer shall be final and binding. In case of such analysed rates, 10% profit including overhead consultant's fees, ST. Turnover Tax etc. shall be allowed. No other overhead, or other expenses shall be taken into account shall be considered to be inclusive of contractors profit.

(2) Variation Exceeding 20%: - If, on certified completion of the whole of the Works, it shall be found that a reduction or increase greater than twenty percent (20%) of the sum named in the Letter of Acceptance, excluding all fixed sums, provisional sums if any, results from

a) The aggregate effect of all Variation Orders, and

b) All adjustments upon measurement of the estimated quantities set out in the Schedule of Prices excluding all provisional sums, and adjustments of price made under Clause 66 (1) hereof but not from any other clause, of the Contract Price shall be adjusted by such sum as may be agreed between the Contractor and the Employer or, failing agreement, fixed by the Employer having regard to all material and relevant factors, including the Contractor's site and general overhead costs.

(3) Claims: The Contractor shall send to the EIC once in every month an account giving particulars, as full and detailed as possible, of all claims for any additional payment to which the Contractor may consider himself entitled and of all extra or additional work ordered by the Employer which he has executed during the preceding month. No final or interim claim for payment for any such work or expense will be considered which has not been included in such particulars. Provided always that the Employer shall at his discretion be entitled to authorize payment to be made for any such working expense, notwithstanding the Contractor's failure to comply with this condition, that the Contractor has, at the earlier practicable opportunity, notified the Employer in writing that he intends to make a claim for such work, provided always that a release of payment shall be preceded by the claim and valuation of variation, in that order.

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. Octroi, GST, Sales tax, VAT, Cess and other imposts. The Contractor shall pay Octroi, GST, Sales Tax, 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 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			
WATER TREATMENT PLANT AND SUB-STATION			
1	Planning, Designing and construction of Inlet Well, Parshall flume with channel, Flash mixer, Clariflocculator including Plastering, Painting, Inlet pipe installation, Valve, Flow meter, Bye pass arrangement of Clariflocculator by placing control valve before Inlet Well with all electromechanical works etc. for water treatment plant of 5.41 MLD capacity complete in all respect as per approved drawing and direction of E.I.C		
	Break up :		
A	All structural work upto EGL	20%	
B	All structural work above EGL	30%	
C	Supply of all E/M Works	15%	
D	Installation of all E/M works	15%	
E	All work including finishing Complete in all respect	10%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
2	Planning, Design and construction of Rapid gravity filter with under drainage system , filter media , clear water & back wash water channels, air scouring and back wash arrangement , blower ,Syphone, all gates and valves , ROF , LOH gauges , control console , rate controller, Electric Actuators and actuator control gates and valves and all other filter equipment's complete in all respect including flooring, plastering, painting, roof treatment & all other finishing works etc. for water treatment plant of 5.41 MLD capacity complete in all respect as per approved drawing and direction of E.I.C (Filter bed must be covered by RCC roof with masonry wall all around with door & windows system)		
	Break up :		
A	All structural work upto EGL	20%	
B	All structural work above EGL	35%	
C	Supply of all E/M Works	15%	

D	Installation of all E/M works	10%	
E	All work including finishing Complete in all respect	10%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
3	Planning, Design and construction of Filter annex building for office room , Blower room, laboratory , MCC room, lobby, Elevated service reservoir of capacity 150 Cum(Minimum) & 13.0 Mtr. staging height for back wash water , preparation of chemical solution and dosing arrangement and other requirements with plastering, painting, flooring, roof treatment, door windows etc. complete in all respect and direction of EIC.		
	Break up :		
A	All structural work up to EGL	20%	
B	All structural work above EGL	20%	
C	Supply of all E/M Works including Laboratory equipments & chemicals, furniture's	20%	
D	Installation of all E/M works & Laboratory equipments	20%	
E	All work including finishing Complete in all respect	10%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
4	Planning, Design and construction of Chemical house with arrangement of storing, preparation of chemical solutions and dozing of chemical like alum polyelectrolyte and chlorine including all safely arrangements including Supply of all water test equipment's in installation of standard laboratory, Gaseous chlorine arrangement for pre & Post chlorination with leak proof detection along with flooring, Plastering, painting, roof treatment, door windows with all necessary E/M equipment's as per approved drawing and direction of EIC.		
	Break up :		
A	All structural work upto EGL	25%	
B	All structural work above EGL	20%	
C	Supply of all E/M Works including Chlorination arrangement & Chemical dosing system	15%	
D	Installation of all E/M Works including Chlorination arrangement & Chemical dosing system	20%	
E	All work including finishing Complete in all respect	10%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
5	Planning, Designing and construction of Clear water reservoir of capacity 780 cum and High lift pump house along with supply and installation of all E/M equipment's, 2.0 MT HOT CRANE including Ironite flooring, plastering, painting, roof treatment & all other finishing works complete in all respect as per approved drawing and direction of EIC.		
	Break up :		

A	All structural work up to EGL	35%	
B	All structural work above EGL	20%	
C	Supply of all E/M Works equipments.	15%	
D	Installation of all E/M Works including Chlorination arrangement & Chemical dosing system	15%	
E	All work including finishing Complete in all respect	5%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
6	Sludge management by Planning, designing and construction of Sludge sump/Sludge well (TWL of which above 0.5 m above FGL) and two chambered sludge pond (TWL of which above 0.5 m above FGL) along with supply & Installation of all pipes, all E/M equipment's, complete in all respect as per approve drawing and direction of EIC.		
	Break up :		
A	All structural work upto EGL	30%	
B	All structural work above EGL	25%	
C	Supply of all E/M Works equipments.	10%	
D	Installation of all E/M Works including Chlorination arrangement & Chemical dosing system	15%	
E	All work including finishing Complete in all respect	10%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
7	Planning, Design & Construction of HT Substation building(RCC Framed) for 350 kVA load along with brick work, Plastering, Painting, Roof treatment, flooring, door & windows, ramp complete in all respect as per tentative drawing in Annexure & in consult with Power Supply Agency and Approved design as per direction of E.I.C.		
	Break up :		
A	All structural work upto EGL	20%	
B	All structural work above EGL	20%	
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	5%	
F	After successful trial run and Commissioning of the plant.	10%	
	Total =	100%	
8	Planning, Design, Construction of sentry room with good architectural appearance, barbed fencing of existing Boundary Wall at the periphery of the whole premises etc. complete in all respect as per approved drawing and direction of E.I.C.		
	Break up :		
A	All work up to FGL	50%	
B	All works above FGL	30%	
C	All work including finishing Complete in all respect	10%	
D	After successful trial run and Commissioning of the plant.	10%	

		Total =	100%
9	Good Earth filling & Land development up to FGL , 4.0 m wide internal roads with 80/100 mm thick paver block , Surface drainage arrangement for over flow and peak hour storm water management, arboriculture and beautification, 25 mm thick chequered tiles at Plinth protection areas and internal pathways complete in all respect as per approved drawing and direction of EIC.		
	Break up :		
	All works completed		80%
	All finishing work completion in all respect.		10%
	After successful trial run and Commissioning of the plant.		10%
		Total =	100%
10	Govt. Electrical inspector's fees as complete in all respect as per direction of EIC & technical advisor (E/M), M.E.Dte. Including indoor and outdoor lighting arrangement, yard lighting etc. complete in all respect as per approved drawing and direction of EIC.		
	Break up :		
	Govt. Electrical inspector's fees		10%
	indoor and outdoor lighting arrangement, yard lighting		80%
	After successful trial run and Commissioning of the plant.		10%
		Total =	100%
11	Operation and maintenance of the plant for one year . The work includes supplying adequate number of operator personnel and skilled labour along with Laboratory Assistant with a provision for necessary training to the personnel 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 Bid document and as per direction of EIC. N.B:- This item will be executed after three (3) months trial run.		
	Break up :		
A	Lump sum price to be quoted which will be paid quarterly basis throughout whole O/M		100%
		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) The 80 % of Security deposit or Retention money will be returned after completion of successful operation & maintenance period for 12 months without any interest & rest 20 % security money will be returned after completion of successful operation & maintenance period for 36 months without any interest.		
	c) There will be no security deposit for Sl no. 11 and payment for operation and maintenance will be made yearly basis.		
	d) The total amount to be quoted & uploaded by the bidder in .xls format of BOQ under Financial document will be as per the clause 57 of section C .		

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 to in or 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, North 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 (1), (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 Clause C-62(8) (a) to (d).

63.0. FRUSTRATION

Payment in event of Frustration: A war, or other circumstances outside the control of both parties, arises after the Contract is made so that either party is prevented 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 COUCILLORS OF MAL MUNICIPALITY

P.O. – Malbazar , Dist. –Jalpaiguri

(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 as suggested by the Superintending Engineer of North 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 North 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 generators. 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 North 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 North 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 North 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 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 North 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 violate 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 North 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 North 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 9.0 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 North 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.



**Chairman
Mal 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, Trial Run for 3 months, commissioning of E/M Equipment's with continuous operation for 72 hrs and maintenance for a period of (12) months after successful trial run upon completion of the works and commissioning and except in so far 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 from the Superintending Engineer, North Circle 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 Chairman, on recommendation of Superintending Engineer, North 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) Piling / Raft
- 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, 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 Chairman 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 Chairman 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 generators. 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 Chairman.

1.7 Fire Fighting Arrangement / Fire Extinguishing arrangement

The Contractor shall provide suitable arrangement for firefighting / 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 Chairman, 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 Chairman 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 Chairman and got set right before execution of works. Such deviations as may arise out of the joint survey shall not violate 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 Chairman 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 Chairman 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 Chairman 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, shall 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 Chairman 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 Chairman. 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 Chairman, 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 Chairman.

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. The Design of all structural part is to be done considering Fe 415 grade of steel.

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.



**Chairman
Mal 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 be to 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 Chairman 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 cement.
IS: 1786	Specification for High Strength Deformed bars & wires for concrete reinforcement.
IS: 1077	Common Burnt Clay Building Bricks.
IS: 1235	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 like 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 piling (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 soil 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 piling 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 properly moistened and well rammed. 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: 515. 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 analyzed 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

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

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 M³ 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 will be used in Reinforced Concrete Structures shall be in Grade of M25, for works of water retaining structure M30 Grade of concrete as per latest amendment of IS:3370 to be used.**

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: 2386 (Part-III).

The Water-Cement Ratio shall be maintained to its correct value. Surface moisture content of aggregate shall be determined as per IS: 2386 (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 shows 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 dressed timber true to line, not less than 37 mm. thick. 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 falling 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 protect 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-in-Charge. The minimum thickness of PVC 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:

Tensile Strength	100 to 150 Kg. /Cm ²
Minimum Safe Continuous Temperature	75°C
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 vulcanised. 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 300 Kg/ Cm ²
Maximum safe continuous temperature	75°C
Ultimate elongation	Not less than 350%
Water Absorption	Not more than 350% by weight in a 7 days 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- If required, all internal angles shall be rounded off as per drawing or as directed by the Engineer-in-Charge without any extra charges.
- 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 1 (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 an 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.

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 & third coat(if required) 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 (IS: 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 smoothed 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 PROOFING 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% Cico or similar approved water proofing compound conforming of IS: 2645 by weight of cement. The proportioning, laying etc., shall be done in 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 polyurethane based water proofing paint. And over it 40 mm thick screed concrete (M20 grade).

Specification for Roof Water Proof Treatment with Polyurethane based Water Proof Paint

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 300 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 chips laid in rectangular panel with diagonal length not exceeding 3.00M and finished smooth with neat cement 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 color 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, 6 mm. thick wires 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 300 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 mm 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 make, 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, discaled 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: 814. All steel work shall be fabricated and erected as per IS: 800 and IS: 806. Welding shall be carried out as per IS: 814, IS: 815, IS: 816 and IS: 823, 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 (vice 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.

13.2 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. For 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 falling 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 fiber 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 be wrapped with said insulating tape.

The thickness of SWMS pipes and specials of 900 mm diameter shall be 12 mm.

20.0 P.S.C. PIPELINES / 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 insulating 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 handling 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.

23.0 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 300 mm. and the size of the rung formed shall be 300 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

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 LIGHTNING ARRESTOR AND AVIATION LIGHT

Required sets of Lightning 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 lightning 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 sixty months 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 12 (Twelve) months period form 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 absolved. 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.



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SECTION - F

GENERAL TECHNICAL SPECIFICATION

1.0 SITE CONDITION

The site of the clear water reservoir, pumping station and water treatment plant is a flat land in general and made up Ground Level to be considered as stated earlier under scope of work. The Bidder shall verify the location of the clear water reservoir, pumping station and water treatment plant by inspection of the site and shall apprise himself of the local condition before submitting the Bid.

2.0 SUB-SOIL REPORT

Sub-soil investigation was carried out by soil-experts engaged by the ULB at the site of the proposed water treatment plant clear water reservoir and pumping station.

The Bidder should satisfy himself about the adequacy of the data for the design of pile foundation for the clear water reservoir pump house. The Bidder may also carry out soil investigation before submission of his Bid by drilling bore hole at work site at his own cost for his own satisfaction. The successful Bidder shall have to undertake fresh investigation of soil at the exact location of the

structure at his own cost to design the foundation properly. Records of such sub-soil investigation such as borehole logs, soil samples, SPT values etc., shall be done by the contractor duly witnessed and authenticated by the Engineer in Charge or his competent authorized representative.

In the event of variation in soil data between that of Municipal Authority and those obtained by the contractor during execution, the more conservative values obtained from the two sets of reports shall be adopted for design without any extra claim over the quoted price as accepted by the Department, unless otherwise permitted by the concerned Superintending Engineer.

3.0 BID DRAWINGS

The Site Layout Plan, general arrangement of the Water Treatment Plant, Clear Water Reservoir and dry pit Pump House are shown in bid drawing. These drawings are purely schematic in nature & meant for giving the Bidder a general idea of the proposed Water Treatment Plant, Clear Water Reservoir and dry pit Pump House. The various levels and dimension of the Water Treatment Plant Clear Water Reservoir, dry pit Pump House and Pump Station Sump are to be fixed by the Bidders. The effective capacity of the Underground Reservoir excluding free board, columns and dead storage in sump will be 780cum litre and calculation to be made above 0.150 m from floor level of CWR. If as per dimension proposed by the Bidder, the Capacity of the Reservoir is found to be more than 780cum litre, no extra payment on account of increased capacity will be made.

4.0 DESIGN CRITERIA

4.1 The basic layout of the WTP, Clear Water Reservoir and dry pit Pump House shall be as per Bid Drawings. The elevation of the WTP, Pump House building and the Reservoir shall be of suitable Architectural design based on the Bid Drawings. The Bidder shall submit with his Bid, the Architectural Elevation of the building and the Reservoir. However, the architectural Elevation with fixation of Plinth level may have to be modified at the time of approval by the Chairman, Jalpaiguri Municipality for which no extra charge will be paid.

Design and construction of all R. C. C. Structures, brick masonry walls and Foundation shall conform to the latest edition of the following IS Codes.

- | | |
|--------------------------------|---------------------|
| a) Loading Standards | IS: 875 |
| b) Earthquake Resistant Design | IS: 1893 & IS: 4326 |

c) Reinforced and Plain Concrete	IS: 456
d) Foundations	IS: 1080, IS: 2950
	IS: 2911 & IS: 2974
e) Liquid Retaining Structures	IS: 3370
f) Structural Steel	IS: 800
g) Reinforcement	
Mild Steel	IS: 456 & IS: 432
Ribbed Tor Steel	IS: 1786 & IS: 1139
h) Masonry and Brickwork	IS: 1905 & ISS: 2212
i) National Building Code of India	
j) Design & Construction of Pile Foundation	IS: 2911

4.2 The clear water reservoir including inlet control chamber and Overflow Pits, the wet pit Pump House Building, the Pump Suction Sump and Unloading Bay and all the units of WTP shall be designed as per requirement based on the Report of soil investigation.

If pile foundation is obligatory as per Report, piles shall be bored Cast-in-situ R. C. C. Piles. The design, construction and workmanship for these piles shall fully conform to and satisfy the requirements of IS: 2911 (Latest Edition). Concrete to be used in Piles shall be of M-25 Grade having Cement content not less than 440 kg/m³. Reinforcement in piles shall be in conformity with the requirements contained in IS: 2911 (Latest Edition). The minimum area of Longitudinal Reinforcements shall be as per requirements and such requirements shall be provided for the full length of piles. For piles subject to Upward Tension, reinforcement shall be provided throughout the full length and such reinforcement shall be designed on the basis of upward load they are supposed to carry.

The safe working loads of the R. C. C. Cast-in-situ bored piles should be that as computed as per IS: 2911 on the basis of Sub-soil Parameters of the Site with a minimum Factor of Safety 2.5 (Compression) and 3.00 (Up lift) applied there on or that indicated in the following table, whichever is less.

Pile termination levels shall be chosen carefully. The safe working load of the piles shall be substantiated by Routine Load Test. The Pile termination level shall not be reduced from that stated herein above unless otherwise permitted by the Engineer-in-Charge.

These Piles shall be designed for Seismic Condition also. The Importance factor for Seismic Analysis of Structure shall be 1.50. The Bidder shall include in his Lump Sum price the cost for Load Test of at least working pile (Routine Test) per 100 piles or part thereof. The testing should be as per Code Stipulations.

4.3 While designing the Foundation of different structures, the Bidder may use the Soil Investigation results enclosed in the Bid.

5.0 DESIGN PARAMETERS

5.1 Loadings

A) Clear Water Reservoir

The roof is to be designed for a live load of 500 kg/M² and the superimposed Load of saturated earth of 450 mm depth. No relief shall be allowed due to this Superimposed Load of saturated earth while computing the Uplift on the reservoir.

B) i)	Live Load on Roof	200 Kg/Sq. m
ii)	Live load on pump house Floor	500 Kg/Sq. m.
iii)	Live load on Control Room Floor	300 Kg/Sq. m.
iv)	Weight of each Empty Pump (approx.)	2000 Kg.
v)	Weight of each Motor (approx.)	2000 Kg.

vi)	Weight of 500 mm diameter Sluice Valve (approx.)	1200 Kg.
vii)	Weight of 400 mm diameter Sluice Valve (approx.)	900 Kg.
viii)	Weight of 400 mm diameter NR V. (approx.)	500 Kg.
ix)	Load due to Electric Panel (approx.)	1200 Kg/Sq. m.
x)	Weight of 400 mm diameter pipe (approx.)	300 Kg/m

N.B. Loading details given herein above are tentative and subject to verification during final execution. No extra cost will be paid to the Contractor on account of variation within ± 30 % limit.

Vertical load data for pumps and motors are inclusive of impact factor subject to confirmation of the Pump Manufacturer during final design. The cost in this regard shall be included in the lump sum offer by the Bidder and no additional claim will be entertained in future due to variation in load data, if any,

The floor slab is to be designed for the worst loading conditions that the floor will be subjected due to the equipment to be housed and may be put anywhere on this floor. The floor slab should be so designed as to withstand such loads.

The floor supporting M.S suspenders/Cable trays are to be designed for a concentrated static load of 200 Kg at any point. The Cable Trenches shall be absolutely free from any obstruction so as to allow the Cables to be lowered in the trenches from top only at the time of laying.

Load of M.S Chequered Plates	50 Kg/Sq. m
For trench covers over opening in Floor	500 Kg/Sq. m
Loading from 2.00 M.T H.O.T	as per Crane Manufacturer's Specifications

The Unloading Bay is to be designed for 16 M.T full truckload.

While designing the sidewalls of the Clear Water Reservoir and pump house a surcharge of 500 Kg/Sq. m is to be taken into consideration. The Bidder has to design in such a way that the permissible limit of vibrations of Roto- dynamic Equipment shall be

within the limit as specified in IS: 11724-1985. The R. P. M. of pump Motor set may be not less than 1500 R.P.M. Sync, subject to confirmation award of equipment contract.

N. B. For calculating earth pressure on the walls of Reservoir/Pump house, the higher value among co-efficient of active earth pressure (K_a) and that of Earth pressure at rest (K_0) is to be considered. Standard backfill materials with conservative soil data are to be considered. No extra claims are to be entertained in this regard. In case of Retaining wall design & RCC wall design also, no passive pressure is to be considered.

5.2 Special Notes on horizontal centrifugal axial split case pump in horizontal Execution of Pump Foundation Design and vertical pumping unit in vertical execution.

5.3.1 Foundation system for support of Rotary machines such as horizontal Pumps shall strictly comply with the requirements of Code IS: 2974 (Part-IV) - latest edition. The Rotary Machine support system require careful study of the foundation system with due consideration of vibration characteristics. For satisfactory design and construction, the following precautions need be taken with careful dynamic analysis of machine foundation and its supporting structures:

- i. The natural frequency of the Foundation System shall be analysed and the mass of the Foundation System shall be considerably larger than the mass of the whole machine.
- ii. Dynamic Analysis due to insufficient clearance between impeller and casing of Pumps should be checked and frequency out of this type of vibration need to be made as per relevant IS Code.
- iii. Dynamic Response check of the block foundation may be carried out as per relevant IS Code.
- iv. Permissible amplitude of Vibration of displacement as per IS Code 2974 (Part-IV), is to be calculated and the design will be checked accordingly.
- v. Permissible stresses in Soil/Concrete be suitably as per IS Code.
- vi. Natural frequency of Foundation System shall be such as will avoid resonance with the Operating Speed of the Machine. The natural frequency of the foundation system should not be within +20% of the operating speed of the machine.
- vii. The foundation system shall be so dimensioned that the resultant force due to mass of the machine and mass of the Foundation passes through the Centre of gravity of the base area of the Foundation.

5.3.2 The Bidder is required to submit a "Technical Write-up" with relevant details of Foundation System along with the Part-I of this Bid. This would help the Department to fix up the accepted Parametric Norms of the foundation System that would finally be adopted in the design and construction of the Building and Structures after award of the contract.

6.0 ARRANGMENT OF ROOM TREATMENT: EARTH FILL VENTILATING SYSTEM

6.1 It is proposed that earth fill shall have to be done up to finished ground level (FGL) which is at same level as high flood level (HFL)

6.2 The R. C. C. Roof Slab of the Clear Water Reservoir shall be protected with water proofing treatment as per specification given elsewhere in the Bid documents.

7.0 DESIGN DRAWING AND OTHER INFORMATIONS TO BE SUBMITTED BY THE CONTRACTOR (SUCCESSFUL BIDDER)

7.1 On the award of the Contract Contractor shall submit to the Chairman and detailed design and drawings of different structures within fourteen (14) days from the date of issue of Letter of Acceptance and thereafter the balance drawings and design calculations will have to be submitted phase wise keeping pace with the work Program.

If called upon the Contractor shall also submit within reasonable time relevant books and other reference, which have been referred to or used in the design. Such books and other relevance will be returned to the Contractor when done with. Secrecy in regard to details of design materials and equipment's etc. shall not be pleaded by the Contractor in the name of "Trade Secret" for not furnishing the requirement details asked for by the Chairman, Jalpaiguri Municipality. The design and drawings shall be subjected to modifications at no extra cost, if found necessary and such modifications shall not vitiate the contract. Similarly, the Contractor shall submit any additional new drawings as found and the drawings shall form part of the Contract Drawings.

Notwithstanding what has been stated above the Contractor shall be responsible for the correctness and soundness of the design and if any provisions are found inadequate or faulty necessary modification will have to be carried out at any stage up-to the expiry of the Guarantee period at no extra cost.

The Contractor will not be permitted to commence the Actual Work at site unless the Chairman on written recommendation of Superintending Engineer, West Circle of Municipal Engineering Directorate approves detailed design and working drawings. Four copies of the approved design and six copies of the approved drawings are to be furnished by the Contractor free of cost for use by the Employer during execution of the work. Any additional copies of same drawings, if required, should also be submitted by the Contractor free of cost at the request of the Employer. If the drawings are done with Auto Cad, then copy of the folders containing drawings in CD/DVD may be submitted for records only.

A tentative work Program in Network Diagram using CPM technique is required to be submitted by the successful Bidder within a fortnight from the date of issue of the letter of acceptance. The drawings from foundation onward will have to be submitted by the successful Bidder successively as per the work Program to be approved by the Engineer-in-Charge. Adequate resources are to be mobilized during execution of the work, for which no extra payment shall be made.

7.2 Completion of Drawings and Other Documents to be submitted the Contractor

The Contractor shall submit within one month after the completion of all construction works the followings drawings and documents free of cost.

- a) Six copies of all approved Completion drawings. These drawings shall be on black and white prints of thick paper and there shall be one transparency of each drawing. These drawings are to be submitted with Chairman in a presentable form as directed by the Superintending Engineer of Municipal Engineering Directorate. In addition to this, CD/DVD's with folders of these drawings drawn in Auto CAD or scanned copies are to be submitted.
- b) Four copies of final designs in properly bound form as directed by the Superintending Engineer.
- c) Four copies of detailed specification and schedules of the completed Pump House, Water Treatment Plant and Reservoir & HT Substation.

- d) Six copies of Instruction Manuals for the Operation, Maintenance and overall of plant.
- i) The Instruction Manuals shall contain the following basic categories of information in practical, complete and comprehensive manner prepared for use by operating and/ or maintenance personnel:
 - a) Relevant information as regards initial installation,
 - b) Instruction for operation, maintenance and repair,
 - c) Recommended inspection points and period of inspection.
 - d) Ordering information for all replaceable parts, etc.
- ii) The information shall be organized in a logical and orderly sequence. A general description of the system including important technical characteristics shall be included in order to familiarize operating and maintenance personnel with the system.
- iii) Necessary reproducible drawing and/or other illustrations shall be included or copies of appropriate certified 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 installation, maintenance and operating cautions shall be duly emphasized.
- iv) A part list shall be included showing part nomenclature, manufacturer's part numbers and/or other information necessary for accurate identification and ordering of replacement parts.
- v) 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.
- vi) The instruction Manual shall include list of all special tools and tackle furnished with complete drawings and instructions for use of such tools and tackle.
- vii) The Instruction Manual shall also include recommendations for consumable supplies e.g. packing, lubricants, etc., for the plant installed as well as for chemicals for treatment and laboratory reagents.
- viii) All the pages of the Instruction Manual shall be clearly legible and prepared on good quality paper.

- ix) The Instruction Manual shall need the approval of the Superintending Engineer of Municipal Engineering Directorate to the Chairman, Jalpaiguri Municipality.

All the copies of the Instruction Manual shall be presented in durable and bound form as directed by the Superintending Engineer, north Circle, and Municipal Engineering Directorate before submission to the Chairman, Jalpaiguri Municipality.

7.3 Release of Security Deposit (Retention Money)

The Security Deposit (Retention Money) shall not be released until all the above-mentioned Completion Drawings and Documents (as per Clause 7.2) are submitted by the Contractor.



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SECTION - G

DETAILED TECHNICAL SPECIFICATIONS

1.0. SPECIAL NOTES

- 1.1. The layout of the plant as shown on the drawing attached is not binding on the Bidder but is only indicative.
- 1.2. The Bidder shall not quote for works differing from the specifications of the Bid unless specifically permitted elsewhere in the Bid documents.
- 1.3. The suitability of the plant will not be decided only by the low capital cost but the economy in the operational costs will also be considered. For this purpose all relevant details should be furnished.
- 1.4. There shall not be any ambiguity in the offer. Bid containing any ambiguity may be interpreted in a manner advantageous to the Employer.
- 1.5. If not mentioned elsewhere in the Bid documents, the contractor shall provide the following arrangements:

- a) Hydraulics of Water Treatment Plant shall be such that water flows by gravity from stilling chamber to the filtered water storage reservoir and over flow from filtered water storage reservoir flows by gravity to the plant drain. The water treatment plant shall be designed for **25% overload**. All the units of treatment plant shall be designed considering 23 hours pumping from Clear water Pump Houses.
 - b) Water supply to different treatment processes namely chemical dosing, dis-infection shall not be made solely dependent on the operation of clear water pumps. The pumping arrangement/Back wash water reservoir over the filter house (RCC) for supplying water to alum solution tank and chlorine dosing equipment's shall have to be provided by the bidder.
 - c) Disposal of drainage of the treatment units shall be made by gravity system as far as practicable. If ultimate disposal has to be pumped, emergency gravity overflow must be provided.
 - d) Particular care shall be taken for satisfactory disposal of sludge from the clarifier.
- 1.6. All valves, sluice gates, etc. shall be of reputed make and shall conform to available IS specifications where name of manufactures do not appear in the List of Vendors. In case of non-availability of relevant I.S. specifications it should conform to British Standard Specification or American Standard Specification.
- 1.7. The water works being a process plant it is imperative that the layout of the plant inclusive of all Civil, Mechanical and Electrical Components should meet the requirements of Indian Factory Act, Indian Explosives Act and all other relevant statutes of the State and Central Government. The contractor has also to procure Explosive License for use of chlorine during Trial Run. The contractor shall provide all Structures, Vats, implements etc. forming part of on-site emergency plan.
- 1.8. In order to provide a normal output of **266 m³/hr (with 23 hours operation)** Filtration, the inflow, flash mixer, alum dosing and Clariflocculator are to be designed accordingly with 25% overloading. Subsequent Units may be designed as per requirement with overloading capacity.

1.9. SCOPE OF WORKS

ITEMS OF WORKS

The scope of works has already been detailed in these documents. However, it is repeated

- a) Raw water inlet arrangement

- b) Raw water flow measurement with Parshall flume
- c) Flash Mixture
- d) Chemical house
- e) Feed channels / pipes and stand well
- f) Conventional RCC Clariflocculator
- g) Filter house with gravity filter including back wash with air & water
- h) Annex building
- i) Chlorine dosing pre and post
- j) CWR with wet pit pump house
- k) Plant waste water including sludge pump house
- l) Recirculation pumping of waste water management from Sludge Pond.
- m) Back filling shall have to be done from the excavated earth and if required in case of short fall the same shall have to be arranged by the bidder.
- n) Illumination of the plant including yard lighting
- o) Sub-Station Building with HT/LT Electro-mechanical works
- p) Beautification of premises
- q) Internal/External including yard lighting by LED lighting fixture

The above scope of works is to be indicative not to be exhaustive. Anything not covered in NIB but required for successful commissioning of the plant are to be provided by the Bidder.

1.10. SOURCES OF RAW WATER SUPPLY AND DESIGN FLOW

The source of raw water supply is the river NEORA. From proposed intake system, the raw water will be pumped through a proposed rising main to the inlet collecting well via valve chamber. The plant is to be designed for treating raw water of river NEORA and providing a normal output of 266 cubic meters per hour (with 23 hours working a day) after deducting back wash waste & other waste. In view of the river nature difference of water level will be changed, the pump discharge will be changed. The plant shall be designed to deal with the varying rate of input which will occur throughout the year. The various unit of the treatment plant shall be capable of over loading & under loading without affecting the quality of the treated water.

1.11. QUALITY OF THE RAW WATER

For designing the treatment plant the quality of raw water should be checked by the bidder at his own cost for getting actual data required for designing.

1.12. DESIRED PERFORMANCE OF THE TREATMENT PLANT

The finished water quality shall be such that it conforms to the drinking water standard given in IS: 10500 unless otherwise specifically mentioned herein.

PHYSICAL QUALITY

- a. Even with the maximum turbidity in the clarified water, in final turbidity in the filter water should be less than 1 NTU. The bidder should specifically mention the clarity of filtered water guaranteed by him.
- b. There should be nothing objectionable as regards Test and odour.
- c. The colour of the finished water shall be restricted to 5 Hazen units on platinum cobalt scale.

CHEMICAL QUALITY OF WATER

- a. The chemical quality of the finished water shall be such that there will not be any harmful effect on human body after prolonged use. In this respect modern concepts regarding quality of drinking water for human consumption shall be given due consideration. In case the pH value shall not be less than 6.5 or exceed 8.5
- b. Iron content shall not exceed 0.3 mg/lit.
- c. The process for removal of nitrates is not included in this Bidder.
- d. Other chemical quality parameter the acceptable limit shall not exceed the acceptable limits specified in the drinking water- Specification IS: 10500 (latest version) published by the Bureau of IS and method of sampling shall be as provided therein.

1.13. BACTERIOLOGICAL QUALITY OF WATER

- a. Throughout any year, 95% of sample shall not contain any coliform organism in 100 ml.
- b. Coliform organisms shall not be detectable in 100 ml of any two consecutive samples.
- c. No sample shall contain E-coil in 100 ml.

1.14. MODE OF TREATMENT

With the quality of raw water available from the river Neora, the following mode of treatment is considered for treating the raw water:

- a. Pre chlorination of the water as and when necessary.
- b. Addition of alum in proportionate doses to coagulate the particles held in colloidal suspension.
- c. Through blending of the chemicals with the raw water by flash mixing.
- d. Flocculation to aid the formation of heavy particles of flocks.
- e. Clarification for setting the flocks in clarifier.
- f. Filtration through rapid gravity sand filters.
- g. Disinfections of the filtered effluent with chlorination.

1.15. DESIGN SUBMITTED BY THE BIDDER

All Civil & Electro-mechanical works shall be designed as per latest IS specification.

- a. Raw water inlet chamber with valves and by-pass valves arrangement
- b. Raw water stands well dia. & height from the finished GL.
- c. Raw water inlet channel with Parshall flume with flow control valves and measurement.
- d. Flash mixer
- e. Stand well for feeding the Clariflocculator and bypass arrangement for feeding directly to the filter bed with valves arrangement (if required in designing process or as per CPHEEO Manual)
- f. Clariflocculator with rotating half dia. bridge arrangement and with de-sludging arrangement
- g. Rapid gravity filter bed
- h. Chemical house & annex building
- i. UGR cum wet pit pump house.
- j. Sub-Station Building
- k. Internal/External including yard lighting arrangement by LED fitting fixture
- l. Boundary wall with adequate foundation.

2.1. Inlet arrangement, collecting well and flow measurement:

The raw water will be delivered into a Collecting/Inlet well through a proposed rising pumping main, Valve chamber & Flow measuring instrument. Detention time for Inlet well shall be considered 45 second and the rising rate of the Inlet well shall be less than 0.100 m/sec for normal output of 266 m³/hr with 25 % overloading. A Flow Control Valve of requisite diameter shall be provided by the Bidder to control the flow of raw water into the collecting well. Suitable valve arrangement shall also be provided to bypass the flow control valve so that the same can be removed for maintenance without requiring a complete shutdown of the treatment plant, the valves (including by pass) shall be hand operated butterfly valve type of materials construction shall be of CI/MS.

The rising main to be laid by the Employer under a separate contract but the raw water valve chamber, Flow measuring instrument and the inlet arrangement will start from this point and shall include the cost of the rising main including its connection with the Employer's rising main provided with a flanged end, connection with the collecting well through 8 mm M.S plate and also including anticorrosive painting.

The raw water shall be measured by flow instrument in the Parshall flume downstream of the venture flow equipment supplied by the Contractors per IS: 14371 (Latest revision). Bidders shall quote for the construction of this flume and for the supply and installation of one open channel flow meter of reputed and approved make. The flow meter shall be provided with a Float control dial type indicator near the flume. The drain pipes shall be of 150 mm dia. CI pipes with 150 mm. dia. sluice valve provided with operating rod and hand wheels.

2.1.1. Civil Works

The collecting well and Parshall flume channel shall be of R.C.C. construction. The soil condition of the site shall be duly considered when designing the foundation of collecting well and venture flume supports. One M.S. step ladder 900 mm wide shall be provided for ready access into the walkway from ground level. Suitable gravity draining arrangement shall be provided with valve for emptying collecting well. All the basic constructions works and finishing works shall be carried out as per specifications contained in other Section of these Bid specifications. There shall be a 1000 mm wide walkway around the Inlet well. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with minimum 450 mm diameter RCC Bored cast in situ piles.

2.2. Flash Mixing

2.2.1. General

The raw water from the flume shall enter into the flash mixing unit for thorough dispersion of the coagulant chemicals added to the raw water. The flash mixing unit will comprise of a flash mixing chambers, designed for a normal output of 266m³/hr with 25 % overloading and to give a mixing time of not less than 45 Seconds. The ratio of tank height to tank diameter/width shall be within 1:1 to 1:3. The flash-mixing chamber will be fitted with electricity driven turbine type motor and with inlet and outlet penstock gates for the purpose of isolation. The flash mixer shall be provided with stainless steel impeller fitted at the bottom of stainless steel shaft under slung from driving gears mounted on the roof of mixing chamber. The impeller, its R.P.M. and the horsepower of the electric motor be designed to give a value of G (Velocity Gradient) greater than (300 Sec)⁻¹ to ensure adequate turbulence for thorough mixing. The electric motor shall be of TEFC enclosure having IP-55 protection group. The motor shall be locally operated and with remote operation from the central control panel having local / remote selection switch on the remote control panel. A MS cover plate shall be provided on the total unit for protection from the sun, rain and dust etc. The flash mixing unit shall be provided with R.C.C. slab fitted with hand railings partly covering the chamber for locating the driving unit of the mixer and for approach to the same. Adequate arrangement for cleaning and de-slugging the flash mixing chamber and finally disposing the same into the plant wastewater disposal system shall be made. The drain pipes shall be of 150 mm dia. CI pipes with 150 mm. dia. sluice valve provided with operating rod and hand wheels.

After flash mixing the total flow shall have to be feed the clarifier central shaft through stand well if required as per design and CPHEEO manual. Bidders shall provide suitable bypass arrangements for diverting the raw water directly into the filters to bypass the clarifier (for clarifier maintenance purpose). The bypass arrangements shall be operated through sluice gates or sluice valves as per design and direction of EIC.

2.2.2. Civil Works

The flash mixing chamber and channels shall be of RCC construction. The walls and floors shall be designed on the basis of un-cracked section. There shall be a 1000 mm wide walkway around the flash mixer and on one side of the channels. Hand railings shall be provided on the walkways. Suitable gravity drainage arrangements shall be provided with valve for emptying flash mixer etc. All the basic construction works and finishing works shall be carried out as per specifications contained in other Section of these Bid specifications. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with minimum 500 mm diameter RCC Bored cast in situ piles- if required after testing the bearing capacity of the soil.

2.3. Chemical House

2.3.1. General

There shall be a chemical house for the plant under this Bid where provision shall be made for alum / PAC storage, alum tanks, dosing equipment, etc. The alum solution shall be fed to the raw water by using metering pump before the Parshall flume from the alum solution tanks in the chemical house.

Alum dosing arrangement shall be designed to cater for a continuous dose of 50 mg/l to a normal flow of 236 m³/hr with 25 % overloading using a 5% strength solution. However, actual dose of various chemicals shall be decided by the jar Test to achieve the required treated water quality. The solution shall be prepared and stored in three (3) tanks of suitable sizes with 8 hours operation capacity each. The floor of the alum solution tanks shall be kept at a level, which will permit sufficient head to feed the solution to the raw water. Provision shall be made in the alum solution tanks for providing timber slats to form trays in which alum blocks will be placed for preparation of the solution. Provision shall be made for a jet spray of water over the alum blocks to achieve rapid dissolution of alum. The alum solution tanks shall be provided with fibre glass reinforced epoxy lining.

Electrically driven mechanical agitators shall be provided for continuous stirring of the solution in the tanks. The agitators shall consist of FRP paddles mounted on stainless steel shafts. The shafts shall be mounted on top of the tank and no thrust or guide beings shall be permitted below the liquid level. The paddles in the tank shall be driven by an electric motor through a speed reduction gear of appropriate ratio to provide gentle agitation of the liquid. The driving motor and the reduction gear shall be totally enclosed and easily accessible for maintenance.

Bidders shall also quote for providing water jetting and flushing the alum solution tank when it is empty so that any settled insoluble material is flushed out. The drainage of such flushing shall be done in the flash mixer(s). Provision for water for the jetting shall be made both from supply main as well as provision of high-pressure water jetting. Bidders shall include in their offer complete arrangements of valves and piping for delivery of the alum solution before the venture flume through the dosing apparatus, discharge of waste water from the tanks during cleansing operations, overflow from the tanks; The solution delivery and waste pipes shall be of HDPE pipes inside the chemical house and rubber-lined double flanged cast iron pipes outside the chemical house. No bends shall be used in the solution delivery pipeline and wherever a change in direction occurs cross pipes shall be used to facilitate rodding of the pipelines to remove chock. All valves for solution delivery and wastewater from the tank shall be rubber lined cast iron diaphragm

valves. The entire pipe work including valves shall be easily accessible for maintenance for which a walkway at the appropriate level shall be provided.

Bidders shall provide two basket type strainers in the alum solution delivery pipeline to the dosing tank. The arrangement of the strainers and the delivery pipeline shall permit isolation of any of the strainers for cleansing. The strainer shall be of cast iron construction and fitted with a stainless steel mesh screen basket.

Bidders shall also provide suitable level indicators operated either electrically or by float. Gauges shall be provided for each tank placed at a convenient place easily visible by the operators.

Water supply for the preparation of alum solution shall be obtained from a tapping off the proposed pressure main in the vicinity (within 150 meters) of the filter house/chemical house. Bidders shall include in their offer inter connection with the proposed main with a C.I. sluice valve of required size and all pipes and fittings from this valve to the alum solution tanks. Bidders shall also provide arrangements for supplying filtered water from the filtered water channel in the filter house. Bidders shall include in their offer the cost of all these arrangements including pipelines, valves, pumps, motors or water jetting system etc. There shall be a provision for 100% standby of pumps & motors for supplying water to alum solution tanks. Bidders shall include in their offer for the supply and erection, where necessary, of the following ancillary equipment for use in the chemical house.

- i) One hand operated 1 ton capacity travelling hoists of reputed and approved make moving on rolled steel joists fixed on top of the alum tanks for lifting alum in trays from ground floor to individual tanks. There shall be sufficient headroom for directly placing the trays in the dissolving trays of the solution tanks by the hoists.
- ii) Four (4) timber/stainless steel S.S. trays of suitable size of a suitable design to be approved by the Engineer. The trays will be charged with alum blocks and placed directly on the dissolving trays of the alum tanks for preparation of alum solution. The water tray shall be of best quality teak wood and shall be made with mortise and tendon joints and with timber nails. All the edges of the trays shall be strengthened with stainless steel angles or straps. In case of S.S. trays it shall be made of robust S.S. tubes frames and slotted S.S. sheet of approved design. The top of trays shall be provided with hooks of stainless steel for lifting.
- iii) Two 4 wheeled rubber tired handcarts for transport of the trays charged with alum blocks.
- iv) One 1000 kg dial type platform weighing machine of reputed and approved make.

V) The sufficient space of the storage of alum for three month.

2.3.2. Civil Works

The chemical house shall be of double storied R.C.C. framed structure with suitable raft foundation (if required after testing the soil bearing capacity) and brick panel walls. Overall plinth area shall not be less than 150 m². The clear headroom for each floor of the chemical house building shall not be less than 3.5 meters. The areas to be provided for different purposes shall be as follows: The areas given purely tentative in nature.

On Ground Floor (all data Tentitative)

Alum storage	64 M ²
Toilet	6 M ²
Chlorine Store Room	50 M ²
Stair	30 M ²

On First Floor

Chlorination Room	20 M ²
Laboratory	75 M ²
Operator's room	20 M ²
Toilet	6 M ²
Alum Solution tanks	36 M ²
Stair	30 M ²

The Bidders shall be free to provide additional areas / designed area within their quoted price. Bidders may make minor adjustments to these areas to suit their own design requirements within the allowable overall plinth area. Adequate common passage and circulation space shall be provided on each floor to give independent access to each individual room. An independent staircase with 1000 mm wide steps shall be provided from alum storage area in the ground floor to the loading platform of the alum solution tanks. A separate staircase with 1200 mm wide steps shall be provided from the ground floor to the first floor for laboratory and chlorination room. The stairs shall be fitted with grided hand railings. The gaseous chlorine room and storage of the chlorine tonner shall have adequate ventilation. The total shutter area of doors, windows and ventilators shall not be less than 25% of the plinth area exhaust fans ensuring four air changes/hr. shall be provided near the floor level. For other parts of the chemical house the total

shutter area of doors, windows and ventilators shall not be less than 20% of the plinth area. The alum storage shall be provided with an entrance a 4500 mm wide fitted with rolling shutter. To facilitate unloading of alum cakes from truck, provision of entering the truck into the store up to the stacking space shall be made. A weighing machine shall have to be provided in the chemical house. For this purpose there shall be a 5000 mm wide ramp for movement by commercial vehicles in front of the entrance. Suitable storage tanks for 6 tons of liquid alum or PAC of strength as per I.S. specification shall be provided over the ground adjacent to the chemical house with suitable facilities for unloading. The main entrance door of the stair block for laboratory and chlorination room and the door of the laboratory shall be of 1st class C.P. teak wood all through including the frame. The Engineer shall approve the design of the doors. These doors shall be polished as per standard practice and shall be to the entire satisfaction of the Engineer. All other doors and windows shall be of steel. Their pattern shall be up-to-date and shall be approved by the Engineer. There shall be an inter-connecting walkway between the chemical house, the collecting well and filter house at the first floor level. The walkway shall be provided with hand railings of approved design. The toilets shall be connected to a septic tank of 6 user's capacity. The soak pit shall be provided at remote place as per direction of EIC. The roof of the chemical house shall be provided with roof water proofing treatment with adequate arrangements for rainwater drainage. The roof shall be accessible from the staircase for laboratory, etc. and shall be provided with a 250 mm thick parapet wall of 1000 mm height. Bidders shall provide a 300 mm wide apron of 75 mm thick 1:3:6 cement concrete laid over brick on edge soling and a surface drain all-round the chemical house. All the basic construction works and finishing works shall be carried out as per specifications contained in other section of these Bid specifications. Grade of all structural concrete shall be of M-30.

2.4. RCC Flocculation and Clarification

2.4.1. General

The bidder shall quote in their offer for construction of Clariflocculator. It shall be designed for a normal output of 266 cum/hr with 25 % overloading. Following guidelines shall be mandatory for designing of the Clariflocculator.

- Detention time of flocculator : 30 minutes (minimum)
- Detention time of clarifier : 2.5 hours (minimum)
- Depth of tank for flocculator : 3.0 m to 4.5 m
- Depth of tank for clarifier : 2.5 m to 4.0 m
- Surface loading rate : 38 m³/m²/day (maximum)& 30 m³/m²/day (minimum)
- Bottom slope of Clariflocculator : 1 in 12 (minimum)

- Weir loading rate : 300 cum/m/day
- Velocity through slots of central shaft : 0.6 m/sec (maximum)
- Velocity through collecting launder : 0.4 m/sec (maximum)
- Minimum thickness of wall : 200 mm

Tenderer shall ensure that clarifier executed by them shall be capable of giving turbidity of less than 10 NTU for normal flow.

Chemically treated water shall be delivered at the top of the tank through a central influent column (central shaft) which shall form an integral part of the tank through suitable dia. P1 class RCC pipe line leading from the stand well at or near the flash mixing unit.

Clarifier shall be provided with mechanism comprising of MS paddles rotating at gentle speeds in the central zone of the tank for flocculating the chemically treated water. The number of such rotating paddles shall be designed by the bidder. The areas of the paddles and the driving mechanism thereof shall be designed to give a velocity gradient in the range of $(20\text{sec})^{-1}$ to $(40\text{sec})^{-1}$. The tip speed of the paddles shall be adjustable by means of variable speed pulley in the driving gear and shall not exceed 600 mm per second. Tenderer shall give full details of the paddles areas and of the drive unit incorporating a variable speed pulley.

The clarified effluent shall be collected in a peripheral launder at the top of the tank. The bidder shall have to provide for collection through orifices built in the wall of the launder. The diameter and spacing of these orifices shall be designed to restrict the velocity through them not exceeding 400mm per second. The clarified water shall be delivered to the filter house in /open channels designed to give a velocity of flow not exceeding 400 mm per second.

The sludge settling to the floor shall be moved to the centre of the tank by means of mechanical scrapers which shall be provided over the entire floor below the central flocculating zone and over half the floor in the clarification zone. The scrapper blades shall be of mild steel plates fixed to a mild steel frame suspended from a mild steel frame bridge rotating round the central pillar of the clarifier tank. The scrapper blades above the floor of the tank shall be arranged in a spiral form to ensure forward movement of the sludge setting over the entire area of the tank towards the centre with each revolution of the bridge.

The clarifier rotating bridge shall be fabricated from mild steel sections and shall be sturdy in construction. The bridge shall be designed to rest on an end carriage at the periphery of the tank and on a turn table resting on top of the central effluent column. Walkways of mild steel chequer plate gratings with hand railing on either side shall be provided on the clarifier bridge to give easy access to all moving parts of the equipment's regular attention and service. The turntable shall be mechanical casting and shall be designed to rotate on ball/ roller bearing. Adequate provision shall be made for lubrication of the bearings from convenient point of the bridge deck.

The bridge shall be designed to travel at a peripheral speed not less than 3.0 meter per minute without production of vibration and jerk at any condition. The cast iron wheel with heat treated chrome steel or cast steel tyres with the axis rotation in roller bearings shall be provided at the end carriage of the bridge. The end carriage shall travel on steel track not less than 14.91 kg/m grouted on the top of the peripheral wall and also on the wall of the central flocculating chamber. Weather proof canopies shall be provided on the bridge for protection of the driving gear motors and electrical components. The electrical motors for the various drives, motor control panel on the clarifier bridge ,central column slip ring for transferring the electrical energy to the rotating bridge cables and earthing and all other works shall conform as per I.E rules and as per IS specification.

The sludge scraped to the two centre pits diametrically opposite of the clarifier shall be removed by means of hydrostatic pressure through two cast iron pipe lines of suitable dia. each embedded under the floor of the tank. This should be done strictly as per CPHEEO manual & design considering diameter of Clariflocculator. These pipe lines shall terminate in two sludge pits which shall be provided sluice valves of suitable dia. at level for manual operation from the top for emptying the tank. A second sluice valve of suitable dia. shall also be provided for blow down the sludge. Arrangement shall also be provided for continuous bleeding of the sludge through an adjustable trumpet weir of nonferrous construction.

Arrangement shall be provided for rodding the sludge main under the floor of the tanks and for applying pressure water for loosening sludge that may consolidate in the pipelines causing choke. A sluice valve shall be provided in the vertical pipe to the trumpet weir for isolating it when applying pressure water.

There shall be terminal point sludge well for connecting the pressure line to the sludge pipe. The sludge pit shall be designed to permit the discharge of sludge from blow down valve and the trumpet weir to flow to the sump chamber of the sludge pump house.

The electrical motors and other electrical equipment shall conform strictly to specification for electrical works given in this tender specification.

All the MS structural members of Clarifier full Bridge in contact with water shall be provided with two coats of epoxy lacquer after sand blasting the members.

The floor of the tank shall be provided with a slope not less than 1 in 12. 1000 mm wide walk way shall be provided all around the top of the tank and would give access to the filter house. Hand railings shall be provided on the walk way. One MS step ladder of suitable width (900mm) with hand railing shall be provided for each clarifier to give ready access to the top of the clarifier from ground level.

2.4.2. Civil Works

The clarifier tanks of required chambers shall be of R.C.C. construction founded on suitable Pile Foundation (if required as per soil investigation report). The clarifier shall have to be designed for uplift thrust with respect to FGL at empty condition & should be safe for empty condition structurally. The bottom of the tank shall be light hopper type provided for sedimentation. The peripheral wall and the base slab shall be designed all around the top of the tank and it would give access to the adjacent Chemical House and Filter house. Hand railings shall be provided on the walkway. Interconnection walkways shall have railings on either side. One M.S. stepladder of 900 mm wide with hand railing on one side shall be provided for each clarifier to give ready access to the top of the clarifier from ground level.

All the basic construction works and finishing works shall be carried out as per specification relevant latest IS codes and contained in other section of these Bid specification. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided as per soil investigation report and RCC Bored cast in situ piles If required.

2.5. Rapid Gravity Filters and Filter House with Annex Building

2.5.1. General

The filter house shall have at least two (2) numbers twin bed filters. The filter beds shall be designed to give normal output of 5.41 MLD with a normal filtration rate of 4.8 m³/hr/m² and the filter beds shall also be designed with 25 % over loading with a maximum filtration rate of 6.0 m³/hr/m². Filtered water turbidity shall be less than 1 ppm. The filters shall be arranged in two rows with a space not less than 6 meters between them to accommodate pipe galleries and a filtered water channel. The filters shall be

designed for head loss not more than 2 meter and for cleansing by air followed by water. The minimum sizes of cast iron pipes, pipe-fittings, electrical actuator control valves and float control valve shall be as follows:

The size of the valves purely Tentative and actual size will be as per design

Filter inlet pipe and sluice gate	250 mm diameter
Filter outlet piping & sluice valve	200 mm diameter
Filter waste piping & sluice gate	250 mm diameter
Filter wash sluice valve	250 mm diameter
Pipes and fittings for ring main for	
Backwash water	400 mm diameter
Pipes and fittings for air scour	150 mm diameter
Sluice valve for air scour	80 mm diameter

The filter bed inlet and outlet all sluice valve gate shall be fitted with electrical actuator control (and a pair of ball / needle roller thrust bearing arrangement to continuous vertical thrust in manual operation by using hand wheels.)All Valves of the actuator will be control consol of the filter bed.

Each filter bed shall be provided with the complete set of under drain system of latest improved pattern, the system being designed for efficient application of compressed air and wash water during filter cleaning. Bidders shall have the option of providing in their offers under drain system to suit their own designs, incorporating nozzles fixed on pre-cast slabs or un-plasticized PYC pipe (un-plasticized PVC pipes for potable water supplies conforming to IS: 4985, 10 kg/cm² pressure rating) laterals with drilled offices or any other system in common practice. Where nozzles are used these shall be of high density polyethylene nozzles and shall be spaced suitably on the filter floor to ensure uniform collection of the filtrate and even distribution of the backwash air and water over the entire area of the filter bed. The under drain system shall be designed to ensure that there shall be no air binding during either filtration or backwashing and shall prevent mud ball formation in the sand bed. There shall be no loss of sand during filtration or backwashing and the sand bed shall settle down fairly uniformly. Bidders shall submit with their offer detailed specifications and description of the under

drain system with necessary sketches they have incorporated in their design. The siphoning system shall have to be accompanied with the filter bed for drying out the back wash water completely. One or Two nos. water jetting system shall have to be incorporated in the filter bed system for washing the wall of the filter bed.

Each filter bed shall be complete with the filter media conforming to the following specifications. The filter media shall consist of a sand bed supported on a bed of gravel. The sand bed shall have a depth of not less than 635 mm while the depth of the gravel bed shall be determined by the Bidder to suit the type of filter floor offered by them. Where pipe laterals are used the gravel bed shall incorporate layers of gravels of different sizes ranging from 6 mm to 50 mm and the total depth of gravel bed shall be not less than 525 mm. Bid shall ensure the stability of fine media & gravel of the filter bed.

The filter media shall be quartz sand of effective size of 0.55 mm to 0.70 mm with uniformity co-efficient not exceeding 1.50. The sand shall be granular, hard, and screened through appropriate meshes and shall be thoroughly washed to the satisfaction of the Engineer prior to leading in the filters. The sand shall be free from clay, dust and other impurities and shall not contain more than 1 % of micaceous matter. The sand immersed in 40% hydrochloric acid for 24 hours shall not lose more than 5% by weight. It shall not contain more than 1.5% of calcium and magnesium calculated as CaCO₃ and not more than 0.7% weight shall be lost after burring. The gravel supporting the sand bed shall be hard, durable and rounded and shall not disintegrate under the action of water. The gravel shall be thoroughly washed to the satisfaction of the Engineer prior to leading in the filters. The solubility of gravel in 40% hydrochloric acid after 24 hours at room temperatures shall not exceed 10% for 10 mm size gravel and 5% for smaller than 10 mm size gravel. Filtration media, sand & gravel shall conform to IS: 8419 (Part I) 1977. The Bidders shall provide a filter outlet controller, which shall permit the filter to operate at a fixed rate of desired output irrespective of the gradual increase in loss of head in the filter bed. The outlet controller shall be designed to operate in the range of zero to 125% of the normal flow. The rate controller may be closed venture type or open type with double beat valves of not less than 250 mm diameter in outlet chambers in front of the filters fitted with rectangular weirs made of brass for measurement of flow and for controlling the double beat valves by means of floats in the outlet chamber and the filter tank. The control valves for open type controllers shall be of cast iron with gunmetal/S.S. facings to render them watertight in closed positions. The floats in the filter tanks and outlet chamber shall be made of fibreglass. All levers operating the controllers shall be designed to move in ball bearings to ensure free movement. Where open type controllers are offered the top of outlet chambers receiving the filtrate shall be provided with removable covers framed of aluminum alloy angles and of design to be approved by the Superintending Engineer, North Circle of Municipal Engineering Directorate. The portion of the chamber receiving the filtrate over the weir shall be provided with a minimum 6 mm thick transparent perplex sheet an underwater bulk head lighting fixture shall be fitted in the chamber below the perplex sheet. Suitable arrangements shall be made for disposal of waste

Water from the float chambers and outlet chamber. Irrespective of head loss in the filter bed; or designed on the principle of declining rate of filtration.

Bidders shall submit with their offer the details of their designs and also complete specifications for the equipment for the filter outlet arrangements and providing slope towards the Sludge pond to clear out the pipe gallery leakage water to avoid sump pumping arrangement.

The filters shall be provided with automatic slow starting equipment so that after each back wash the filter unit shall give an output at 10% of its rated capacity for a minimum period of 15 minutes before reaching the rated loading. This slow start equipment shall either form an integral part of the outlet controller or be independent of it. In addition, Bidders shall provide a rewash valve of at least 200 mm diameter at the outlet of each filter to operate the filter at a much-reduced rate immediately after backwash. Each filter shall be provided with Rate of Flow and Loss of Head indicators of a dial type in order to indicate the rate of flow from each filter and the progressive loss of head in the filtration process. The rate of flow indicator shall be operated by a differential head in the venture controller and in the case of open type controllers by the depth of flow over a rectangular weir in the outlet chamber. The loss of head indicator shall be operated by means of a differential mercury pot or by water columns in which case arrangements shall be provided in the indicator to compensate for fluctuations of water levels in the filter box. The loss of head indicators shall incorporate an electrical contact point to give a signal when the filter is due for washing. Bidders shall also provide remote sensing for reading the rate of flow and loss of head indicators in the central control room in the annex building. The meters, which shall be, dial type or digital and shall be mounted on an instrumentation panel. All electrical wiring and/ or air tubing from the local indicators to the instrumentation panel shall be included in the offer.

The filters shall be designed for back washing with water at the rate of 500 liters per square meter per minute preceded by air scouring at the rate of 750 liters per square meter per minute. Arrangements shall also be kept for suitable surface wash by water jets to break up the surface of the sand bed prior to the application of back wash water. The overhead reservoir for storing the pumping unit capacity shall have to be designed considering the water requirement for two beds.

The water for back washing of the filters shall be obtained from overhead reservoir of the filter bed. Capacity of the backwash overhead reservoir shall be such that at least one numbers twin filter beds can be backwashed. The pumping unit (1 W + 1S) shall have to be designed for feeding the overhead reservoir taking suction from the filter water channel / clear water UGR. Bidders shall include suitable pumps, capable of delivering the required capacity and head of the pumping unit. The overhead reservoir shall be designed to operate against a head which shall be adequate to overcome losses due to all causes including friction in the wash main

and the filter under drain system when applying water at a rate of 500 lpm/m² and the pressure measured in the under drains should be equal to 5 M to 7 M head of water with providing necessary hand operated vales and specials. The wash water delivered from the OHR of the filter bed through MS pipe lines and other necessary arrangement. One pipe lines of (suitable size) MS shall have to be provided for interconnecting the O.H.R of the filter bed and main clear water delivery line with supplying all valves and other materials for filling the same.

Trenches with chequered plate covering shall be provided on the floor of the pump house/ Treatment plant for placing all pipes and electrical cables.

Two units of Rotary Air Blowers of reputed make to the approval of the Employer each capable of delivering required free air per minute at 0.35 to 0.50 kg/cm² pressure at the under drains complete with motors etc., shall be provided. Out of two units one will be in operation and the other will act as a standby. The header from the blower shall be (at least 200 mm) suitable diameter Cast Iron pipe and the piping leading the compressed air to each filter unit shall be (150mm) suitable diameter cast iron double flanged pipes with hand operated controlling vales etc. Requisite air filters shall be provided to control the air supply to the filter beds. Adequate arrangements shall be made to ensure uniform application of air over the entire filter bed. Measuring instrument for measuring quantity of air shall have to be provided of approved make. The design of the blower and its silencer shall be such that the decibel level in the blower room would be within permissible limit, and should in no case exceed 80 dB at a point 3 m away. Two units of the air blower connected to a common manifold with necessary valves and specials, pressure gauge etc.

Bidders shall provide a flow meter of the indicating, integrating and recording type for the measurement of wash water flow rate and consumption. The meter shall be of a reputed make to the approval of the Engineer in charge and shall be operated by a pressure differential in an orifice plate in the 250 mm diameter Pumping-main. The loss of head in this orifice plate shall be taken into account for detenlining the duty of the wash pumps. A 100 or 150 mm diameter dial or digital type wash water flow indicator shall also be provided for the guidance of the operator when applying backwash water.

The filter wastewater during backwashing shall be collected in waste troughs, which shall be provided sufficiently above the level of the sand bed to allow for expansion of the sand bed. The spacing between the troughs shall be arranged to limit the horizontal travel of the wastewater to a maximum of 1 meter. The waste trough shall be provided with horizontal inverts and shall be designed to discharge with a free fall into the main waste gutter channel of the filter unit. Some arrangements shall be provided to drain off during the washing process such light particles of impurities floating in the water above the sand had which are unable to reach the lip of the waste troughs. Such device shall ensure that the sand held in suspension during the application of wash water is not drained off with

the impurities. Bidders shall submit with their offer a detailed description with necessary sketches of the equipment offered by them for this and the manner in which it will function.

It is decided that the wastewater from filter backwashing process will directly go to the Sludge Pond via. Sludge well/Sludge sump. There will be an arrangement at Sludge pond so that whole clear water recycle by Pump and motor to the inlet well of the plant. The design of plant will be done in a manner so that minimum wastage of water occurs producing a most efficient system.

The space below the filter inlet channel around or on the two sides can be used to give the necessary volume of storage of the wastewater. In this case the floor of the channel shall be provided with a slope from one end towards the pump sump to give a scouring velocity between 1 to 1.2 m/sec. for a flow of 20 l/sec, which is the rate of re-circulation. Provision shall be made for access to the bottom of the sump by means of stair made of non-corrosive materials. The filter wastewater channel would be located outside the filter house, below the inlet channel but not below the pipe gallery.

There shall be a provision for measurement of the filtered water output from the plant. The measurement shall be by means of an open channel venture flume built in the filtered water channel at the end of the filter house. Bidders shall include in their offer an open channel flow meter of reputed make to the approval of the Employer incorporating an indicator, an integrator and a recorder which shall be mounted on an instrumentation panel in the central control room. A control console shall have to be provided for each filter bed from where operator operates the blower, back wash pump, recirculation pump, LOH indicator, and loss of head meter, actuators valves and others.

2.6.2. Civil Works

The filter house and annex building shall be of R.C.C. framed structure with brick panel walls and shall be provided with suitable foundation. The filter units and channels shall be of R.C.C. construction only. The annexure building will also be used as administrative purpose.

Total plinth area of the filter house excluding the areas covered by the inlet and wastewater channels shall satisfy the following two norms:

- i) The distance between the two rows of filters shall be minimum 6 meters to accommodate filtered water channel and pipe galleries.

- ii) The total area of sand beds in the filter units shall be sufficient to give the normal output of 1014 m³/hr of filtered water after deducting for backwash loss with 25 % overloading.

The filter tanks shall have a minimum free board of 500 mm and operating platforms walkways shall be provided at the level of the top of the tanks. The operating platforms over the pipe gallery and the walkways connecting the two ends of the platforms shall have a width not less than 2500 mm. The two operating platforms shall be suitably intermediately connected by 1200 mm wide walkways. The walkways at the rear of the filters and on the cross walls shall be 1000 mm wide. A platform of adequate size shall be provided outside the building on part of the filter inlet channel to give access to the inlet sluice gates. Hand railings as specified in shall be provided on all walkway and operating platforms. Bidders shall also include for the supply of not less than two stairs (at least 1 meter wide) of mild steel construction to give access to the top of the filtered water channel from the operating platforms.

There shall be at least three manholes fitted with cast iron manhole cover and frame for getting into the filtered water channel.

There shall be a 900 mm wide R.C.C. staircase at the rear end (end opposite to the annex building)"of the filter house to give access to the filter house from ground level to operating platform.

One door at least 1.0 meter wide shall be provided at the entry to the operating platform

The annex building shall be a two-storied building each floor having a minimum carpet area of 150 m²

The building shall have the following minimum provisions:

On Ground Floor

1. Main entrance hall with staircase
2. Space for air blower
3. Space for waste water re-circulation pump
4. Toilet

On First Floor

1. Central control room for the plant

2. Operators room
3. Chemist's room including office
4. Store room
5. Toilet

Adequate common passages shall be provided on each floor to give independent access to individual room.

The staircase shall be of aesthetic architectural design and the width of steps shall be 1200 mm minimum with 250 mm tread and 150 mm rise. The staircase shall provide an access to the operating platform from the entrance hall. The staircase shall be provided with decorative hand railings.

The main entrance to the annex building shall be designed in a consultation with an architect to give an aesthetic appearance for which purpose the Bidder shall provide a porch of not less than 5 meter an entrance foyer in which decorative plants can be placed. Bidders shall submit preliminary sketches of this with the Bid.

It is to be noted here that the chemical house and the annex building cum administrative building shall be interconnected with a gangway as specified elsewhere in the Bid documents.

The clear height between the filter operating platforms and underside of the roof beams shall not be less than 3.3 meters. Similarly the clear headroom for each floor of the annex building shall not be less than 3.3 meters.

Adequate skylights and windows shall be provided in the filter house and annex building to admit sufficient natural light. The total shutter area of doors, windows and ventilators shall not be less than 25% of the plinth area. The windows and skylights shall be provided with grills of approved design. The position of windows and ventilators/skylights shall be such that these can be opened and closed easily. All the doors, windows and ventilators/skylights except the main entrance door of the annex building operator's room and toilets shall be of mild steel and their pattern shall be up-to date and approved by the Engineer. The doors including frames to operator's room and toilets shall be of NUWUD quality. The main entrance door shall be of aluminum alloy construction photoelectric cell controlled sliding type of decorative design as per recommendation of the Bidder's architect and approved by the Employer.

The toilets shall be connected to a septic tank to be provided of 10 users' capacity.

The roof of the annex building, which is likely to be flat, or shell roof shall be provided with roof waterproofing treatment with adequate arrangements for rainwater drainage. There shall be a 250 mm thick parapet wall of 1000 mm height. A suitable access shall be provided to the roof from either within the filter annex building or outside it without such access being prominently visible from the front of the building. The roof of the filter house may be a flat or shell roof. While the flat roof shall be provided with a parapet wall as mentioned above with roof water proofing treatment, the shell roof shall also be provided with water proofing treatment. Adequate arrangements shall be made for rainwater drainage in either case. There shall be architectural blending of roof of the annex building and the roof of the filter house in order to provide an integrated and pleasant look.

All external doors and windows shall be provided with R.C. Chajja in box type or any other approved architectural design.

A 300 mm wide apron of 75 mm thick 1:2:4 cement concrete laid on brick on edge soling and a surface drain shall be provided around the filter house and annex building.

Adequate arrangements shall be provided to dispose of water from the rewash valves, overflow from filter outlet control chambers, leakage water from glands of pumps and sluice valves in the filter house and annex building to natural drainage through surface drains, for which purpose sump pump shall be provided if necessary.

Adequate number of lighting arresters shall be fixed on the top of the filter house annex building and chemical house and these arrangements should conform to IS-2307-1969.

2.7 Chlorination by gaseous chlorine (pre & post)

Chlorine gas is 2.5 times heavier than air and thus tendency has the tendency to settle down the floor, whenever leakage of gas occurs. The room to house the chlorinator should be isolated and should have at least two doors opening outward leading to outside galleries or platforms, fire escape or other unobstructed areas.

The ventilators should be provided at the floor level, one opposite the other for the exhaust of chlorine gas in case of leakage.

The floor of the chlorine house should be at least 15 cm above the ground level. The room should have convenient access for truck loading and unloading. An auxiliary water supply system should have to be provided for the chlorination arrangement. The flow required is 600 liters of water per kg of chlorine with minimum flow of 5 liters per minute. A 15 mm water connection should be provided. The water supply system should have to be provided by providing a minimum 1800 liters capacity of the tank and also

connected to the water supply system for filling the tank. A space of at least 0.75m should have to be left in front of the chlorinator and an equal space behind, as connection is approached from the back of the machine. As the instrument projects about 15 cm behind the panel, the total width of the room from front to back should be at least 2m. There should be enough lateral space to remove and replace the chlorine cylinders. A lateral width of 2.25 m or more should be provided as per nos. of gas cylinder placed there. The height floor to ceiling should be at least 2.75 m. There should be a window on the side facing behind the machine.

Plants with one chlorinator feeding less than 90 kg per day should have at least 6 m²area.

Chlorine House and Tonner room Dimension. (As per IWWA- revised edition -2000)

(The dimension do not include space occupied by the ramp for parking the truck and carrying the tonners / cylinders)

Tonner room M x M	Panel room M x M	No. of tonner connected	No. of tonners in store
10x9	9x4	1	3

Neutralization pit 2.5 m x 2.0 m x 2.5 m to be provided inside the tonner room. A chlorine gas leakage detector should have to be provided in the tonner room.

A Mono rail with 2MT capacity reputed make chain pulley block shall be provided.

The above mentioned dosing system shall be used for pre and post dosing system

2.7.1. Civil Works

Chemical House for gaseous chlorine dosing

A separate chlorine storage room at the ground floor of the Chemical House of sizes mentioned elsewhere for storage of about 3 (three) months consumption with adequate ventilation, and handling equipment like Mono rail with 1MT capacity reputed make chain pulley block shall be provided. A chlorine neutralized chamber shall have to be provided for adequate size.

2.8. Filtered Water Conveyance

The finally treated water shall be conveyed from the filter house to the clear water reservoir through a NP2 class concrete pipeline having diameter not less than 600 mm. Bidders shall include for this pipeline up-to the U.G.R. with proper connection including necessary mild steel bends, valves etc. The NP2 pipes shall be laid on continuous concrete bedding with full encasement. NP2 pipe may be providing in form of R.C.C. duct with equivalent cross-section area.

2.0. Underground Clear Water Reservoir

The general arrangement of the underground level reservoir is shown in Bid Drawing. The top water level of the UGR must be at least 0.500 M above the High flood level. The clear water will flow into the reservoir from the clear water channel of the filter house. The Reservoir shall have overflow arrangement with suitable nos. Over flow pipes not less than 300 mm diameter C.I pipes, special etc. so that, whenever the water level rises above the design water level, the excess water flow into covered overflow pits of suitable approved design. The overflow pits will be interconnected with suitable diameter. NP2 Pipes/small covered masonry drain laid on 1:2:4 concrete bedding of approved design in proper slope with concrete manhole chamber of 750 mm x 750 mm size through which the overflow water will be disposed into existing drainage system of the area through a pit of approved design and is included in the scope of work.

- 3.0. There shall be opening of size 300 mm diameter CI pipes on the roof of the reservoir for berating action and for accessing inside the reservoir a manhole frames and covers. 450 mm wide rung ladders made of hot dip galvanized 25 mm diameter rods or P. V. C. ladders shall be fitted in the walls of the reservoir. The manhole covers will have locking arrangements. The reservoir shall have a clear free board of 300mm. below the bottom of beams.
- 4.0. The underground reservoir and overflow Pits shall be in R. C. C. Construction. The walls, base slab, flooring & columns including the roof slab and roof beams shall be designed on the basis of un-cracked section and the R. C. C. shall be not leaner than M30 grade to minimum cement consumption of 400kg/cum. Thick blinding layer of mix provided below the floor slab, which shall be not less than 100 mm thick. The floor and walls of the reservoir and overflow pits not show any signs of water leakage or sweating. For this floor slab and walls shall be provided with special water proofing treatment as per specification of PWD building schedule given in detailed technical specification. The Bidder is instructed to carefully note this clause before quoting his lump sum prices. The Base slab, wall & roof slab/beams, columns of reservoir shall be of concrete grade of M-30 designed as un-cracked section.
- 5.0. The roof of the clear water reservoir is to be designed for a live load of 200 Kg/Sqm and the superimposed load of saturated earth of 450 mm depth over average 50 mm thick grading concrete. No relief shall be allowed due to this superimposed load of saturated earth while computing the uplift on the reservoir.
- 6.0. The roof slab of the reservoir shall have proper roof treatment together with water proofing treatment on it. The standard lime roof treatment is not acceptable. Pre-cast R. C. C. roof will also not be acceptable. 150 mm diameter C.I cowl ventilators with mosquito nets shall be provided all the said of the reservoir @ 50 Sq m. of the surface area. Staircase of adequate width as approved by the Engineer-in-charge has to be provided for entry to the part from the formation level. The external and internal faces of the wall of reservoir and overflow pits shall be rendered smooth. The exposed face not be allowed to have any shutter mark and be rendered smooth by rubbing with carborandum stone. The inside water faces of the UGR shall be floored/plastered with neat cement with necessary water proofing compound provided to make the UGR 100% leak proof from water. Roof Sealing should be finished with 2 coats of non-toxic painting. External exposed faces of wall should be plastered with neat cement up to 600mm from GL and rest portion finished with plaster & 2 coats of synthetic emulsion paint including primer of approved colour.
- 7.0. The Bidder shall provide expansion joints whenever necessary as per relevant I.S Code and spacing shall not exceed 45 meters. Construction joint treatment shall be as per IS: 3370 and spacing in floors and walls shall also be as specified in I. S Code.
- 8.0. One mechanical level indicator shall be provided on the chamber of UGR so that the water level can be visible from the operational room inside the building. The level indicator shall be manual type with PVC floor, guide wire, level indicator board etc. as per requirements. The arrangement and details are to be get approved by the department.

- 9.0. The foundation system of the reservoir and overflow pits shall be as per Soil Investigation Report. Sub-soil water level shall be taken at the existing high flood level. The structure shall be designed to withstand full down ward load taking no relief from subsoil pressure both during construction and afterwards.
- 10.0. The Bidder shall make in his design all the provisions of safety of the structures and foundations thereof. Any deviation in quantities from the design and drawings approved by the Authority during actual execution compared with those provided in the Bid shall not entitle the Contractor to any extra payment. Two number separate walls shall have to be done to avoid vortex form of the pumping unit. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with minimum 500 mm diameter RCC Bored cast in situ piles (if required).

4.0. Wet pit Pump House

The Wet pit Pump House shall have to be constructed on the top of the UGR. The wet pit pump house shall be constructed at any suitable side of the underground reservoir. The pump house will house **4(four) nos. pumps** with four working and two nos. as standby located at motor floor and will be vertical execution type pumping units and two numbers common manifold for the pumping unit of two separate roots. The motor floor shall have to be constructed on the UGR top floor level. The two separate common delivery manifolds of pumping unit shall have to be placed on the RCC structure for facilitating to interconnecting the rising main with individual Butter-fly valves and a temper proof double throat air release valves. Six nos. delivery line passes through the inside/outside wall of the pumping station up to the common delivery main after placing actuator control butter-fly valve, NRV , expansion joint , reducer enlarger. The pump delivery line shall have to be connected with the common delivery line bellow 45 degree. The cable trench shall be made 500mm deep X 460mm width bellow the motor floor level and also covered by the chequered plate. The motor control unit shall have to be placed in the motor floor of pump house from which pumping unit readily visible. One maintenance bay shall have to be constructed on the G.L. of adequate size for easy maintenance of the electro-mechanical components. One stair case shall have to be constructed for reaching the motor floor. There will be two entry points of the pump house both fitted with rolling shutters covering the maintenance/unloading bay. One HOT crane of 2.00 MT capacities is also included for loading / unloading pumps & motors and other equipment as specified in technical details. The buildings will also have an unloading bay, which will be directly accessible to 8.00MT. full load trucks. The contractor's lump sum price shall also include design and construction of foundation for the six pump motor sets, pedestals supporting valves & foundation for pipe thrust block and cable trenches with provisions of necessary inserts as required by the pump/motor manufacturer.

There may be some variations of such details as per the final recommendations of the pump and motor suppliers and the successful Bidder shall have to accept such modification for construction purposes without any extra cost to ULB. The foundation of pump-motor bases shall take into account the static and dynamic load of pump motor. The vertical pump suction sump shall be located below 1 M of the Clear Water Reservoir for avoiding the pump vortex.

The building shall be structurally designed. The main entry to the pump house shall be provided with glass panelled door fitted with a collapsible gate. The entry will be through one RCC stair of good architectural elevation. Adequate ventilators and windows shall be provided for sufficient ventilation and for entry of natural light. The total shutter area of doors, windows, and ventilation shall be adequate to meet such requirements and shall be in any case not less than 20% of the total covered area. 12 (in two opposite wall) opening for exhaust fans (fans included) 600 mm diameter area to be provided with removable M.S. louvers. First class in cement mortar (1:6) will be used in all superstructure brickwork. Superstructure panel wall should have 19 mm thick cement plaster (1:6) and 12 mm thick plaster (1:6) faced outside. All inside walls have two coats of cement based paint with primer. Inside wall and ceiling of operator's room / control room will be provided with cement based paint of approved quality over plaster finish. All external walls shall be provided with two coats of synthetic emulsion paint of approved colour. The ceiling shall be rendered smooth with 10 mm thick 1:4 cement plaster and shall have two coats of cement based paint with primer of approved quality.

The building shall have roof in RCC construction of mix not leaner than M25 (Pre-cast RCC roof slab will not be allowed). The structure of the pump house building shall be of RCC frame with brick panel walls. The brick walls shall be of minimum 250 mm thickness.

The flooring of repairing bay and other area of Pump House excepting operator's/control room shall be of IPS of 50 mm thick complete with Ironite topping. Cast-in-situ mosaic (12 mm thick) shall be provided in Operator's / control room, lavatory and RCC staircases, in skirting up-to height of 225 mm, and windowsills. The walls of the lavatory should be finished with tiles of 2 m height from floor on all sides.

Seismic effect, wind load and crane surge load should be considered in the design as per relevant IS code. The roof slab of the pump house shall have waterproofing treatment with polyurethane with 40 mm thick screed concrete.

The Bidder shall provide a lavatory block which shall be completed with two taps, one shower, one Indian pattern type W.C, one western type W.C two mirrors, two wash basins, two urinals, towel rack, two rails complete with fixtures. The W.C shall be fitted with 10 litres capacity flushing cistern. The urinals shall be fitted with 10 litres automatic flushing system with all accessories. A septic tank of 10-user capacity shall be provided with connection of toilet through a master trap.

A Syntax or equivalent made water tank with IS specifications for 3000 liters capacity shall be provided over the roof. This tank will be connected with toilets and other points as desired by Engineer in Charge.

The Bidder shall provide an approach road of not less 4 m wide, cross road of 4 m wide road surface, a 1.0 m wide apron of 75 mm thick 1:2:4 P.C.C on double brick flat soling around the UGR cum pump house building and substation building. The Bidder shall also include in his quotation provision of a surface drain 250 mm wide x 250 mm deep (minimum) with 250 mm brick side in 1:4 cement mortar on 100 mm thick concrete base slab of P.C.C 1:2:4 over 75 mm flat brick soling complete with 20 mm thick plaster along the entire edge of the brick apron for disposal of the rain water up-to underground drainage system of the area. Proper slope has to be maintained with minimum depth of 250 mm draining water.

The contractor's lump sum price shall also include design and construction of the foundations for pump and motor sets, pedestal supporting valves and enable trenches covered with M.S gratings to be supplied by the contractor. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with minimum 500 mm diameter RCC Bored cast in situ piles.

5.0. Sub-Station Building

The HT substation building (As per Tentative drawing in Annexure) shall have to be erected at the suitable side of the UGR cum pumping station. The plinth of the HT substation will be minimum **1.50 M from the EGL**. Adequate ventilators and windows shall be provided for sufficient ventilation and for entry of natural light. The total shutter area of doors, windows, and ventilation shall be adequate to meet such requirements and shall be in any case not less than 20% of the total covered area. 4 opening for exhaust fans (fans included) 600 mm diameter area to be provided with removable M.S. louvers. First class in cement mortar (1:6) will be used in all superstructure brickwork. Superstructure panel wall should have 19 mm thick cement plaster (1:6) and 12 mm thick plaster (1:6) faced outside. All inside walls have three coats of white wash except. The ceiling shall be rendered smooth with 6 mm thick 1:4 cement plaster and shall have three coats of white wash except operator's room / control room. The building shall have roof in RCC construction of mix not leaner than M30 (Pre-cast RCC roof slab will not be allowed). The structure of the building shall be of RCC frame with brick panel walls. The brick walls shall be of minimum 250 mm thickness. The flooring of HT rooms etc. and other area of building accepting any other room shall be of IPS of 50 mm thick complete with Ironite topping. The front gate of the each room shall have to be provided a rolling shutter gate.

The total sub-station shall comprise mainly four basic section such as, WBSEDCL Supply Room, 11 KV H.T. Switchgear Room, 1(one) No.350 KVA indoor Transformer room, L.T. PDB room.

Out of this section, the WBSEDCL Room shall be for WBSEDCL Authority. All the Civil, Electro-mechanical work excluding the equipment to be provided by WBSEDCL, shall be under the Scope of Customer.

The 11 KV H.T. switchgear room shall comprises of 11 KV (one) Panels composite VCB Board. The basic configuration of H.T. Switch Board shall be one incomer & feeder for transformer.

Power from WBSEDCL room will be fed to the Incoming Feeder of the Customer end 11 KV 1 Panel VCB Board and Power from same composite shall be fed to the transformer. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with minimum 500 mm diameter RCC Bored cast in situ piles.

6.0. Boundary Wall:

The boundary with fencing with necessary gate/entrance will be provided in such a fashion so that no obstruction will be arise for free movement of heavy loaded vehicles for the purpose of loading/un-loading and installation of equipment as per site requirement. The inter plant roads shall have to be constructed 4m wide RCC for easy movement of the heavy loaded trucks with 60/80 mm thick paver block.

7.0. Plant Waste Water and Solid Waste Disposal

7.1. Natural drainage

Arrangements shall be made for the disposal of wastewater from the different treatment plant units and rainwater by gravity into natural drainage system. For this purpose the disposal Point shall be suitably located at the site and the Bidders shall satisfy themselves as to the suitability of this point for natural drainage. The waste disposal system shall be designed to make the discharge of the wastewater into the outlet channel by gravity alone.

7.2. Sludge well / Sludge sump

7.2.1. General

The arrangements provided for natural drainage of the plant wastewater, there shall be a sludge pump house primarily meant for dealing with the clarifier sludge and in addition, when necessary, dealing with the overflow of filter wastewater from the overflow weir, and wash water from the collecting well and flash mixers during emptying. The sludge collected in the sludge well of the pump house shall be pumped into sludge pond. The sludge ponds TWL shall have to be 0.50M above FGL of the WTP with provision of Y connection and with two valves. The sludge line terminal points are the inlets of two sludge ponds (masonry structure with lining) of

designed (for three months sludge storing each chamber) size to accommodate within the proposed site. The sludge ponds and sludge line are included in the scope of contract.

There shall be two vertical pumps non-clog type with designed head and capacity in the sludge pumping station. One of which will be under operation and other will act as a standby. The pumps shall be designed (20-40 LPS) discharge capacity and will deliver designed head when the pump is running. Arrangements shall be made for the standby pump being capable of replacing the pump in operation at any time.

Adequate provisions shall be made to scour sludge accumulated in the sludge pump sump by air and water jet. The offer shall include all piping, fixed jets valves & nozzles etc. For air, two nos. of air blowers (if same blower is used for filter bed and sludge pumping station then a constant head tank shall have to be provided) with fixed air nozzles at the bottom of the sludge pump sump shall be provided. Alternately the air can be taken from the same blower which used for filter back washing after providing constant head chamber.

Each pump shall be completed with driving motors, necessary cast iron sluice and reflux valves and cast iron piping for suction and delivery including all fittings. Bidders shall include for delivery and laying pipeline sludge line up-to sludge ponds shown in Bid drawing. A manually operated chain pulley block of 2 ton capacity shall be provided for handling the pumps and motors in the pump room. The specification for pumps, motor and control panel and other equipment shall strictly conform to specification of equipment of these Bid specifications.

7.2.2. Civil Works

The sludge pump house shall be of R.C.C. underground structure with brick panel walls and RCC column beam arrangement in the superstructure.

The sludge sump shall be circular in shape having requisite capacity to handle the sludge and shall be provided with a wet pit at the center for accommodating sludge pumps. The bottom floor of the pump shall be placed at a sufficiently low level to receive the discharge of clarifier sludge coming out at the lowest level of the clarifier sludge pipe. The floor of the sump shall be given a slope not less than 1 in 12 towards the wet pit. A 1000 mm wide walkway shall be provided to give access to the pump room and R.C.C. steps 750 mm wide shall be provided from the walkway to floor level of the wet pit. An annular platform shall be provided on the outer wall at plinth level excepting the portion over part of the steps. Steps shall be provided to give access to the walkway from ground level. Hand railing, as specified, shall be provided on the walkway platform one and one side of the steps.

Adequate skylight and windows shall be provided in the sludge pump house building to admit sufficient natural light. The total shutter area of doors windows and skylights shall not be less than 25% of the plinth area. The windows and skylights shall be provided with grills of approved design. The main entrance door shall be of 1.5 meter wide mild steel rolling shutter.

The roof of the pump house shall be provided with roof water proofing treatment with adequate arrangements for rain water drainage.

All the basic construction works and finishing works shall be carried out as per specifications of these Bid specifications. Grade of all structural concrete shall be of M-30. Pile foundations shall be provided with adequate diameter RCC Bored cast in situ piles as per soil investigation report.

Note:- The TWL of Sludge sump/Sludge well will be designed in such a way so that sludge from all the areas such as Flash mixer, Clariflocculator etc. through pipeline network goes by gravity and also effective volume of the sump/well will be calculated on the basis of TWL. This well will also be checked against uplift in empty conditions with respect of FGL.

7.3. Sludge pond

Sludge pond with two nos. of chamber and cleaning period of 1 year for each chamber has to be constructed with masonry structure and 100 mm thick PCC. Weep holes are to be provided at suitable locations. Beam may be provided at suitable locations if required. The minimum slope of the sludge pond to be adopted will be 1:1. The TWL will be 0.3 to 0.5 m above FGL. There will be adequate overflow arrangement and it directly goes to surface drain.

7.4. Laboratory

There shall be one Laboratory for the treatment plant suitably equipped for carrying out physical and chemical tests. As already stated the laboratory shall be located in the first floor of the chemical house. The layout and dimensions of the laboratory room shall have to be designed by the bidder scope. Necessary arrangement should be made for supply of clear water to the laboratory from the backwash tank.

7.5. Sampling Table

Bidders shall provide and install one sampling table with a granite top. The sampling table shall be provided with three clarity bowls to indicate the clarity of raw water, clarified water and filtered water; a stainless steel sink; and three faucets with swan necks to

give independently samples of raw water, clarified water and final filtered and chlorinated water Individual supply line of the sampling table shall be marked distinctively as RAW, CLARIFIED and FILTERED WATER.

7.6. Laboratory Equipment

All the laboratory equipment as per CPHEO Manual shall be of reputed and approved make. Bidders shall submit with their offer. All the equipment is to be installed in position and commissioned including supply of all accessories, stands, tables etc. The quoted rate shall be inclusive of all such installations, supply of all accessories, stands, tables with complete air conditioning arrangements where necessary, excluding laboratory glass apparatus and chemical reagents.

7.7. Tool Box and Tools

Bidders shall supply two suitable MS toolbox (overall dimensions 1200 mm x 900 mm x 750 mm) made of best quality as per direction of the Engineer. The box shall be compartmentalized suitable to hold different types of tools separately. The box shall be fitted with lock and key arrangement.

In addition, Bidders shall quote separately on their own letter heads for supply of one set special tools and tackles that they feel shall be necessary for maintenance, overhaul or replacement of the equipment under this contract. The quotation shall be attached with the Schedule of Prices.

7.8. Scaled Model and Animated Flow Diagram

Bidders shall supply scaled (1:200) model of the entire treatment plant and separate models on a larger scale (1:100) of one clarifier tank and one filter unit. These models shall be displayed at a suitable place in the entrance Hall. The models shall be mounted on suitably designed stand fitted with trolley wheels. Adequate illuminations shall be provided for this display. The larger models of the clarifier and the filter unit shall be fitted with all equipment and the bridge on the clarifier shall be arranged to rotate by an electrically operated switch. In addition, an animated flow diagram of the process showing the color of the water during the different stage of the treatment shall be provided. The flow diagram shall be in a wooden cabinet with glass cover suitable for hanging on the wall of the entrance hall. The switch buttons shall be located at the bottom of the frame.

7.9. Levelling of the site

After completion of the work, the entire site all-round the chemical house, filter house and annex building and other structures within the scope of this contract shall be cleared and all construction equipment shall be removed within a period not exceeding 3(three) months from the date the plant is put into trial run. The site shall be graded and levelled to the required level.

7.10. Procurement of Equipment etc.

Whenever in this Section or elsewhere, equipment, contrivance, special or this like are specified to be of 'reputed', 'approved' or similarly worded make, the List of Vendors should be consulted first and the scope of procurement limited to the same. In cases where the name of such equipment etc. do not figure in this list of vendors, written approval of the Employer about the make should invariably be obtained, failing which the equipment etc. even if procured may be subject to rejection.



**Chairman
Mal Municipality**

SECTION – H
SCOPE OF WORKS & TECHNICAL SPECIFICATIONS FOR
ELECTRO-MECHANICAL WORKS

GENERAL TECHNICAL SPECIFICATIONS OF THE CONTRACT

Scope of Works(Electrical & Mechanical)

The scope of works under this specifications generally cover selection, design, manufacture, testing at manufacturer's works, supply, delivery to store and project site properly packed for the transportation on FOR site basis, receiving at store and site including loading & unloading at all terminal points, safe storage, installation, pre- commissioning activities, primary acceptance test, final acceptance tests, commissioning, PG tests including three months trial run of the plant, hydraulic system integration with the downstream water distribution system, operation & comprehensive maintenance for the New WTP & pumping station for a period of twelve months with all associated equipments, accessories and ancillaries to be executed through this contract. The contractor has to assume full responsibility of making the pumping station project complete in all respect perfectly keeping the intent and the requirement of the project in mind.

In the light of the above, the scope of work is broadly divided, into following parts and shall invariably cover all work(s) as mentioned herein and or necessary to complete the electro mechanical works for building up a pumping station and WTP in all respect.

Successfully carrying out selection, supply, safe delivery at site, installation, shop test, primary and final acceptance tests, P.G. tests, trial run, commissioning of the following equipments and accessories.

Axially spilt case, horizontal, dry pit, centrifugal pump set coupled with 415 Volt, of required horizontal foot mounted SCIM complete with all other accessories having pump duty point discharge as per BOQ of clear water at a head to be

determined by the bidder on different obligatory data given in this document complete with all other accessories like pump manufacturer's own make common base frame for pump-motor set, flexible coupling, foundation bolts etc --- required sets.

415 Volt M.C.C Cum Distribution board Cum APFC panel including capacitor and other required accessories. --- 1 set

Central Control & Instrumentation Desks----- 1 set

Lockable type Lock out switches with stand post----- 4 set

Suction side piping to be made from Steel plate, 8 mm thick , for individual pump set consisting of suitable puddle plates, bell mouth , MSDF suction piping of required length, MS spool pipe pieces, MSDF eccentric reducer DIDF sluice valve with by-pass arrangement , MSDF bend , compound gages as required etc. _____ 4 sets .

Delivery side piping to be made from steel plate, 8 mm thick with MSDF enlarger as required; one MSDF/ metal expansion joint with control & stay rods; one DIDF single door non-return valve either with integral damping arrangement or with external damping arrangement, one DIDF butterfly valve and pressure gauge for measuring individual line pressure, necessary MS spool pipe pieces; MS bends, puddle plates.

MS common manifold piping to be made from steel plate, 8 mm thick consisting of enlarger / reducer as required , one DF non evasive electro-magnetic flow meter for measuring flow in the common delivery manifold along with flow stabilizing pipe of required diameter of required length to maintain 10D and 5D or as desired by the flow meter manufacturer , one DIDF/CIDF electrically operated butterfly valve with extended spindle , pressure gauge , transducer / transmitter for measuring manifold line pressure. Suitable leak proof R.C.C. pits to be constructed for installing the said flow meter & BFV. It is to be noted that the BFVs shall be placed after the flow- meters 2 no.

Making inter connections between the delivery manifold with the pre-laid forced main with enlarger /reducer, bend, short pieces as required is within the scope of this contract 1 lots .

All civil works like making cable trenches for cables directly buried in the ground or construction of permanent cable trenches outside the pump house i.e. from the transformer yard to the entry point in the pump house, or wherever required, all machineries foundations, construction of water tight RCC Chamber for flow meter, thrust block, civil foundations for laying delivery manifold and supports for transformers, transformer yard fencing work by wire net etc as would be required 1 lot .

Float type mechanical level gauge with stilling pipe and staff indicating levels marked in indelible fluorescent paint / ink

----- 2 set

All cabling works comprising multi core XLPE / PVC insulated power cables of aluminum conductor & of copper conductor of different voltage grade and sections, multi core XLPE /PVC insulated control cables of copper conductor of different sections (1100 V grade), multi core screened /shielded signal cables & PTC cables -- 1 lot

All grounding materials for system grounding and equipment grounding – 1 lot

Complete set of vacuum pump motor sets including piping and PVC overhead water tank 1 sets excepting OH tank which shall be one in number.

Complete set of dewatering pump including piping -----2 sets.

Complete set of HOT crane of 2 MT Capacity -1 set

All illumination works within the pump house, from the pump house building and outside road lighting – as per measured quantity in line with the BOQ.

Air circulators and exhaust fan works for ventilation purpose – as per measured quantity in line with the BOQ.

All structural works, such as M.S. staircase (drawing to be approved by the department) within the pump house, fabrication of cable covers by Chequered plate, cable trays, brackets, hangers, supports, clamps, pipe and valve supports etc as required –1 lot

All mending good damages of the work by others if damaged by the contractor – 1 lot

Display of all drawings, notices, shock treatment chart etc in the pump house is required.

Display of sign board of various sizes on the pump house wall fascia or elsewhere as directed by the department.

All fire fighting equipments and works

All painting works of the installation by epoxy paint

Any other works required to build the pumping station complete in all respect.

Successfully carrying out shop tests at manufacturer's works, primary acceptance tests, final acceptance tests at field on each equipments and accessories

Successfully carrying out performance guarantee tests on each set of pump motor assembly at field, other equipments and system integration including three (6) months virtual trial run period .

Successfully carrying out (a) the entire electrical and mechanical installations and (b) day to day routine maintenance of the electrical and mechanical installations so as to make the entire installations ready for operation at any point of time & (c) comprehensive maintenance of the built installations so as to handover the station to the end user in complete ready and operative condition. The scope of work under this contract work shall also include but not limited to the following; - (a) Taking delivery of departmental materials including their transport from the owner's store to the actual work site. (b) Opening of packing boxes where necessary, inspection and joint checking of stores with packing list for their completeness and condition along with the representative of the department. (c) Appropriate action in case of any shortfall with the packing list (d) Supply of all goods, mentioned elsewhere, to undertake and to carry out the day to day operation and maintenance of the entire electrical and mechanical installations. (e) Providing all required tools and plants to undertake and to carry out the contract job.

Submission of all drawings, data, manuals, display of notices, drawings as required is also within the scope of work under these specifications.

Obtaining permission for bringing into use the entire electrical installations done by him from the Directorate of Electricity, GOWB in favour of the ULB. All expenditure like payment of requisite fees on behalf of the ULB's on this account shall also be paid by the contractor in favour of the beneficiaries.

Obtaining permission for bringing into use the HOT crane done by him from the Directorate of Factories, GOWB in favour of the ULB. All expenditure like payment of requisite fees on this account shall also be paid by the contractor in favour of the ULB.

Imparting training during trial run and subsequent comprehensive O&M period of the pumping station to the personnel accredited by the department.

Any other work which has not been mentioned here but otherwise incidental to and necessary for completeness of the contract work shall be carried out by the contractor within the scope of work under this specification.

Detailed Technical specifications of major equipments & accessories

The pumping station comprising of various electro mechanical equipments and accessories such as pumps, motors, suction and delivery side piping including different type of valves, specials etc, pressure gauges, pressure transmitter, flow meter, MCC cum PDB, APFC combined panel, Central control desks, indoor and outdoor lighting, air circulators, exhaust fans, HT Switchboard, transformers etc including all cabling works have been generally described here for convenience of the tenderer.

Main Centrifugal Pumps.

The main pumps shall be of horizontal split case and centrifugal type with closed impeller.

Pumps shall be horizontally driven with shaft directly & flexibly coupled with horizontal foot mounted, B3, squirrel cage induction motors.

The pump impeller shall be securely held on the pump shaft as per provision of the pump manufacturer's design so as to prevent sliding of the impeller along the shaft during operation.

The pump casing shall be horizontally split so that by removing the upper casing the entire rotating assembly can be attended to / removed without disturbing the pump alignment and piping connections.

Pump rotational speed shall not be more than 1500 RPM.

The pump H-Q characteristics curve shall be stable all throughout. There shall be a margin of at-least 30% in between the run-out flow and the duty point flow.

The pump efficiency shall be reasonably high. The head-discharge-efficiency-KW absorbed-NPSHR shall be guaranteed without any tolerances at the duty point working at mean level condition.

For the other working points as will be declared by the tenderer at all given water level conditions, the performance figures may follow the tolerance limit as per IS:1710. The tenderer shall have to confirm the maximum power absorbed by the pump on the entire range starting from the shut-off to run-out without any positive tolerance.

The NPSHR test as per IS: 9137 shall be conducted to at least one pump as per choice of the department at various discharge conditions including at duty point during the joint shop test of the pumps.

The impeller of the offered pump shall not be either on the lowest trim or the highest trim of the same pump family offered.

The wetted portion of the pump shall have a proper finish. The pump shall have a minimum efficiency as per CPHEEO manual at duty point.

The pump shaft shall be accurately machined and ground all over. The portion of the pump that will come under the contact with pumped liquid shall be protected by replaceable sleeves. Suitable pump casing wearing ring and/or impeller neck ring as per the manufacturer's design shall be provided. Each pump shaft shall be adequately supported, both at driving and non-driving ends, on anti-friction type ball/roller bearings capable to withstand the worst thrust loading for the pump operation from shut-off to run-out.

The pump shall be suitable for valve open starting and shall be suitable for taking care of back water flow in it, if any. Grease injection nipples and grease collector at each bearing points shall be provided.

The pump rotating assembly shall be balanced both statically and dynamically. The impeller balancing shall be as per grade 6.3 IS: 11723 grades. No hole or piece being welded shall be allowed for balancing. Special care shall be taken that the pump-motor total assembly, considered as a single unit, is within the permissible limit for such class of roto-dynamic unit as per the relevant IS.

The overall noise level of the pump-motor unit shall be within the stipulations of the relevant BIS limit all round measured from a distance of 1.5 M.

The identical parts of the pumps shall be inter- changeable type.

The supply of the pump shall be completed by the pump manufacturer with the following components and accessories: -

Base frame of the total pump-motor assembly with all foundation bolts, nuts, washers, and other erection materials as required. It may be noted that there shall be no other thrust encountering device on the pump discharge pipe branch and the common delivery header excepting the pump foundation bolts. The pump foundation bolts shall be adequate enough to withstand all the thrust that may occur during pump operation including start/stop.

Suitable flexible coupling with bolts, nuts, pins, keys etc. for coupling the drive and driven unit.

Air-vent cock, priming cock suitably placed.

Self sealed packing box provided with packing rings, lantern rings, split type glands, gland cooling water connection with cock, valves etc., all service pipes, valves, fittings, drain plug, lifting lugs etc. as required for safe operation of pumps.

Any other accessories & component considered by the manufacturer for safe, efficient operation of pumps.

The pumps shall be capable for continuous operation at any stated level condition.

The preferred material of construction of the pump is given below. If the tenderer feels that the MOC other than what have been stated will give better service and performance, he may offer the pumps with the MOC as per his choice, backed by technical justifications, but the same shall only be made as an alternative offer.

- (a) Pump Casing : CI as per IS210, Grade FG 260
- (b) Impeller : SS, CF8M
- (c) Pump Shaft : SS410
- (d) Sleeves : SS410 hardened.
- (e) Keys : SS 410
- (f) Coupling : Forged steel.
- (g) Wearing ring/Neck ring : Materials having at least 50 BHN hardness
difference to the nearest component
- (h) Impeller Nut : SS410
- (i) Base frame with drain tray : MS as per IS: 226

All materials, casting used for manufacture of the pumps with allied components & accessories shall be of best tested quality and the contractor has to submit the test certificate for the MOC at the time of shop test as well as with the supplies.

Ultrasonic test of the shafts are to be conducted and test certificate to be furnished.

The dynamic balancing of the rotating unit with coupling, key etc. is to be conducted and test certificate is to be submitted on shop test.

Hydrostatic tests at a pressure not less than 1.5 times of the shut-off pressure for duration of 30 minutes are to be performed and test certificates to be furnished.

The pump performance test of all the pumps for head, efficiency, power consumed etc versus discharge shall be conducted as per IS: 9137 in presence of the departmental representatives at full load, full speed.

The NPSHR test as per IS: 9137 on at least one pump as per choice of the department at various discharge conditions including duty point shall be conducted during the joint shop tests of pumps. The duration of the performance tests of all pumps shall be not less than 8 hours each, during which the temperature, noise, vibration shall be monitored and tested.

After the performance tests, one pump as per choice of the department shall be stripped off and the internal components shall be checked.

Apart from the stated shop tests all field tests including noise, temperature rise, and vibration analysis shall be conducted by the contractor.

The tenderer shall fill-up the guaranteed performance figure / data given in the separate section and submit with the part-I offer.

Main Drive Motors

The main drive motors shall be of squirrel cage TEFC induction motor, horizontal axis, foot mounted type, B3 (as per IS: 2253), continuous duty , insulation class F , to suit the offered pumps and shall be capable to drive the pump in all declared working conditions. The motor shall be of high starting torque type suitable for $415 V \pm 10\%$; $50 C/S \pm 5\%$; combined variation $\pm 10\%$ AC; 3-phase supply.

All the motors shall be rated for continuous duty (S:1) operation and IP 55 degree of protection in accordance with IS:4691. However, due to operational schedule of the pumping station, the pump-motor unit may demand for 8 / 10 start or stop operation in a day, with a maximum time gap of 20 minutes from one stop after prolonged operation in rated load and may demand restarting of the same . The pump motor unit shall be capable to take care of the stated situation. The pump motor

unit shall also be capable of one hot restart and three equi-spaced starts per hour. The motor shall be capable to drive the pump at valves open conditions.

All the motors shall be required to meet the requirement for IE 2 class as stipulated in the latest IS code . It shall have unchanged efficiency during rated output utilization.

All the motor ratings shall be of required rating having at least 1.3 margin over the Pump BKW at duty point or 10% margin over the maximum pump input in the worst case of the pump operation in the total range (from shut-off to run out), whichever is higher. The overall capacity of the motor shall be selected for continuous operation at the rated output for the voltage and frequency condition mentioned above in the worst case by allowing the temperature rise limited to that of class-B over the ambient temperature of 45° centigrade. But the class of insulation of the motors shall be Class F.

However, if the tenderer feels otherwise on to the departmentally selected Kilowatt rating of the motor, they may indicate the same in the alternative offer, if there is any.

The motor characteristics shall match the requirements of the driven unit (pump) so that adequate starting torque, acceleration, pull up, break down and full load torque are available for the intended service. The motor shall be suitable to start the pumps in valve open condition. It shall also not be overloaded in case of back water flow occurs occasionally.

The motor shall be of 4-pole having rotational speed of 1500 RPM syn. The percentage slip of the motor at different load conditions shall match the pump speeds required then at the different load conditions. The tenderer shall clearly indicate the motor speed and slip at different load conditions as will be required to drive the pump.

The insulation of the stator winding of all the motor shall be of Class-F but the heat exchanging arrangement shall be such that the temperature rise is limited to that of Class-B as per IS: 325 over the ambient temperature. The ambient temperature may be considered as 45° C and the relative humidity may vary from 50% to 100%. The stator windings design shall be such that it shall have superior electrical, mechanical and thermal properties and shall achieve better heat transfer and higher dielectric strength.

The rotor of the motor should be sturdy in construction so as to ensure trouble free operation. Special care shall be taken to ensure better torque characteristics

All the motors shall be provided with a very efficient cooling system so that the temperature of the stator winding does not rise additionally. The method of cooling shall be at least IC 411 as per IS: 6362 :1995. All the motors shall be provided with bi

directional specially designed external cooling fan for low noise operation. Noise level shall be within the values as stipulated in IS: 12065.

The motor shall be suitable for inside delta connection for soft starting. The soft starter for motor starting shall be in the MCC cum PDB cum APFC panel described elsewhere.

The motor shall deliver rated output and accelerate at full speed with 85% of the rated voltage at the motor terminal.

With 85% rated voltage at motor terminal, it shall be capable of working satisfactorily at full load for at least 10 minutes without injurious heating or stalling.

The motor locked rotor current shall be limited within 600% max of the motor rated current plus IS Tolerance.

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

Hot thermal withstand curve shall have a margin of at least 10% over the full load current of the motor to permit relay setting using motor rated capacity.

The rotor shall be dynamically balanced with all the fans and with half key in the shaft extension and to vibration severity grade as per IS: 12075. But the noise level of the pump and motor in combine shall not exceed the stipulations as mentioned in IS: 12065.

The motor shall be provided with anti-friction bearings, grease lubricated both at driving and non-driving ends.

The bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matter like dirt, water etc. into the bearing area. The NDE bearing shall be insulated.

Grease lubricated bearings shall be pre-lubricated and shall have provision for in-service positive lubrication with drains and grease collectors to guard against over lubrication.

The motor terminal box shall be of detachable type and rotate-able by 360° in steps of 90° in each position. The terminal box shall have IP 55 degree of protection. It shall be suitable for terminating 2 number 3-core, 1.1 KV grade, of required dia., XLPE aluminum conductor armoured cables for main motor feeding. In case of necessity one higher size terminal box with adopter box shall be provided to match the site requirement.

Mounting of the terminal box shall preferably on top of the motor or to match with the site requirement.

The terminal boxes shall be with removable cover /adaptor pieces with access to connection. The motor terminal boxes shall be furnished with suitable cable lugs and double compression brass glands to match with the cable size. The terminals shall be clearly identified by phase markings and termination indication corresponding to direction of rotation.

The frame of each motor shall be provided with two separate and distinct grounding pads suitable for accommodation of suitably sized grounding conductors. The main cable terminal boxes shall have separate grounding pads.

The rating plate of the motor should contain the minimum information as indicated in the relevant IS. and shall be made of stainless steel.

The successful tenderer shall furnish the motor load-efficiency curve, torque-speed curve, load-power factor curve, thermal withstand curve (hot and cold), current-speed curve and current-time curve during detail engineering.

The dimensional drawing of the offered motor, terminal box drawings, load data, GD² value of the drive unit and the driven unit shall also be furnished during detail engineering.

The motor shall also be provided with suitable lifting lugs/eye bolts having adequate provision for lifting/ installation. Common base frame for the pump & motor as indicated earlier shall be used with suitable foundation bolts, Dowelling pin etc. shall also be provided.

The routine tests as per IS: 325 shall be conducted to each motor at Shop i.e. at manufacturer's works. Similarly, the type test (Heat Run Test) shall be conducted on at least one motor randomly selected during the tests. All necessary arrangements and costs thereof for the tests are to be made by the contractor and shall be included in the offered cost.

Apart from the technical offer, the tenderer should furnish the enclosed data sheet duly filled-in in the Part-I offer.

Vacuum pump motor sets

The vacuum pumps shall be used for both priming and evacuating air from suction pipes and chambers. The contractor is required to furnish the detailed calculations for adequacy of the pump size for approval so as to ensure priming of the pump from LLWL by running single pump within maximum 10 minutes time.

The pumps shall be horizontal centrifugal end suction vacuum pumps of wet seal design. It shall have following MOC (a). Impeller – bronze (b) Delivery casing: CI (c).Shaft: carbon steel

The pump set shall be provided sturdy casing with foot including suction and delivery nozzles. Rotating parts shall be dynamically balanced and shall be properly secured with shafts by shaft sleeve nuts.

Rotational speed of the pump shall not exceed 1500 rpm syn.

The motor shall be directly coupled with the pumps and shall be of 3 - phase TEFC squirrel cage motor. The degree of protection of the motor shall be IP 55.

.One adequate capacity PVC over head tank including all GI pipeline (class-B, Medium) connections with specials, valves (GM), as would be required for seal water and priming purpose shall be within the scope of this job to ensure the completeness of the work and are to be provided by the contractor.

The starting device of the pump motor sets (DOL Starter) shall be located nearer to the pump motor sets but remote operation shall be from the control desk. Arrangement for such shall be within the scope of the contractor.

Detailed calculations as stated in including one complete set of drawing in four(4)copies for piping connections including its accessories showing disposition of pump set including foundation details shall be furnished by the contractor for approval of the department.

De-watering Pump motor set

De-watering pump motor sets shall be of self priming centrifugal non clog submersible type in vertical or horizontal execution. The dewatering pump motor sets shall be capable to discharge at least 15 M³/ hr of accumulated water containing suspended solids up to 15 mm dia from the wet sump at a head of 8 meter. The pump shall be mono block and the impeller shall be of CI. The pump set shall be coupled with 3 phase submersible motor having degree of protection IP-68 and shall be complete with all foundation / fixing arrangement.

Preferably the motor shall have in built thermal overload protection with float switch.

The discharge piping shall be either suitably sized GI pipe or reinforced flexible hose pipe with all specials, valves (GM) and other accessories as required for successful performance of the pump set.

The starting device of the pump motor sets (DOL Starter) shall be located nearer to the pump motor sets but remote operation shall be from the control desk. Arrangement for such shall be within the scope of the contractor.

Valves & Other Accessories for Piping

Individual Suction Piping. The suction side piping within the wet sump shall follow the guideline of back-wall clearance, bottom clearances etc. as per HIS/CPHEEO manual and subjected to the approval of the Engg-in-Charge.

Brief specifications of major equipments and accessories shall be as follows:

Sluice Valve

The sluice valves as mentioned here in before shall be manufactured conforming to GGG-40 / IS: 1865 / IS : 14846 / IS – 1538 /IS-5312 . The valves shall be used for tight shut off. It shall be maintenance free, 100 % leak proof and shall have low life cycle cost. The PN rating of valves shall be of 1.0.

The sluice valve shall be double flanged. The body, bonnet and wedge materials shall be ductile iron (Gr. GGG 40). The construction of the sluice valve shall be of bolted bonnet type, inside screwed with non rising spindle. The wedge lining shall preferably be lined with EPDM rubber.

The trim and spindle of the valves shall be of stainless steel (SS 316). The end connection shall be drilled flanged type as per IS or BS or equivalent standard. Face to face dimension shall be as per relevant standards. The sluice valve shall have anti friction thrust bearing, gun metal shoe and channel guide. It shall also have sealed worm gear box, by pass valve with cock, mechanical gate travel indicator. The operating hand wheels shall be marked 'CLOSE" or 'SHUT' to indicate the direction of rotation

The surface protection of the valve shall be done by either epoxy powder coating or epoxy painting (min. paint thickness - 250 micron) for both inside and outside.

The MOC of other accessories to complete the individual suction piping like 90° bend, Y/T connectors with one end flanged , flanged end short piece, flanged end enlarger/ reducer, bell mouth or any other components required to complete the job in all respect shall be MS as per IS 226.

All bolts and nuts for flange connection(s) of entire pipe line (suction/ delivery/ common header) where applicable shall be of carbon steel having tensile strength 300 N/ mm².

The valves are subject to satisfactory shop test at manufacture's works and other tests mentioned elsewhere in this document in presence of the department's representative for acceptance.

Compound pressure gauge

The compound gauge (accuracy $\pm 1\%$) (6" dial) shall be of bourdon type. The bourdon tube shall be of SS 316. The gauge shall have cast aluminum weather proof case and casing shall be black stove enameled. The accuracy shall be of $\pm 1\%$. The full scale range shall be from (-) 1 to (+) 1 MWC. The gauge shall have 3 way cock and fitting.

Individual Delivery Piping

The individual delivery piping shall be manufactured from 8 mm thick MS plate. The MOC of other accessories to complete the individual piping like 90° bend, Y/T connectors with one end flanged, flanged end short piece, flanged end enlarger/ reducer or any other components required to complete the job in all respect shall be MS as per IS 226.

Brief specifications of the salient items to be installed shall be as follows.

Butterfly Valve

Butterfly valve as mentioned here in before shall be manufactured conforming to IS GGG- 40 / IS: 1865 / IS : 14846 / IS – 1538 /IS- 5312 standard. The valves shall be used for regulating purposes. It shall be maintenance free, leak proof and shall have low life cycle cost. The PN rating of valves shall be of 1.0 .

The butterfly valve shall be double flanged, double eccentric design. The body, disc materials shall be of ductile iron (Gr.GGG 40).

The seat and body shall withstand pressure accordingly respectively. The valve shall operate smoothly & steadily in both directions, free from flow induced vibrations. It should provide tight shut off & shall be suitable for frequent operation as well as for throttled duty condition. The valve disc should rotate 90° from full open to full close. The valve disc shall be solid streamlined slab design and to have minimum head loss.

The seat ring shall be of stainless steel (SS) with micro finished nickel / Monel overlay. The seating shall preferably be integral. The disc seal shall be of elastomeric EPDM. The EPDM seal on the disc must be of easy replaceable type with the facility of replacement at site. The shaft bearings shall be medium free, steel backed PTFE / bronze and suitable for maximum axial thrust imposed by the shaft during testing and in service. The fasteners shall be of SS 304.

The end connection shall be drilled flanged type as per IS /BS/equiv standard. The mating flange shall be as per the valve flange. The butterfly valve shall have anti friction thrust bearing.

The surface protection of the valve shall be done by either epoxy powder coating or epoxy painting for both inside and outside (min. paint thickness -250 micron). All bolts and nuts for flange connection(s) of entire pipe line (suction/ delivery/ common header) where applicable shall be of carbon steel having tensile strength 300 N/ mm².

Non return Valve

The non return valve as mentioned here in before shall be manufactured conforming to GGG-40 / IS: 1865 / IS : 14846 / IS – 1538 /IS-5312 standard. The valves will be used for handling water to maintain the flow unidirectional. The valve shall be maintenance free, leak proof and shall have low life cycle cost. The PN rating of valves shall be of 1.0.

.The non return valve shall be single door and double flanged. The body, door, cover shall be of ductile iron (Gr GGG 40).The seat and body shall withstand fluid pressure accordingly. The body seat, door face rings, bearing block, disc shaft, hinge pin, plug and fasteners shall be of Stainless Steel. The bearings shall be suitable for maximum thrust imposed by the shaft during testing and in service.

The end connection shall be drilled flanged type as per IS or BS or equivalent standard. The non return valve shall have in built features for quick closing (up to 85%) and slow closing from 85 to 100%. It shall have either integral damper arrangement or with external damper arrangement. It shall have by- pass valve with cock.The valve shall be marked to indicate the direction of flow.

The design and construction of the non return valve shall be non slam type and the disc shall be so balanced that it will not bump against the valve body while the pump is in operation.The surface protection of the valve shall be done by either epoxy powder coating or epoxy painting (min. paint thickness - 250 micron) for both inside and outside.

All bolts and nuts for flange connection(s) of entire pipe line (suction/ delivery/common header) where applicable shall be of carbon steel having tensile strength 300 N/ mm².

The valves are subject to satisfactory hydrostatic test at manufacture's works and in presence of the department's representative for acceptance.

Metal dismantling joint

.For ease of dismantling and fitting of the pump assembly during installation & maintenance, one metal dismantling joint (MSDF) of 250mm. shall be provided after the enlarger on the discharge side.

The dismantling joint shall be match with the individual delivery line and shall have control and stay rods. The flange of the dismantling joints shall match with the adjoining flanges.

The dismantling joints shall also be complete with split flange, long stud (SS 304) holding arrangements matching with the site requirement. The hydrostatic test pressure of the dismantling joints shall be HIS.

The contractor shall furnish detailed drawing of metal dismantling joint for approval of the department prior to manufacturing the same.

Air Venting Valve

The air venting valve as mentioned here in before shall be suitably sized (suction and discharge capacity) as per system requirement and manufactured conforming to relevant IS standard. The valves shall be single chamber, double orifice and capable of releasing air at high speed during normal running of pump while it shall automatically induce large volume of air to prevent formation of vacuum in the pipe line during stoppage of pump or pipe is being emptied out for any reasons what so ever. The valve shall be maintenance free, tamper proof, leak proof and shall have low life cycle cost. The PN rating of valves shall be of 1.0. Valves shall be of ductile iron (GGG 40) body with stainless steel internal float.

Electro-magnetic flow meter

The micro processor based electromagnetic flow meter shall be of required dia and shall comprise sensor and transmitter both with stabilized power supply provision.

The electrical power at site shall be available either at 415 volt a.c. or at 230 volt,A.C.

However, the power supply (24v DC or otherwise), if required for the flow meter, shall be integral with the meter and shall be within the scope of the contractor.

The sensor shall be directly flange mounted on to the manifold pipe. It shall have display, serial communications and analog output. The effect of fluid pressure and temperature shall have negligible impact on the performance of the sensors.

The MOC of the metering tube of the sensor shall be stainless steel with elastomeric lining. Similarly, the MOC of the electrode and the earthing electrode shall be also of stainless steel. The

sensor shall be housed in stainless steel enclosure with IP 68 degree of protection. The end connections shall be flanged.

The transmitter shall be micro processor based and fully programmable. The mounting of the transmitter may be integral with sensors or may be in remote from sensors. But the accuracy of the measurement shall always remain within $\pm 1\%$. The power supply shall be inbuilt. Analog output shall be 4-20 mA. The interconnecting signal cables shall be within the scope of the manufacturer / contractor. Hooking up of field signal into the indicator placed at control desk shall also be the responsibility of the contractor. All and any hardware like interconnecting signal cable, watertight joint box etc shall also be included while pricing the item.

The transmitter shall have LCD alpha numeric display of flow rate and total flow in SI unit. Facilities for scrolling and resetting the display shall be available by magnetic reed switches.

The transmitter shall be programmable at site without any effect on performance in SI units and in English language.

The rate of flow and total flow in SI unit shall be available locally i.e. at field of application and in central remote control desk, located at pump house floor. The flow sensor shall be suitable for PN1.0 pressure rating. The flow sensor shall be powered, if and as necessary from the MCC cum PDB through PVC armored copper power cable described elsewhere. If the flow meter demands for any signal conditioner/amplifier, the same shall be provided with the unit. Since the sensor pit may not be water proof, the sensor with terminal connections shall be suitable for prolonged submergence and degree of protection shall match the situations at site. Companion flanges as per the sensor unit shall be provided for connecting the stabilizing pipes.

H.T. Switch Board

The switch board shall be of 3 - panels H.T. switch board suitable for indoor installation for use at 11.0 KV $\pm 10\%$, 3 ϕ , 50 Hz $\pm 5\%$ AC earthed system. The board shall comprise of the following:-

- i) Incomer Panel – 1 No.
- ii) Outgoing feeder panel – 2 nos.

Incomer panel will be used to receive power at 11 KV $\pm 10\%$ from the supply company source (WBSSEDCL).

Outgoing feeder panels will be used to energize the transformers for WTP cum booster pumping station.

The switch gear shall be indoor, metal clad, floor mounted, horizontal isolation and horizontal draw out type and shall be suitable for trouble free and continuous operation at 11KV $\pm 10\%$, 3 phase, 3 wire, 50Hz $\pm 5\%$, grounded system and provided with 100% neutral bus.

Design and construction shall be such so as to allow extension at either ends. The base channel frame of the switch gear along with all hardware shall be within the scope of the contract. The switch gear enclosure shall conform to the degree of protection IP-4x. The minimum thickness of sheet used shall be 2 mm except the gland plate where the sheet thickness shall be 3 mm.

The switch gear assembly shall comprise a continuous dead front, line up of free standing, vertical cubicles. Each cubical shall have front hinged door with latches and a removable back cover. All covers and doors shall be provided with neoprene gaskets.

Circuit breakers, instrument transformer, bus bars, cable compartment etc. shall be housed in separate compartments.

All relays, meters, switches, selector switches, TNC switch, local-remote selector switches and indicating lamps shall be flush mounted on the respective cubicle.

The main buses and connections shall be of high conductivity electrolyte grade copper, sized for specific current rating with maximum temperature rise limited to 90°C.

Bus-bars and connection shall be fully insulated for working voltage with adequate phase / ground clearances. Insulating sleeves for bus bars and cast resin shrouds for joints shall be provided.

All buses and connections shall be supported and braced to withstand stress due to maximum short circuit current and also to take care of any thermal expansion.

Bus-bars shall be colour coded for easy identification and the bus-bar chamber shall be provided with inter panel barrier with epoxy cast seal-off bushings through which the buses will pass through so as to prevent fire from one panel to other.

Calculation for bus-bar size for adequacy shall be submitted to the department for approval.

Circuit breaker shall be triple pole and vacuum type, 800 Amps rated. All breakers shall be rated for 350MVA. Short time current rating shall be 18.4 KA for 3 Sec. Circuit breaker shall be horizontal draw-out type having SERVICE/TEST/ISOLATED positions with positive indication for each position. The circuit breaker shall be of horizontal isolation.

Circuit breakers of identical rating shall be physically & electrically interchangeable.

Circuit breaker shall have manual spring charged trip free mechanism with anti-pumping feature and shunt trip. Facilities for manual charging of spring shall be provided after one close operation.

Mechanical safety interlock shall be provided to prevent

- (i) The circuit breaker from being racked in or racked out of the SERVICE position when the breaker is closed.
- (ii) Racking in the circuit breaker unless the control plug is fully engaged.
- (iii) Automatic safety shutters shall be provided to cover fully the female primary disconnects when the breaker is withdrawn.
- (iv) Each breaker shall be provided with an emergency manual trip, mechanical ON-OFF indicator, an operation counter, and mechanical charge /discharge indicator.
Each breaker shall be provided with the following also:
 - (i) Auxiliary switch, with 4 NO + 4 NC contacts mounted on the draw out portion of the switch gear. Auxiliary switches shall be convertible type that is facility for changing NO contact to NC contact and vice-versa. Switch contact rating shall be 10A AC and 2A DC at operating voltage.
 - (ii) Arrangements to permit breaker closing operation in test position and in service position by an

auxiliary switch having requisite number of electrically separated contacts.
The circuit breaker shall be completely wired up for local operation.

Each cubicle shall be equipped with the following:

- (i) Heavy duty pistol grip type T-N-C switch, spring return to neutral.
- (ii) 6(six) No indicating lamps on front of the each compartments.
 - (a) Green- OFF, (b) Red- ON, (c) Amber- Auto-trip, (d) Blue- Spring charged,
 - (e) Milky white- Trip circuit healthy, (f) White- DC available.

Lamps shall be LED type. Lamp and lens shall be replaceable from the front.

- (iii) 240 Volt a.c. Alarm Bell for non trip fault with arrangement for alarm cancellation.
Current transformer shall be of cast resin type and conforming to IS:2705. All secondary connections shall be brought out to terminal blocks. CT ratings shall be as under. However, if the tenderer feels, the rating are not adequate for the scheme, they may furnish revised ratings backed by proper calculations. I- thermal rating of the current transformer shall be adequate and matching with the system requirement.

The accuracy class of the current transformer shall be

- a. Class 5P10 for protection
- b. Class 1.0 and ISF <5 for metering CT

ratings:

For incomer : ratio as required , VA- as required for metering, VA- as required for protection

For transformer feeders: ratio as required , VA- as required for metering, VA- as required for protection

Voltage transformer for each incomer shall be cast resin, draw out type and shall have an accuracy class of 1.0. The VT shall be 3-phase, 3-limb, 100VA per phase,

11KV / 110 V, 110V star-star-star connection and conforming to IS:3156.

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High voltage windings of voltage transformer shall be protected by current limiting fuses.

The voltage transformer and fuses shall be completely disconnected and visibly grounded in fully draw out position. Low voltage fuses for preventing overload shall be installed in all ungrounded secondary leads. Fuses shall be suitably located to permit easy replacement while the switch gear is energized.

The VT shall power all voltage operated relays and meter circuits and if the tenderer feel the VA rating be inadequate, they may furnish revised ratings backed by calculations.

Relays shall be of draw out design with built in testing facilities and shall be rated for operation on 5 A CT secondary current. Number and rating of relay contacts shall suit the job requirements.

The contractor shall furnish, install and co-ordinate all relays to suit the requirements of protection and interlock scheme provided elsewhere.

Indicating instruments (96mm x 96mm) shall be switch board type, anti-glare glass and accuracy class of $\pm 1\%$ full scale. Each meter shall have zero adjustment on the front.

The analog voltmeter at Incomer shall be with 3-way and off selector switch and shall have scale range of 0-15 KV.

The analog ammeter of Incoming panel shall be with 3-way and off selector switch and shall have scale range of 0-50 -100 Amps.

The analog ammeter of outgoing switches (transformer feeders) shall be with 3-way and off selector switch and shall have scale range of 0-50 Amps.

There shall be one 3 phase analog KW meter and power factor meter in the incoming panel.

In addition, there shall be digital multi-function meter (with 3nos of display at a time voltage/frequency/p.f.) in the Incoming panel with communication facilities.

The minimum protections to be provided to different circuits are listed below:

Electromagnetic relays / microprocessor based relays are to be provided for protections. DC power pack to be provided within the HT panel .

(a) *Incomer feeder*

- (i) A combined relay of 2 element IDMT over current relay having setting range 50% - 200% for phase fault, 1-element definite time earth fault relay having setting range 10% - 40% type , 2 element high set instantaneous over current 250%-2000% , 1 element high set instantaneous earth fault having range 100% to 800% .
- (ii) Instantaneous over voltage protection relay having setting range 110% to 170% .
- (iii) High speed tripping relay for master trip type.
- (iv) Trip circuit supervision relay .

(b) *Outgoing Transformer feeders*

- (i) A combined relay of 2 element IDMT o/c relay having setting range 50% - 200% for phase fault, 1-element instantaneous earth fault relay having setting range 10% - 40%, and 2-element instantaneous high set over current relay having setting range 250% - 2000%.
- (ii) Voltage operated auxiliary relays for transformer OTI/ WTI/ BUCHHOLTZ relay for alarm and trip type VAA 33 or equivalent as required based on rating.
- (iii) High speed tripping relay for master trip .
- (iv) Trip circuit supervision relay .
All relays shall be hand reset type. The relay current shall be 5A.

The Switch gear shall be fully wired at the factory to ensure proper functioning of indications, control, protection, transfer and inter-locking scheme.

Fuse & links shall be provided to permit individual circuit isolation without disturbing other circuits. All spare contacts of relays, switches and other devices shall be wired up-to terminal blocks.

Wiring shall be done with flexible, 1.1KV grade PVC insulated switchboard wires with stranded copper conductors of 2.5 sq. mm for control and current circuits and 1.5 sq. mm for voltage circuits.

Each wire shall be identified with both ends with permanent marker bearing wire number as per contractor's wiring diagram. Wire termination shall be made with crimping type connectors with insulating sleeves.

Not more than two wires shall be connected to any terminal. At least 25% spare terminal shall be furnished in the terminal block.

Switch gear shall be designed for cable entry from bottom. Sufficient space shall be provided for ease of termination and connection.

Power cables shall be XLPE insulated, armoured, overall PVC sheathed with stranded aluminum conductors.

Control cables shall be PVC insulated, armoured, overall PVC sheathed with 2.5 sq. mm stranded copper conductors.

All provisions and accessories shall be furnished for termination and connection of cables, including removable gland plates (4 mm thick), cable supports, crimping type tinned copper/aluminum lugs, brass compression glands with washers and terminal blocks.

A copper ground bus, rated to carry maximum fault current, shall extend full length of the switchgear.

The ground bus shall be provided with two bolt drilling with cadmium plated bolts, nuts and washers at each end to receive GI flat of adequate sizes to withstand earth fault current.

CT & VT secondary neutrals shall be earthed through removable links so that earth of the one circuit may be removed without disturbing others.

Each stationery unit shall be directly connected to the ground bus.

Each circuit shall be provided with thermostatically controlled space heaters and 5A, 3pin plug socket.

Each panel shall be provided with suitable in-panel lighting with control switch.

Following power supplies shall be arranged to switch gear.

AC Supply :

110V AC from VT secondary, The A.C. supply feeding to all feeder panels shall then be

distributed by loop-in & loop-out system for all metering circuits.

All equipment, accessories and wiring shall have fungus protection.

Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

All surfaces shall be sand blasted, pickled and grounded as required to produce a smooth, clean surface free of scale, grease and rust.

After cleaning, the surfaces shall be given a phosphate coating followed by two coats of high quality primer and stoved after each coat.

The switch gear shall be finished in RAL 7032. with two coats of epoxy paints

Notwithstanding whatever mentioned else where in the document, following tests shall include but not necessarily limited to the following:

- (a) Operation under simulated service condition to ensure accuracy of wiring, correctness of control scheme and proper functioning of the equipment.
- (b) All wiring and current carrying part shall be given appropriate high voltage test.
- (c) Primary current and voltage shall be applied to all instrument transformer.
- (d) Routine test shall be carried out on all equipment such as circuit breakers, instruments, transformers, relays and meters.

All tests shall be performed in presence of owner's representative.

Certified copies of all the tests carried out at the manufacturer's premises shall be furnished in six copies for despatch clearance.

Recommended site tests as mentioned in the PAT and FAT for commissioning of the switch gears shall be carried out by the contractor at site.

Following safety interlocking shall be provided between H.T. Vacuum Circuit breaker and L.T. air circuit breaker in outgoing transformer feeders.

In the event of any tripping in H.T. Vacuum Circuit Breaker, L.T. Air Circuit Breaker shall trip simultaneously.

L.T. Air Circuit Breaker shall not close unless HT Vacuum Circuit Breaker is made 'ON'. That is, HT Vacuum Circuit Breaker shall always close first.

Transformers

The transformers (two numbers) shall be of 315 (as required) KVA, 11/0.433 KV, DYN 11, ONAN, energy efficient distribution transformer.

The transformers shall be generally in conformity with latest revision of IS :1180 (part-I) & (part –II) , IS: 2026 (Part-I to part -IV), IS: 10028 (P-II) or as per latest IS code as available .

The transformers shall be suitable for operation continuously at their ratings within the service conditions as mentioned elsewhere of this section.

The transformers built / manufactured in accordance with this specification shall be operated at its rated KVA at any voltage within $\pm 10\%$ of the rated voltage of that particular tap position. The frequency of the supply voltage shall be 50 HZ with tolerance of $\pm 5\%$.

The temperature rise of the transformers shall conform to the requirement of temperature rise specified in latest revision of IS: 2026 (P-II)

The insulation level of the transformer oil shall be in accordance with the latest revision of IS: 2026 (P-III)

The terminal markings, tapings & connections shall be in accordance with the latest requirement of IS:2026 (P-IV).

The loading on each transformer shall be made in accordance with latest revision of IS:6600 – 1972 (Reaffirmed 2001)

The transformers shall be designed and constructed to withstand without damage the thermal and dynamic effects of external short circuit.

Tap changing equipments of each transformer shall be capable of carrying the same over current due to short circuit as the windings.

Neutral terminal of star connected winding of each transformer shall be designed for the highest over current that can flow through the terminal. The neutral terminal shall be brought out and intended to be directly connected to earth permanently.

Termination arrangements of each transformer for both the HV and LV terminals shall be cable end boxes with a disconnecting chamber between transformer terminals and cable end box to facilitate disconnection of terminals without disturbing the cable connections.

Cable end box shall be suitable to accommodate multiple number of XLPE/PVC cables as indicated in the single line drawing attached herewith and accordingly end connections shall be so arranged / made so that no undue stress is developed in cables. All cable glands (double compression) and sockets as required for completeness of the work shall be within the scope of the contractor. Cable terminating box shall have detachable gland plate of 3 mm thick.

Insulating liquids of each transformer such as mineral oil shall comply with latest revision of IS:335. the bushings to be used on the transformers shall comply with latest revision of IS:2099 -1973.

Each transformer shall be provided with a stainless steel rating plate fitted in a visible position showing the followings. :-

- a. Kind of transformer
- b. Ref to IS standard
- c. Manufacturer's name
- d. Manufacturer's serial number
- e. Year of manufacture
- f. Number of phases
- g. Rated KVA
- h. Rated frequency
- i. Rated voltage
- j. Rated current
- k. Connection symbol
- l. Percentage impedance voltage at rated current
- m. Type of cooling
- n. Total mass in Kg
- o. Mass and volume of insulating oil
- p. Basic insulation level

Following fittings and accessories shall be provided in each transformers.

- a. Rating plate as above.
- b. Terminal marking plate
- c. Two number earthing terminals
- d. Lifting lugs
- e. Drain valve with plug
- f. Dehydrating breather
- g. Oil level indicator with minimum marking
- h. Thermometer pocket with dial type thermometer (150mm)
- i. Oil filling hole with cover
- j. Conservator
- k. Air release valve
- l. Filter valves
- m. Pressure Relief Valve
- n. Winding temperature indicator
- o. Oil temperature indicator
- p. Buchholz's relay
- q. Skids
- r. Inspection cover
- s. CI Roller- flat tread (CI)

In addition to above, outdoor type marshalling box shall be provided to each transformer to accommodate WTI and OTI as required . The terminal block shall be provided for WTI, OTI and Buchholz's relay within the box with proper identification label to facilitate field connections. Wiring work between the terminal block and the equipments shall be within the scope of the manufacturer but the connections between the equipments terminals and the control desks shall be within the scope of the contractor.

The WTI, OTI and the Buchholz's relay shall be provided with alarm and trip contacts to match with the scheme requirement.

The transformer tank including the oil tank shall be made of MS plate and as per latest IS standard.

The transformer HT side shall be fitted with off load tap changer with $\pm 2.5\%$ & $\pm 5\%$ with tap with steps number and tap changer locking arrangement.

Each transformer shall be supplied with first filling of oil.

Following shop tests shall be carried out on each transformer.

- a. Measurement of winding resistance.
- b. Measurement of voltage ratio and check on voltage vector relationship
- c. Measurement of impedance voltage / short circuit impedance on principal tapping and load loss
- d. Measurement of no load loss and current
- e. Measurement of insulation resistance
- f. Di electric tests
- g. Temperature rise test.
- h. Magnetic balance
- i. Over voltage test & over fluxing

MCC cum PDB cum APFC Panel:

The LT AC Motor Control Center cum Power Distribution board cum APFC panel shall be indoor type, free standing, floor mounted, complete with all base channels, anchor bolts and all hardware as required. The panel shall be of sheet steel cubicles with ventilating louvers. Sheet steel (CRCA) thickness shall be of minimum 2 mm thick. The panel shall be finished in RAL 7032 with epoxy paints.

Each switchgear assembly consisting of all the units shall be mounted and bolted to a common channel. The channel in turn shall be bolted to the foundation at site. The panel shall be extension able type at both end. All indicating instruments, control switches, indicating lamps shall be placed on the front of the enclosures.

Each LT cubicles shall be provided with a front access door with handle, lock and key and a removable back cover. The degree of protection for the entire panel assembly shall be IP 54.

Circuit breakers, bus bars, instrument transformers shall be installed in separate compartments within the cubicle. The compartments shall be so constructed that failure of one equipment does not effect the adjacent units. Suitable vent shall be provided to release gas pressure developed due to the operation of breakers or due to live arc at the bus. Each similar module shall have facilities for interchangeability with each other. Each cubicle shall be separated from adjacent one by grounded

sheet steel barrier. Each cubicle shall have proper vermin proof and dust tight arrangement. Degree of protection shall be IP-54.

The fixing bolts, screws etc appearing on the panel shall be so arranged as to present a neat appearance. Door hinges shall be concealed type.

Each switch gear shall be provided with thermostatically controlled space heater operated at 240 Volt,A.C. 50 HZ.

The panel shall be provided with two incomers and one bus coupler feeder along with other outgoing feeders. These incomers shall be provided with voltmeters (before the breaker), ammeters with selector switches and power factor meters.

Normally, two incomer feeders shall run on 'LOAD' from the individual section separately. Bus coupler feeder shall remain off. But, in the event of parallelization of transformers, the bus coupler feeder shall be made 'ON'. The protection scheme shall be made accordingly.

Automatic correction of power factor for each section shall be made separately i.e. two different modules shall be used in two different independent sections. But in the event of bus coupler is made 'ON', the power factor correction scheme shall be such that the correction is made automatically for the entire down stream load. The drawings for power factor correction scheme shall be got approved by the department.

Control supply voltage for motor control centre shall be 240 V AC provided through two fully rated control transformers. Each control transformer shall be housed in a separate compartment of the panel. The control supply scheme shall be such that in the event of failure of one control transformer feeder module, other control transformer feeder module shall come into operation automatically.

Drawing for such control scheme shall be got approved by the department. Control supply to each drive motor shall be fed over individual DP miniature circuit breaker.

All cable entry shall be from bottom of the panel. Suitable cable glands and lugs shall be provided by the contractor for cable core termination. Gland plate shall be of four (4) mm thick aluminium plates with knock outs.

Each drive motor and other feeders shall have 'ON' and 'OFF' indication.

All drive motor feeders shall be operable from this panel and remote control desk cum instrumentation panel as well located separately. The facilities for testing the control circuit by-passing the power circuit shall be provided.

All drive motor feeder and other important feeders shall be provided with local / remote selector switches for satisfactory operation of various equipments from locally and from the control desk.

All drive motor feeder shall be provided with suitably rated ammeter with ammeter selector switches.

The terminal numbers for all similar feeder module shall be identical. Interlocked type identification ferrules shall be provided at the device end and at the terminal end.

Normally both electrical and mechanical interlocking arrangement shall be provided to prevent operation of incomer feeders and bus coupler feeder at a time. It shall be such so that any two out of the three above stated feeders can be made 'ON' at a time.

But in the event of parallelization of transformers, in situ arrangement shall be provided to defeat these interlocking.

The switch gear buses shall be rated for continuous current and fault level as per the enclosed drawing. Maximum temperature of the bus and bus connection shall be limited to 90°C.

The main bus of the switch gear section shall be of high conductivity pure aluminum, liberally sized with high safety factor for specified current rating. Besides, vertical bus bars and horizontal bus bars

are to be provided for future extension. Test Certificates for purity of the aluminum shall have to be furnished during shop testing from the testing laboratories accredited by the department

The bus and connections shall be so supported as to be capable of safely withstand stress due to maximum short circuit current and shall take care of any thermal expansion. The bus supports shall have adequate creep age distance. The material of bus supports shall be of porcelain or equivalent and shall be free from absorbing moisture and accumulation of dust.

The bus bar shall be rated at 50°C and shall be air insulated type and provided with insulating sleeves. The bus joints shall be provided with cast resin shrouds.

Bus bar chambers between adjacent cubicles shall be separated by inter panel partition sheet.

All bus connections, joints and taps shall be either silver plated or provided with special jointing compound to remove the oxide films. Connections shall be as short and as straight possible.

The marking of bus bar shall be RYB colour coding and arrangement shall conform to IS: 375. Neutral link of suitable capacity and material shall be provided when ever required so as to achieve a good contact.

The panel shall be extensible type at both ends. Panel compartment shall have adequate space for termination of incoming and outgoing feeder cables equipped with compression glands etc. Terminal blocks with at least 20% extra terminal shall be provided.

One no ground bus (Aluminum of adequate capacity) rated to carry maximum fault current shall be furnished along the full length of the panel. Each unit shall be connected directly to this ground bus by two separate and distinct connections in accordance with I.E. Rules. Grounding terminals shall be provided at two points of the switch gear. Connectors shall be provided at either end for connection to purchaser's ground conductor.

Calculations for main bus bar sizes for adequacy shall be furnished to the department for approval.

Air circuit breaker

There shall be 2-nos incoming feeder and 1no Bus coupler feeder (without protection) each comprising of (capacity as required , to be fridged during detail engineering) four pole indoor, metal clad, electrically drawn out type air break circuit breaker mounted on welded sheet carriage with stored energy mechanism and shall be suitable for 415 Volt, 50 HZ AC operating voltage with $I_{cu} = I_{cs} = I_{cw} (1s) = 50 \text{ KA}$. The circuit breaker shall be provided with 30V shunt trip coil.

The Circuit breaker shall be fully rated up to 50°C. The neutral conductor capacity shall be 100% of that of phase. All circuit breaker units of like rating shall be physically and electrically interchangeable.

The circuit breaker shall be complete with self aligning primary and secondary disconnecting device. Each circuit breaker shall be provided with suitably encased rollers meant for use on heavy duty finished floor. Roller shall permit full withdrawal of breakers and flexibility of movement on the floor outside the switch gear cubicle. Each breaker shall be provided with indicators to check the healthiness of the contact. Each breaker shall have integral safety mechanism to prevent accidental attempt to draw out in closed position. Each breaker shall be provided with An emergency manual trip device

- (i) Mechanical ON –OFF indicator.
- (ii) Operation counter and mechanical spring charge- discharge indicator. Electrical and mechanical closing
- (iii) Tripping device, electrically tripping coil suitable for 30 Volt D.C.

Each breaker shall be provided with three positions namely (i) service (ii) Test & (iii) Withdrawal position.

Each breaker shall be provided with operation facilities in test and service position with Auxiliary switch (Cell Switch) having electrically separated contacts and shall be so connected as to permit breaker operation in test and service position by switch. However, the facility for local manual tripping shall be kept operative.

The design of the circuit breaker shall be such that it will be possible to close the front access door even when the breaker is in test position and withdrawal position.

Operating mechanism shall be rugged and reliable. The operation of the breaker shall be trip free and anti pumping. For maintenance purpose, it shall be possible to close and open the circuit breaker by means of a separate detachable handle.

In addition to the auxiliary contacts required for normal breaker close open operation and indication, six numbers normally open and six numbers normally

close auxiliary switches shall be furnished. The switches shall be convertible type. The circuit breaker shall be completely wired up for local and remote operation. Each circuit breaker cubicle shall be equipped with the following:

- (i) TNC switch
- (ii) Indicating lamps for breaker 'OFF', 'ON', 'AUTO TRIP', 'SPRING CHARGED' and 'TRIP CIRCUIT HEALTHY' on the front above control switch of the each cubicle.
- (iii) 240 Volt a.c. Alarm Bell for non trip fault with arrangement for alarm cancellation.
- (iv) 1 set- suitable CTs for protection & metering (see enclosed drawing).
- (v) 1 no - 96 sq mm flush type ammeter with selector switch (excluding bus coupler feeder).
- (vi) 1 no- 96 sq mm flush type volt meter with selector switch (excluding bus coupler feeder).

- (vii) 1 no 96 sq mm power factor meter (excluding bus coupler feeder).

Current transformer

Each switch gear shall have current transformer of cast in resin type, mounted on the stationary portion of the switchgear and shall be easily accessible for maintenance and testing purpose. The method of securing current transformer in position shall be such that no undue strain comes on the winding and terminals. The current transformer shall be capable of safely withstanding the short circuit stresses corresponding to the fault level of the switchgears. The ratio and rating of the current transformers shall be as per drawing given herewith. However, if the tenderer feels the rating are not adequate and proper for the scheme, he may furnished revised rating backed by calculations and logic. The current transformers shall conform to the latest edition of IS; 2705.(P-I to P-III).

I- thermal rating of the current transformer shall be adequate and matching with the system requirement.

Relays:

Each switchgear shall have protection relays as shown in the drawing. However, the contractor shall be responsible for selection, coordination of all switch fuse/ MCCB and overload relay, release setting so as to provide optimum protection discrimination of the various circuits and equipments.

Whenever called for, auxiliary relays and or contactors shall be furnished by the contractor for the requirement of the scheme.

Outgoing feeders

Four (4) numbers out going motor feeders each having switch fuse unit with fully automatic star-delta starters having over –current , over voltage, short-circuit, earth fault protection, single phase protection etc. through electronic relays having variable setting . Each motor feeders shall have proper indications as required and push button switches, ammeters, etc. as required to complete the job.

Adequately rated starter feeders for vacuum pump motor sets each having.

- (i) Local / remote selector switch.
- (ii) START & STOP button shall be at central control desk for remote operation.
Adequately rated SDF unit for power supply to de watering pump motor set having

- (i) Local / remote selector switch
- (ii) START & STOP button shall be at central control desk for remote operation
- (iii) ON / OFF lamps
63 amp /32 amp /16A TPN /16A SP ,switch disconnecting fuse unit with HRC fuses, each with ON/OFF lamps, shall be provided , in quantities as required.

Two nos Control transformer unit in two sections of the panel with facilities for selection so as take care of all loads even in case of outage of one such unit and as stated here in before.

Two nos 1000 VA noise less digital sine wave user friendly inverter in two sections of the panel shall be arranged in parallel redundancy mode. Under power failure situation, the total load shall be shared equally by the inverters. On resumption of Mains, the battery shall be charged again simultaneously.

The design of the inverter shall be such that controlled wave form is obtained. The inverter shall have in built protection against phase reversal, battery terminal reversal, and overload with auto reset, short circuit and DC over voltage. Digital display for Mains failure. Moreover, it shall have audio alarm and digital display for all trip faults.

The inverter batteries shall be thick plate dry charged and capacity shall be 180 AH @ 10 hours /rate discharge

The contractor has to provide adequate emergency illumination system through this 1400 VA inverters within the pump house. The scheme shall be such that in the event of normal power failure, this illumination arrangement shall be activated instantaneously and the entire emergency lamp shall light up. The entire job of such wiring shall be within the scope of the contractor. The scheme for emergency illumination shall be got approved by the department.

Power factor correction

Sectionalized power factor correction shall be made through an automatic power factor correction relay sensed through a suitably rated current transformer placed in the incomer feeders.

Detailed calculations for selection of capacitor rating along with detailed scheme shall be furnished to the department for approval.

The power factor correction scheme shall be such that in the event of parallel operation of transformers, power factor correction scheme shall be in force and operative. The scheme shall be got approved by the department.

APFC relay

The APFC relay shall be micro processor based and shall meet the requirement of fully automatic control of the plant power factor i.e. switching in or switching out capacitors as required by the system to achieve desired power factor at all permissible times

The relay shall detect the differing capacitor sizing automatically and any subsequent loss of reactive power from any capacitor step shall be recognized and evaluated. Relay memory shall record such defect steps.

There shall be arrangement to reset or change relay parameters i.e. target power factor, switching time delay, step limitations, data reset etc.

There shall be No Volt release feature by which the relay shall immediately disconnect all capacitors from main supply.

Lock up time of at least 120 Seconds shall be provided before the relay starts switching again. In the event of power failure, the entire set of capacitors must get switched off and the relay starts with steps one when the supply is restored again.

The relay shall be multistage, preferably 12 stage. The steps shall be energized in arithmetic sequence and de-energized in arithmetic reverse sequence.

There shall be adjustments in switching time delay of range 5 to 1200 seconds.

The setting of the power factor shall be adjustable digitally by button within a range of 0.70 lag – 1 – 0.90 lead.

Temporary fluctuations in loading pattern shall not lead to hunting of relays. The control module shall have auto manual and local remote selector switch.

The relay shall have following display

1. Display of capacitor size
2. Display of switching operations per step
3. Display of defective steps
4. Display of power factor
5. Display of active and reactive power
6. Switching cycle of each contactor

In addition, provision for following alarm shall be provided

- i) current overload alarm
- ii) control alarm
- iii) harmonic overload alarm
- iv) potential free contact for fault signaling to remote desk

Capacitors & contactors.

The required value of the each capacitor steps shall be evaluated by the relay and shall store in its memory permanently even if the voltage supply to the relay fails.

The supply voltage shall be considered as 440 Volt, 1 phase, 50 HZ.

The contactor for switching in the capacitors shall be capacitor duty type (AC-3 duty) with coil voltage 230 Volt, 1 phase, 50 HZ. and shall be with required auxiliary contacts (NO & NC as the case may be) as per the system requirement.

Since the major load is an inductive type, major VAR shall be introduced in the system on energisation and acceleration of main motor. For other small motor loads and linear loads, the selection of VAR rating shall be accurate.

The capacitors shall be conforming to IS 2834: 1996 and IS:13585:1994 and shall be of stringent applications and low loss. The capacitor shall be manufactured with non-PCB fluid, having bio degradable and non inflammable and non deteriorating chemical properties.

The capacitor shall be hermetically sealed and fully protected from atmospheric ingress and hazards. The capacitor shall withstand abnormal system hazards like switching transients and surges, inrush currents, over voltages and over currents.

The termination arrangement shall be such that there shall be no chance of impregnant leakage with internal lug crimping to an assembly of epoxy moulded insulator bushings with terminal studs being insert moulded.

The tenderer may note that the selection and sizing of different VAR based on the likely system information furnished with this document shall be considered for determination of multiple steps to be used for capacitor. The detailed design for such shall be furnished to the department for approval. The selection and sizing shall be such that in no case the power factor shall not fall below 0.97 even in

the lightest load condition. If felt necessary , in built series reactor/ inductor to limit the switching inrush current may be used.

Central Control Desk cum Instrumentation panel

The central control desk cum instrumentation panel combine shall be designed to monitor and control the significant process variables and provide all operating requirements.

The tenderer may note that P & I. diagram shall be furnished to the department and got approved by the department prior to manufacturing of the panel.

The scope of supply under this item shall include the cost of all field mounted sensors and panel mounted instruments comprising of the following excepting the pressure transducer/ sensor, ultra sonic type level meter, mechanical float type level meter and electromagnetic type flow meter, the cost of which shall be indicated separately in the BOQ.

The scope of supply shall also include but not limited to the following . All field mounted instruments comprising of primary sensing elements, transmitters, level switches, pressure and vacuum gauges, level gauges, temperature indicators, flow transmitters etc, as required as per P.I. diagram approved by the department. The cost for few such item namely, flow transmitter, pressure transducer, pressure gauges, compound pressure gauges, level meters (ultra sonic type level gauges, float type level gauges) have been indicated separately in the BOQ. No such cost shall be included in this instant panel cost.

Front panel mounted instruments comprising all meters, solid state alarm annunciator.

Pre wired glass fiber illuminated mimic panel (by LED) showing all P&I and electrical scheme as per plan requirement complete with metering and instrument mounting bins, system power supply, electric plug in modules, computing and signal conditioning modules.

Pre wired annunciation panel complete with suitable point annunciation fascia with visual displays and audio-visual alarm for trip and non trip fault coupled with all necessary relays with pick ups from different field instruments and accessories mounted on the panel.

Accept, reset and test push buttons shall be provided. All indications shall be engraved on translucent plastic windows with indicating lamps.

Following indications shall be provided on the annunciation fascia.

H.T. power incomer and outgoing feeders trip indication for trip & non trip faults. Transformer feeders trip indication for trip and non trip fault. L.T. Air Circuit Breaker trip indication for trip fault.

Motor feeder panel trip indication for short circuit, over current/ earth fault/ thermal / stall protection etc : Motor –I /II/III/ IV. LWL trip for dewatering pump. Transformer feeders OTI, WTI, Buchholtz's alarm and trip. Audible visual bell indications for the alarm signals. Hooter indication for trip signals with suitable relays .

Adequate spare windows.

Interconnecting wires, cables, instrument pipes and fittings, conduit and junction boxes etc as required.

TNC switches for remote operation of LT incomer ACB (As required).

Push button switches for remote operation of main pump motor sets (As required).

Indicating lamps (As required)

Indicating lamps & Push buttons for remote operation of vacuum pumps and 2 nos. bilge water pumps – (As required)

Ammeters for individual equipment (Main HT in-comer feeder -1no, transformer feeders - 2 nos for both H.T. and L.T. side, main pump motor feeders - 4-nos, vacuum pump motor feeder

-2 nos, dewatering pump feeder -2 nos, APFC capacitor feeders -2 nos.) all having 3-way & off selector switches.

Voltmeters (for both H.T. & L.T.) with 3-way & off selector switches (main in-coming feeder and transformer feeders).

3-phase 3- wire multi function meter with MODBUS communication facilities - (As required) Rate of flow indicators and totalizer. Centrally placed one electronic clock.

General specification of the panel shall be as follows:

Free standing type floor mounted indoor panel shall be made from sheet steel not less than 2 mm thick sheet steel (CRCA) and suitable for tropical climate. The panel shall be epoxy painted. (RAL 7032)

The degree of protection shall be IP-55.

All relays, meters, mimic, switches shall be mounted on the front.

The mounting of the switches, meters, relays, etc. shall be such that the switches meters, relays, indication lamps etc. for one particular section or equipment are placed in a row having symmetrical arrangements.

The annunciation window with suitable point annunciation fascia shall be placed centrally.

The operating/control switches shall be placed suitably so as to cover within the operator's easy arm movement area.

The control switches, push buttons and indicating lamps shall be sequentially placed on the control desk and the meters, instruments etc. shall be placed on the allied instrumentation panel.

Requisite number, type and size of junction boxes shall be provided for terminating individual control cables emanating from various devices. Multi-core control cables shall be provided from this boxes to the control panel. This junction boxes shall be of dust and vermin proof and made of pressed sheet steel having minimum thickness of 2 mm with gasket joints. Proper control terminals shall be provided for termination of cables. Arrangement shall also be made in the box for flexible conduit connections.

All field mounted and panel mounted instruments shall be suitable for 4-20 A D.C. input/output. All recorders shall be microprocessor based recorders.

The audio visual annunciator shall be solid state type.

The control wiring shall be done by 2.5 Sq.mm & 1.5 Sq.mm stranded multi-core switch board copper wire for current circuit and voltage circuit respectively.

Cable entry shall be from bottom /top.

Cost of the a few components though shall be mounted in the panel and corresponding field instruments as stated earlier (9.12.4.) shall be indicated separately in the BOQ. The cost of other items of this desk shall be included in this instant panel and itemized pricing shall be done accordingly. No additional claim for any inclusion of any item within this panel required for the system shall be paid.

All interconnecting cables for signal transmission shall be included here if the context does not mean otherwise.

Cables & Wires & 11 KV grade power cable.

The HT power cables shall be of 11 KV grade heavy duty 3 core cable with stranded aluminum conductor, high quality XLPE insulated, extruded PVC inner sheathed or wrapped inner sheath of plastic tape, each core screened on conductor as well as on insulation, single round or flat steel wire strips armored and overall extruded PVC sheathed and shall generally conforming to latest revision of IS: 7098 (P-II).

The thermal properties of cable shall permit maximum conductor operating temperature of 90°C and short circuit temperature of 250°C in order to have high continuous current rating and high short circuit rating.

The cable shall also be capable to operate even at higher operating temperature in case of emergencies. The cable shall have low dielectric losses and lower charging current.

The conductor shall be made from electrical purity aluminium wires and stranded together for compactness. All conductor construction shall comply to latest revision of IS:8130.

The cable shall be provided with both conductor shielding and insulation shielding with extruded semi conducting compound.

Extruded inner sheath or wrapped inner sheath of plastic tape shall be provided over the stranded conductor with suitable non hygroscopic fillers in the interstices.

Flat steel wire strips or single round galvanized steel wire armouring shall be applied over the inner sheath. A tough outer sheath of high resisting PVC compound shall be extruded over the armouring for resistance to outdoor exposure.

Outer sheath shall be embossed with manufacturer's name & brand, voltage grade and year of manufacture.

Routine & type test certificates duly authenticated by the manufacturer shall have to be submitted at the time of actual supply of the cable. All the cables shall have ISI certification marks.

1100 Volt grade power cable.

1100 volt power cable shall be either aluminium stranded conductor or annealed high conductivity copper conductor, PVC / XLPE insulated, PVC extruded inner sheath, single galvanized steel wire armoured (no armouring for single core cable) having an overall extruded PVC sheathing and shall comply with latest revision of IS: 1554 (P-I)

Thermal properties of cable shall permit maximum conductor operating temperature of 70°C and short circuit temperature of 160°C. However, it shall be capable to withstand overload for short periods without any harmful effect on cable life. It shall also safely withstand short circuit current without any deformation of insulation or displacement of conductors.

The cables shall be tough and abrasion proof and shall have long service life.

The conductor shall be composed of either from high electrical purity aluminium wires or plain annealed high conductivity copper and conform to latest revision of IS:8130 -1976

The insulation shall be of high quality XLPE/ PVC base compound complying with requirements of Type-1 compound of latest revision of IS:5831-1970. The insulation shall be applied by the process of extrusion.

The sheath shall be of PVC base compound complying with requirements of Type-6 compound of latest revision of IS:5831-1970.

Armouring shall be applied over the inner sheath for all multicore cables. Outer sheath extruded over the armouring for multi core cables where as in case of an armoured single core cables, it shall be extruded over the insulation.

Outer sheath shall be embossed with manufacturer's name & brand, voltage grade and year of manufacture.

Routine & type test certificates duly authenticated by the manufacturer shall have to be submitted at the time of actual supply of the cable. All the cables shall have ISI certification marks.

1100 volt grade control cables , signal cables & wires for lighting.

All control cables shall be of PVC insulated and sheathed (heavy duty) and suitable for working voltages up to and including 1100 Volt with armoured copper conductor and shall conform to latest revision of IS: 1554 (P-I). The control cable up-to 5-core shall have at least 1(one) spare core in each run, blanked at both ends, 14-core control cables shall have at least 2(two) spare cores in each run, blanked at both ends.

All signal cables shall be 2 wire shielded / twisted pair, 0.5 mm² screened PVC copper cable suitable for working voltages up to and including 1100 Volt with to protect from any radio frequency interference.

All multi-core switch board wires shall be of stranded copper conductor with proper core identification marking and shall conform to latest revision of IS: 1554 (P-I).

Cable termination & cable end boxes:

For 11 KV grade HT power cables (XLPE), ready to use, push on type, pre moulded cable termination shall be used. Pre moulded silicon rubber insulators or EPDM rubber compounds with built in stress cone shall be used. Semi conducting pad shall be used to make the connection between screen and cone. Pad material shall have the cold flow properties. All other necessary components and hardwares (compression glands, lugs and jointing materials) for making a 'push on' pre moulded cable joints complete in all respect shall be within the contractors scope.

For 1.1 KV grade LT power cables and control cables (PVC / XLPE) having aluminium or copper conductor, either soldering or crimping type joints are to be used. Extreme care and cleanliness shall be

maintained to achieve satisfactory results in joints. All other necessary components and hardwares (compression glands, lugs and jointing materials) for making a cable joints complete in all respect shall be within the contractors scope.

Lighting – indoor & outdoor.

The job of lighting includes the SITC of below mentioned works but not limited to the following

Complete supply and installation of internal wiring of the pump house proper by supplying and wiring in galvanized iron conduit with continuous earth attachment of 1.0 Sq.mm. PVC multi strand copper wire originating from respective power distribution board / exhaust fan cum lighting panel and terminating to the termination chamber of light / fan / receptacles.

Complete supply and installation of external illumination by supplying street lighting column and wiring through underground cables for outdoor area and pathway lighting as the case may be including earth work.

Complete supply and installation of wiring arrangement for emergency lights and shall be fed from inverter sets located in the MCC cum PDB cum APFC panel or any suitable locations. The emergency light shall glow in the instant of power failure automatically.

Complete supply and fixing of distribution boards, sub distribution boards, GI octagonal must (10 Mtr long), Galvanized single/double arm brackets, decorative light pole with luminaries, bollard type light fittings with luminaries, joint box / terminal box, clamps, lighting fixtures with lamps, fans with regulators switch boards with switches, regulators mounted on it etc as required and as would be approved by the department during designing works including earth work.

Complete supply and erection of heavy duty ball sockets, ceiling rose, crimping type lugs, terminal blocks, junction box, earth clamps, jointing and fixing materials including all consumables, switch board with switches, receptacles, suspension arrangements, conduit accessories and ancillaries, all masonry works and mending good damages, electric and gas welding, fabrication of brackets, supports, hangers including supply of all steel materials, painting, testing and commissioning. It may be noted that the cost of such works shall be included in the lighting works and no extra cost for making of clamps, brackets would be measured separately and paid.

As regards the wiring work, the words 'wiring installation', 'fitting', 'mounting', 'erection' used in this specification shall mean as described below unless the context means otherwise.

Wiring installation : G.I. conduit wiring from lighting panel /switch/ junction box to individual fitting or from source to individual fitting through junction box including supply of all required materials & fittings, fabrication and erection of brackets & supports, except otherwise stated else where.

Fitting :

Lighting fixtures, switch board, fan & regulator, switch, receptacle, junction box, MCB distribution board etc or any other item connected to the lighting distribution system.

Mounting:

Fixing of the fitting in proper alignment as required including supply of all necessary hardwares, masonry work, welding, gas cutting or any other material and consumables that may be required for proper fixing of the fitting.

Erection:

Taking delivery from store, handling, assembly, mounting, testing and commissioning of all electrical equipments including lighting distribution board, fittings and fixtures and other accessories that may be required for satisfactory completion of the entire lighting work.

As regards the wiring work, the words 'fluorescent fixture' 'HPSV fitting /fixtures', '230V, 2 pole, 3 pin receptacle', '415 volt, 15A, 3 phase 4 wire receptacle' used in this specification shall mean as described below unless the context means otherwise.

Indoor Industrial Reflector Luminary

The luminaries shall be suitable either for 1x36W or 2x36 W fluorescent tube lamp as per schedule of supplies attached herewith and shall comprises mounting channel made of CRCA sheet steel stove enameled grey and shall incorporate all accessories like electronic ballast, high luminous efficacy lamp(s), click fix lamp holders, starter holders and starter duly wired up to the connector block. The channel shall be provided with knockouts suitable for 19 /20 mm conduit. The channel shall be covered with reflector of CRCA sheet metal, stove enameled white and shall be fitted with screws. Provision of an earthing facility shall be made. The luminary shall be complete in all respect and ready for use at site.

Indoor Industrial High bay Luminary

The luminary shall be suitable for SON 400 Watt high pressure sodium vapor lamp. The luminaries shall comprise of a housing made from die-cast aluminum with low copper content to achieve excellent corrosion resistant properties. It shall have anodized aluminum reflector and an eye bolt of 30 mm inner dia for suspension. Provision of earthing facility shall be made. The luminaries shall be provided with suitably rated control gear box and 400 W SON lamps complete in all respect and ready for use at site.

Indoor Industrial Reflector Luminary for emergency circuits: The fluorescent fixtures shall be with necessary control gear such as electronic ballast, starters, capacitors with T5 tube lamps (28 W) and spring loaded rotor type lamp holders complete with all other accessories.

230Volt, 2 pole, 3 pin receptacles: the receptacle shall be rated for 5 / 6 Amps at 230 volt, 2 pole,3 pin with plug base and top for flush mounting.

415 Volt, 15 A, 3 phase 4 wire receptacles: This shall be metal clad composite type plug and socket coupled with a disconnect switch designed for heavy load application and shall be conduit entry type.

All lighting fixtures shall be provided with suitable conduit entry and termination of two single core wires and another stud for termination of earth wire close to the conduit entry point.

All lighting fixtures and fittings shall be completely wired up with PVC wire having copper conductor up to the built in connection chamber. The internal wiring shall be terminated by crimping type lug

In strategic locations of the building / pump house, adequate number of 415 / 240 volt TPN / SPN MCB Distribution board shall be placed with multiple ways of different current rating (MCB) along with a incoming switch from where power to be fed to different switch board.

Individual switch board shall comprises of multiple number of individual toggle or individual toggle switch (6/10 Amps rated) as the case may be, which shall be used for switching 'ON' and "OFF' operation of the lights / fans / receptacles etc. The individual switch board shall be double door design so as to cover up the toggle switch / regulator etc i.e. switches / regulator etc shall be accessible on opening the door cover.

The above stated distribution board shall be fed from independent switch fuse unit located in the MCC cum PDB cum APFC panel.

440 volt, 15 Amps and 240 volts/15 Amps socket outlet shall be provided where ever required and power shall be taken from the individual way of the distribution board.

The minimum required size of the conductor for internal distribution point wiring shall be as follows:-

Sl. No	Type of fitting /wiring	Minimum size of wire
1.	Fluorescent fitting	2 nos. 1 core -1.5 mm ² copper & 1 no. Earth wire of 1.0 mm ² copper
2.	HPSV fitting	2 nos. 1 core -1.5 mm ² copper & 1 no. Earth wire of 1.0 mm ² copper
3.	Flood light fitting	2 nos. 1 core -2.5 mm ² copper & 1 no. Earth wire of 1.0 mm ² copper
4.	Receptacle-5A	2 nos. 1 core -2.5 mm ² copper & 1 no. Earth wire of 1.0 mm ² copper
5.	Receptacle-15A	2 nos – 1 core-4 mm ² copper & 1 no Earth wire of 1.0 mm ² copper

Mtr long street lighting column.

The lighting column shall be continuously tapered octagonal section, presenting a good and pleasant appearance and shall comply with all statutory regulation and safety codes standards having hot dip galvanized both internally & externally with an uniform thickness of 86 microns (min).

The column shall be fabricated from steel plate conforming to MS (IS 5986)and grade Fe 510, cut and folded to form octagonal section as stated above and shall be telescopically jointed. The weld shall be in

accordance with IS 7318 & IS 817. Sections shall be joined together by slip-stress fit method. No welding at site or bolted joint shall be allowed on the mast.

The wall thickness of each section shall be designed to withstand the load, to which the mast will be subjected to, but shall not be less than 4 mm for base section and 3 mm for top section. The base diameter and the top diameter shall not be less than 240 mm and 110 mm respectively.

The column shall be provided with fully penetrated flange, which shall be free from any lamination or incursion. The welded connection of the base flange shall be fully developed to the strength of the entire section. The base flange shall be provided with supplementary gussets between the bolt holes to ensure elimination of helical stress concentration. The entire fabricated mast shall be hot dip galvanized, internally and externally, having min. thickness of 86 microns and in accordance with IS 2629.

The base section shall be equipped with a hinged service door. The service door opening shall be complete with close fittings weatherproof and equipped with a vandal resistant lock. The service door shall not be smaller than 600 mm x 250 mm. The opening shall be reinforced by a thick steel door frame.

The decorative type arm bracket shall be fabricated out of M.S. (IS : 2062) sq. tube/channel/ plate / pipes duly hot dip galvanized. The design of the arm bracket shall be got approved by the department. The bracket shall also be with flange duly hot dip galvanized and suitable for carrying 1 no. 1x150 HPSV street light luminaries in each bracket.

A suitable terminal block and 1No SPMCB shall be provided at the base compartment of the column for terminating the incoming cable.

For each and individual luminary, the electrical connections from the bottom to the top shall be made by 1100 volt grade PVC insulated 1.5 Sq.mm. 2 Core copper conductor flexible cable. At the top there shall be weather proof junction box to terminate the wires. Connections from the top junction box to the individual luminary shall also be made by using 2 core 1.5 Sq.mm copper flexible PVC cable.

The automatic control of all the street lighting luminaries shall be made from a control box located suitably at the premises or at the pump house room through a logic controller so as to save energy.

Ventilation, Fire fighting & Air conditioning System: Ventilation: The entire pump house including all electrical rooms shall have proper ventilation arrangement. The scope shall include the supply and fixing of following equipments complete with GI conduit wiring including all other accessories as mentioned in Clause no: 9.15.0. where ever applicable.

3 - phase 600 dia Exhaust fans including proper louvers, duct work, rain cowl and bird protection screen.

Floor / wall mounting type control panel for exhaust fan and others.

3 - phase 600 dia Air circulators with independent switching arrangement at pump bay level to be mounted on wall including guard, bracket, clamps as required

48" Ceiling fan with appropriate down rod with regulator and all other fixtures

18" Pedestal fan with regulator and all other accessories.

Fire fighting: The pump house shall be provided with the following :

Portable type fire extinguisher (2 Kg Capacity) with HCFC based

Compounds like NAF, Halotron, FE-36.etc.and consisting of welded cylinder, squeeze lever discharge valve, fitted with pressure indicating gauge, internal discharge tube, discharge nozzle suspension bracket, conforming to IS:15683 duly charged and pressurized with nitrogen gas.

ABC stored pressure type fire extinguisher 5 Kg capacity with discharge hose and nozzle and consisting of welded cylinder, squeeze lever discharge valve, fitted with pressure indicating gauge, internal discharge tube, discharge nozzle suspension bracket, conforming to IS:13849 duly charged with ISI marked Mono Ammonium phosphate base ABC powder conforming to IS: 14609 and pressurized with nitrogen gas.

Fire buckets (9 litre capacity) made from 24 swg GI Sheet similar to IS:2546 including wall mounting bracket or floor mounting pedestals including filling of sand.

Back lit Sign boards, Non lit Sign , Safety Signage etc.

Illuminated / glow sign board in the front fascia of the pump house building or any other suitable location within the area as directed by the Engineering in Charge. shall be provided. Similarly safety signage shall also be provided within the pump house as per direction of EIC The tenderer may note that general guarantee clause shall not be applicable for this item. A 3 year guarantee shall be provided for this component of job though SD for this item job may be released against equivalent amount of BG on completion of general security period.

Back Lit Sign Boards

Illuminated and or glow sign board box shall be made of 22 swg thick aluminium sheet and coloured powder coated. The front fascia of the box shall consist of lettering pasted on quality flex. The board shall be ready in all respect i.e. factory wired with Philips make tube light fittings and tube lamps and shall have in built automatic control arrangement so that it glows and goes off at pre set time. This setting of time shall be possible at place of installation. The size of the lettering and the 'matter' of the board shall be determined by the department later. Computerized display of the entire display arrangement shall be available prior to the finalization of the board and shall be got approved by the department prior to manufacturing. All fixing hardwares shall be supplied by the manufacturer.

Non Lit Sign

Coloured powder coated Steel lettering superbly finished of given size shall be made and fixed on wall as per the direction of the department. The size of lettering and matter, prior to manufacturing shall be got approved by the department. All fixing hardwares shall be supplied by the manufacturer.

Safety signage

The safety signage shall be either from best quality Flexyle and or Rigid photo luminescent sheet and shall be with high grade self adhesive gumming. Detailed sizing of the signage shall be as follows.

Sl No	Sign	Size	Materia	Quantity
1	Stair identification / hand rail identification	80 mm X 10 meters	Vinyl tape	2 Rolls
2	Restricted Area Authorized	300 X 400	Flexyle	1 nos.

	Personnel only.		sheet	
3	Authorized Personnel only.	150 X400	-do-	1 no
4	No Exit	150 X300	-do-	4 nos
5	Exit	150X400	-do-	4 nos
6	No Smoking	100X300	-do-	2 nos
7	First Aid	250X200	-do-	1 no
8	Fire equipment	150X 150	-do-	10 nos
9	Toilet	100X300	-do-	2 nos
10	Control Room	150X400	-do-	1 no
11	WBSEDCL ROOM	150X400	-do-	1 no
12	K.M.D.A.HT Switch Room	150X400	-do-	1 no
13	Store	150X400	-do-	1 no
14	Danger High Voltage	150X300	-do-	2 no
15	Do Not Touch	150X400	Rigid Sheet	2 no

Hand operated crane

One (1) no indoor 3 Metric Ton (SWL) HOT crane shall be designed, manufactured, tested, inspected at works and at site, supplied and delivered at site, installed and

commissioned at site shall be in accordance with IS: 3177-1999 (Reaffirmed 2006) and general structure of the crane shall conform to IS: 807-1976.

The tenderer may note that the pump house is under construction. The RCC gantry girder shall be built by the others but the suitably sized insert plates on the RCC girder at regular intervals shall be fixed by the bidders during construction of the girders or after the construction of the girder as the situation demands. The rail shall be welded on these insert plates upon the gantry girder.

The crane shall be of single girder type with required stiffeners; diaphragms, suitably designed to carry the load of the crane. The girder shall be so designed that the deflection of the same with full load at the center shall be maintained well below $L/900$ and the Slenderness Ratio i.e. L / r_{yy} of the compressive flange shall be within the value as per IS: 807 and IS: 800.

The span of the crane shall be ascertained by the tenderer. The bidders are requested to verify the declared span with the actual pump house now under construction. The height of lift and length of long travel shall be as required respectively. The end carriage & Trolley frame shall be fabricated with MS Rolled channels and MS plates, suitable stiffeners and diaphragms shall also be provided.

Antiskid chequered plate with suitable maintenance platform for Hoist Block and long travel drive shall be provided. Sufficiently wide full length walk way with hand railing should be provided on the girder. Drawing & specification are to be approved from the Dept. by the manufacturer / agency.

Totally enclosed helical splashed oil bath lubricated gear box shall be used for all motion. All gear & pinion shall be hardened and tempered alloy steel having metric module machine cut teeth. The housing shall be graded cast iron / cast steel or fabricated from steel plates. Fabricated housing shall be stress relieved before the machining. The gear box shall be oil tight and fitted with oil level indicator, breather plug, inspection cover and oil drain out plug. The internal surface of gearbox shall be painted with oil resistant type paint.

Rope drum shall be fabricated from rolled steel plates or seamless tube. Fabricated rope drum shall be stress relieved before machining. The rope drum shall be designed for single layer of rope; the helical groove shall be smooth finished.

Wire rope shall be regular right hand lay fiber core as per IS: 2266. The construction of wire rope shall be 6X36 constructions. The factor of safety shall be 6 minimum. Rope sheaves shall be graded cast iron. The rope sheaves shall be mounted on anti friction bearing.

Lifting hook shall be single point with shank as per IS: 3815. The hook shall be mounted on anti friction thrust bearing which shall be enclosed by protective skirt for 360° smooth swiveling of the load on the hook. The block sheaves shall be fully encased in close fitting guards fabricated out of steel plate. Smooth opening shall be provided in the guard to allow free movement of rope. Hook block should be tested and certified with proof load from Govt. accredited testing authorities. Test certificates for lifting hook shall be furnished during the supply.

Crane and trolley wheels shall be double flanged, parallel tread rotating axle type. Wheel shall be mounted on antifriction roller bearing housed on the fixed axle type wheel for easy removal during maintenance. Wheel shall be carbon steel and heat treated to 250 BHN minimum.

Braking system shall be provided with hoist motion. All breaks shall be fail safe type;

Spring loaded buffer shall be provided on all the 4 corner of the carriage & trolley for Cross & Long travel motion respectively

Lubrication points shall be provided for all grease Lubrication parts. Lubrication points (grease nipples) shall be so located nipples so that regular greasing can easily be carried out by operator.

The successful bidder shall have to provide MS step ladder suitably placed in the Pump house for access to the RCC girder as per direction of the EIC and manufacturer's recommendation.

Quality of Materials

All materials and equipments brought to the site of works must be as per the approval and satisfaction of the Engineer in Charge.

In case of materials and or any equipment are not up to the satisfaction of the Engineer in Charge or his authorized representative, the Engineer in Charge reserve the rights of rejection of such items brought to the site. Rejected materials / equipments must be removed from the site within twenty four (24) hours of the issue of such rejection order/ instructions.

In case of non compliance of such removal order and or instructions, the EIC shall have the authority to cause removal at the cost and expenses of the contractor and the contractor shall not be entitled to any claim, any loss or any damage on that account.

Quality of Workmanship

All electro mechanical installations shall be done in most engineers like manner and shall satisfy the department in all respect and shall satisfy performance of the contract job. The workmanship quality for installation work, if found unacceptable as per the standards, shall be redone by the contractor upon receipt of intimation / complaint from the department. In the event of failure to re do the part or whole of the job by the contractor within a definite period of time, the same may be got done by the others. The involvement of such expenditure shall be at the cost and expenses of the contractor but the guarantee for the particular part or whole of the job shall not be void in any circumstances.

Quality testing & cost of testing

All materials and equipments shall be of the respective kinds described else where in the contract document and shall be subjected to such tests from time to time as the Engineer in Charge may direct at the place of manufacture or place of fabrication and or on erection at the place of installation or at all places or at any such places. The contractor shall provide such assistance, machines, measuring instruments, skilled and unskilled labour as the Engineer in Charge may require for examining, measuring and testing the part or whole of works

. The department may appoint one or more firms or organizations for third party inspection, testing and or any quality checking of any or all equipments or any work done or being done by the contractor at the place of manufacturer, fabricator, or at the place of installations or at all places or any such places. The contractor shall provide assistance to the third party inspector(s) for such inspection, testing and quality checking of the equipments to be brought at site or any erection works at site. The result of such testing and suggestive measure if any for quality assurance by the third party inspection agency shall be binding upon the contractor. Each major components like pumps, motor, transformer, HT panel, LT panel Capacitor bank, control desk ,battery charger, flowmeter, valves ,etc. are to be inspected at the manufacturers workshop as desired by the E.I.C. The Superintending Engineer or any of his two departmental authorized representatives may visit the works of the manufacturer for the said inspection cum testing. They have each and every right to withheld / reject the materials if found unsatisfactory to them. The cost of all such inspection and testing including journey by air fare in economy class, stay, local transport etc as the case may be towards to and fro travel, for two inspectors shall be borne by the contractor. The contractor shall note that the cost and expenditure to this account (i.e. all sorts of testing required for the job and mentioned elsewhere) shall be inclusive in the offered price of the itemized works.

The contractor shall in writing place inspection call of indigenous articles/ equipments indicating the venue, test date etc. at-least 21 days in advance of such inspection date. In case the article/equipment is of foreign make the call shall be sufficiently ahead to obtain statutory clearance of such foreign visits.

Erection programme & Progress Responsibilities.

The contractor shall submit work programme in accordance with the relevant clause of this document at such times and in such forms as may be requested by the Engineer-in-charge, schedule showing the programme and the order in which the contractor proposes to carry out the work dates and estimated completion time for various part of work. Such schedule of work programme shall be approved by the Engineer in charge prior to commencement of any erection work. the contractor must adhere to this approved programme of work for all practical purposes. If for any reasons, the work is held up, the contractor shall bring it to the attention of the Engineer in charge in writing and without any delay.

During the progress of work, the contractor shall submit monthly progress report and such other reports on erection work as the Engineer in charge may direct. The erection work shall be carried out in such a manner so as to preserve access to the other equipments installed.

The erection work shall be supervised by the competent supervisors and engineers. The contractor shall at all times work in close co ordination with the department and its representative / supervisory personnel and afford them every facility to become familiar with erection and maintenance of the equipments. Such direction and supervision however, shall not relieve the contractor of his responsibility of correctness and quality of workmanship and of other obligations under the contract.

Erection :-Prior to erection of any equipment, the contractor, upon opening of the packing cases in presence of the departmental representative not below the rank of Technical Assistants shall ensure the quantity of the respective packing list items and their conditions for proper erection. If any defect / damage in any item are observed, the same shall be brought into the notice of manufacturers for remedial measure.

A set of erection drawings shall be drawn by the successful tenderer indicating the lay out of the all equipments of the pumping station and be furnished to the department for approval. No erection work shall

be commenced at site prior to obtaining written concurrence of the department. While preparing the erection drawings, individual equipment manufacturer's specification shall be positively followed.

Individual equipment foundation shall be designed to carry the static loads and all impact load (dynamic load) imposed upon the individual equipments on any worst eventualities. Manufacturer's recommendation of all Individual equipments shall be strictly followed.

Great care shall be taken to ensure that the equipments have been correctly installed and leveled properly before the holding down bolts are grouted in the foundation for efficient, smooth and correct operation of individual equipments. All the equipment shall be installed in site in a most Engineer like manner as per the direction of the Engineer-in-Charge observing all recommendations and guide lines of the individual equipment manufacturers and obeying all statutory Rules, Safety Regulations, IE Rules & Acts etc. All equipments shall be efficiently earthed as per provision made in IS:3043 -1987 with all up to date amendments. All the appropriate tools and tackles as would be required for the proper installation works of any equipments and or requisitioned by the department for such purpose shall be arranged at site by the contractor before the work is started. All sorts of consumables like cleaning solvent, emery cloth of various grades, grease, cotton waste, cloth, brass shims of different thickness, cement, stone chips, sand, bricks, non shrinking powder etc shall be provided by the contractor. The erection work shall also include proper grouting of all foundation bolts, fixing of all other nuts, bolts, washers, sole plate, machine plates, wages, supports etc. as would be necessary for proper erection work of all equipments, accessories, pipe lines etc. The cost for such erection work covering all expenditure shall be included in the offered cost. All false works, staging, scaffolding etc and as would be required for good workmanship shall be arranged by the contractor and same shall be removed by the contractor after completion of the erection works, mending all damages good in the civil structure. All electrical installations shall comply with the requirements of Indian Electricity Acts and rules made there under and with any other regulations that may be applicable. The electrical installations shall only be carried out by authorized persons competent to undertake such work under the

rules and regulations. As regards, various testing, trial run, commissioning of the individual equipments and the built up pumping station as indicated in this document shall be strictly complied with. A general guidance for erection work of major equipments are given here in below. Erection of major equipments & accessories. The pump motor sets.

The tenderer may note that the 4 four) number independent foundation pits of adequate size having dowel would be available in the dry sump pit for constructing the pump foundation and thereafter installation of main pump motor sets in the shape of individual foundation bay. The foundation pocket of proper size as per manufacturer's recommendation shall be made for positioning and grouting of foundation bolts. Upon erection of the pump motor sets in respective position, the foundation pits shall be cast by M 25 grade RCC to match with the adjoining civil construction. After completion of the erection work of pump motor sets, leveling and alignment shall be made. Care shall be taken to avoid any undue stress or any undue vibration on the set. The tenderer may note that position of vacuum pump motor sets is not earmarked for installation of vacuum pump motor sets. The contractor shall determine and prepare his erection drawing showing most convenient disposition of pump motor sets indicating therein the detailed piping connections including all accessories for submission to the department and obtain approval prior to commencement of any work on this item. All piping works and foundation works including positioning and grouting of foundation bolts along with supports, brackets, clamps as would be required shall be done. Leveling and alignment of the pump set shall be made properly. Dial type thermometer for main pump BTM shall be provided and be included in the item cost.

The submersible dewatering pump sets including its all piping with supports, clamps, brackets as would be necessary shall be done by the contractor at his offered cost.

It shall be mandatory to the contractor to arrange for technical supervision of pump manufacturer during erection of the pumping sets and furnish a certificate to the department obtaining it from the pump

manufacturer that the pumps have been erected to their satisfaction and technical need of the pumps for producing desired performances.

The piping

The suction piping of individual pump sets complete in all respect as stated earlier shall be laid by the contractor to ensure all hydraulic and technical requirements of the pumping scheme. It shall be the responsibility of the contractor to fix a puddle collar / puddle plate of adequate size (16 thick M.S.plate) at site during civil construction work so as to level and align the piping work smoothly. In addition, all sorts of pipe support (structural /CC /RCC /Masonry) as would be required at all relevant points (to be decided by the EIC) underneath the pipes/ valves/ specials etc. are within the scope of this work. The contractor may have to make his own arrangement to pierce the wet sump for erection of suction pipe including suction bell and mend good the civil construction work absolutely watertight.

The individual pump delivery piping complete in all respect with all other equipments and accessories mentioned else where shall be laid as per requirement of the scheme narrated else where. The individual pump delivery line shall start from individual pump delivery port and end up to the common manifold pipe through Y/T connections. Such connections may be made within the dry sump area and or outside the pump house area as per situation of the site.

The laying of common delivery manifold complete in all respect , be it within the pump house or outside the pump house shall be the responsibility of the contractor. The cross over of either individual delivery pipe emanating from individual pump sets (four nos) or manifold pipe (one no) from the pump house shall be within the scope of the contractor. During such crossing over the pump house, piercing the pump house wall and fixing MS puddle collar/ plate at required point and mending good damages shall be also within the scope of the contractor.

The piping inside the wet & dry sump shall be properly epoxy painted (2 coats) after 2 coat of primer paint. The colour shed shall follow the BIS specification. The flow stabilizing header pipe, including the electro-magnetic flow meter shall be laid up-to the battery limit of the job which is 10D in upstream & 5D down stream of flow sensor or as directed by the manufacturer. After the down stream flow stabilizing pipe one extended spindle electrically operated CIDF/ MSDF butterfly valve shall be placed and this shall be battery limit of the contractual job.

The manifold and header pipe leaving the dry sump shall be laid underground and shall be properly coated with tar based polymeric anti corrosive tape conforming to IS:10221 (PYPKOTE -4 mm thick) and shall be holiday tested. All earth work in excavation, shuttering, dewatering, laying on brick flat soling, back filling the pipe trench, ramming, dressing etc. all complete shall be within the scope of this job and cost shall be included in the laying cost.

All required nuts, bolts, washers, rubber insertions, hardware etc. shall be provided by the contractor.

Making proper support of the suction and delivery side piping, common header, valves etc. as required, earth work for laying manifold cum header piping, back filling, ramming, dressing etc. shall also be within the scope of erection work. However the flow-meter chamber & the butterfly valve chamber shall be constructed separately by the Department.

All field mountable sensors/ instruments shall be fixed / mounted on the pipe lines as specified and as per recommendation of the respective manufacturer. Complete process connection shall be made by the contractor maintaining the engineering requirement to achieve best results. The signal cables shall be laid through conduit pipe up to the control desk in one length and shall be properly earthed. However, during laying If any joint box, is required to be used for situations beyond control, then the same shall be manufactured and fixed as per respective manufacture's recommendation.

The bidder may note that the cost of supply and laying of all sorts of signal cable of requisite length for individual equipments / accessories/ i.e. process connection shall not be given separately. Such cost shall be included in the different and relevant itemized offer.

Power supply (DC), if required for the field mounted sensors shall be provided by the contractor. Arrangement shall be made to use adequate capacity single power supply unit for multiple field mounting instruments. Cost for such shall be included in the itemized offer.

The transformers.

One transformer yard will be available at site of works for erection of two number transformers. A level concrete plinth above the maximum flood level or storm level of the size (dimensions) as per the requirement shall be built by the contractor. The contractor has to furnish a foundation plan drawing for such purpose for approval of the department before starting of the work. Upon placement of transformers in final position, the wheels shall be locked to prevent accidental movement of the transformers.

The contractor shall have to provide galvanized barbed wire fencing or chain link fencing in the transformer yard with adequate opening for taking in or out the transformers. Fire resistant partition wall of adequate size and strength shall be constructed in between the two transformers as per the drawing provisionally approved by the Directorate of Electricity, GOWB.

At the time of filling or topping up of transformer oil, it shall be ensured that oil is filtered, clean and dry. Before filling with oil, transformers shall be fitted with all accessories such as conservator along with its piping works, valves, gauges, thermometers, indicators etc. It is to be ensured that all gasket joints are oil tight and the pipe work is clean and free from any moisture.

The transformer oil shall be dried out. Drying out process is to be performed with great care in order to avoid damage resulting loss of transformer insulation through overheating. Drying out process shall be continued without a break and temperature of 80°C shall be maintained. Measurement of IR values, while drying out the transformer oil, shall be recorded in the log sheet for determination of the status of drying. An insulation resistance curve based on the above results shall be drawn and submitted to the department before energisation of transformers. Oil samples shall be taken and tested before filling.

Transformer Oil shall be filled through Centrifuge or metal hoses resistant to transformer oil. Sufficient time (12 to 24 hours) shall be allowed for the oil to permeate within the transformer and also the locked up air bubbles to escape. Any air accumulated in the Buchholtz's Relay shall be released and shall be checked for correct functioning of the mercury switches. Silica gel dehydrating breather shall be free from any moisture content. Correctness of wiring for both alarm and trip circuit of OTI and WTI shall be checked.

Entire installation work shall be done in conformity with IS: 10028 (Part-II) – 1981.

The H.T. switchgear

The switchgear assembly shall be installed at the proper place in conformity with IS: 10018 (Part-III)-1982. The foundation plan shall be so designed to carry the normal loads and impact loads imposed on switch gear during breaker 'open' operation under short circuit conditions. Fixing of channels, angles as would be required shall be supplied and erected by the contractor. The switch gear shall be checked against manufacturer's drawing to ensure works settings have not been disturbed during transit. Manufacturer's recommendation to this effect shall also be carried out.

Proper leveling of the switch gear shall be ensured prior to grouting holding down bolts in the foundation for efficient, smooth and correct operation of isolation mechanisms and jointing of bus bars of various units.

Bus bar connection between the each unit of the switch gear to form a complete switch board shall be properly made and tight. The bus bars shall be aligned and connected in such a way so that no undue stress is experienced upon them. Adequate phase to phase clearance shall be maintained. Cable connections to switch gear terminals shall be done carefully making sure that they are tight and of correct sequence and insulators are not unduly stressed.

All auxiliaries like relays, meters and switches shall be connected properly in accordance with the drawings supplied by the manufacturer. All sorts of precaution, care shall be taken to ensure that its insulation has been thoroughly dried before final commissioning and energizing. All porcelain parts though do not absorb moisture, shall be thoroughly cleaned. Bonded resin laminates if found to be of low IR value, shall be dried out or replaced.

If the measured insulation resistance is found less than 100 meg ohms, it shall be dried up again before it is switched on. Measurement of IR shall be taken by a motorized Megger of at least 2.5 KV. What ever method is employed for drying out, measurement of IR values shall be recorded periodically so as to plot a graph to establish that IR values has reached its maximum.

A through check on to the correctness of the wiring and protective schemes have to be carried out before commissioning. All arrangement shall be made by the contractor to undertake and carry out different tests as are requisitioned by the Electrical Inspector, Directorate of Electricity, GOWB for their requirement to issue final clearance for switching in and bringing into use the high voltage system installed by them.

The motors:- The motors shall be checked on arrival at site and installed in conformity with IS:900 -1965. and maintaining all safety norms. Precautions shall be taken particularly when hoisting through EOT crane. Horizontal Motors must be moved in horizontal position using lifting lugs/eye bolts provided with the motor.

Leveling of the motor set shall be done in such a way so that the combined pump motor set remain in leveled condition. Final leveling shall be checked and recorded. Alignments of shafts shall be checked (i) for axial positioning (ii) for paralleling of shafts in vertical and horizontal plane and (iii) for centering of shafts.

Other mechanical checks like free rotation of motor by hand, grease for bearings, etc shall be checked before first kicking off the motor. Electrical checks for insulation resistance shall be measured and if it is found to be less than acceptable level, then it shall be dried up in conformity with the stated IS specification.

The MCC cum PDB cum APFC panel & control desk The LT MCC cum PDB cum APFC panel & the Central Control Desk shall be erected in position as directed by the department and firmly secured in foundation by grouting holding down bolts and leveled. Care shall be taken to connect the bus bars and bus bar jointing so as to avoid undue strain upon it.

All auxiliary equipments like switches, meters, relays etc which may arrive at site in separate packing shall be placed in position and connected as per manufacturer's drawing and instruction.

All factory wiring shall be checked for tightness. All field wiring shall be made to terminals of switchgear panel carefully making sure that they are tight and are of correct phase sequence.

On completion of the erection work, the panels shall be thoroughly cleaned and checked to ensure that all nuts, bolts and clamps are tight, all moving parts are lubricated, breaker operates mechanically, all wiring is in accordance with diagram, earth connections are made properly, arc chutes are fitted in position, where ever applicable.

Insulation resistance of main circuits shall be measured and shall never be less than values specified here in after. The IR value of earth to each phase and in between phases shall be measured and recorded properly. Insulation resistance value of all secondary circuits shall be measured by using a 500 Volt Megger. High voltage tests shall be conducted for main circuits in accordance with relevant IS standard and after all

pre commissioning checks are completed. A through check on protective scheme shall have to be carried out before commissioning the equipment. Primary injection test shall be done where ever conditions permit. Secondary injection tests shall be made on protective relays and readings shall be recorded properly.

In order to ensure stability of the electrical system, following arrangements shall be provided. All interconnections for the below stated arrangements shall be within the scope of the work of the successful bidder. In the event of motor circuit being put into operation, capacitors (VAR in stages) shall be put into circuit after a time delay required for the motor accelerations. Similarly, during motor 'OFF' operation, VAR in stages shall be withdrawn from the circuit first.

No capacitor panel can be re-switched earlier to the specified self discharge time of the capacitor once it is off. In the motor feeder panels there shall be an interlock between the motor starter and motor anti condensation heater so that the anti condensation heater of motor gets OFF immediately the motor feeder is ON. Similarly when the motor feeder is OFF the anti condensation heater of motor shall be automatically ON. There shall be ALARM and TRIP arrangement of all motor feeder through ultra sonic level sensor at LWL and LLWL condition of the sump during pump running condition. There shall be ALARM and TRIP arrangement of all pump motor feeder through Pump and motor BTM during pump running condition. There shall be ALARM and TRIP arrangement of all motor feeders through individual motor thermistor.

Cabling works

Generally all cables shall be brought into site of works in cable drums and be kept preferably at concrete surface having well draining facility. Cable drums shall be positioned under batten placed directly under flanges. In no case, cable drums shall be stored flat i.e. with flanges horizontal.

Cable drums shall be rolled in the direction of arrow mark inscribed in the flanges of the drum. The drums shall not be slung except by a bar through centre. Cable shall be taken from the top of the drum with

a supporting ramp, if necessary. Cable drums, if required to be shifted at site shall generally be done by means of cable wheel.

Depth of laying for voltage grade up to 1.1.KV and 11 KV shall be 750 mm and 1000mm respectively. Not more than two circuits shall be laid in one horizontal plane. Minimum spacing between centre of circuits shall be at least 450mm. If more than two circuits shall be laid, at least 300mm gap shall be maintained. Fabricated cable tray, bracket for such laying has to be made, the cost of which may be included in the cable laying cost. No extra payment shall be entertained for job.

For number of multi core cables laid direct in ground in horizontal formation, at least 150 mm spacing shall be maintained. Following minimum bending radius shall be observed in order that cable insulation do not undergo any damage. Where ever possible, larger bending radius shall be used.

Voltage grade	Multicore cables	Single core cables	Remarks
Up to 1.1 KV	12 D	15 D	D is overall diameter of cable.
Up to 11 KV	15 D	-	-

Cable trenches inside the building shall be made by the others as per the drawings submitted by the contractor. After completion of cable laying works, cable trenches shall be filled with sand, pebbles or similar non inflammable materials.

All cable work shall be done in accordance with IS: 2274 (latest revision). All cable boxes and metallic sheathing and armouring shall be efficiently earthed. Clamping of cables with proper cable tag identification shall be provided.

Earthing

The installation shall generally be carried out in accordance with the Indian Electricity Rules 1956, as amended from time to time and in conformity with the requirement included in the Indian Standard Code of Practice for Earthing IS:3043 -1987.

Following drawing and design shall be submitted to the department for approval prior to commencement of work.

Detailed calculations of earthing system design including selection of number of earth electrodes based on the soil resistivity test at site.

A drawing showing the main earth connections and earth electrodes or as directed by the competent authority for submission and obtaining approval of the competent authority.

All terminal connections for earthing shall be carried out by soldering earth strips / wires with suitable lugs.

Pipe electrodes for earthing shall be made of galvanized steel of class 'B' Medium quality and shall not be smaller than either 50 mm (2") or 65mm(2½") internal diameter. The length of the pipe electrode shall not be less than 3 Mtr (10') in case of 50 mm (2") dia and 2.44 Mtr (8') in case of 65 mm (2½") internal bores. A hole shall be provided at 100 mm (4") from the top end to receive a 13 mm (½") dia galvanized bolts, nuts etc and the bottom end shall be chiseled out for penetration in the soil. Proper sizes of galvanized flat shall be connected securely on the properly cleaned surface of top end of pipe electrode by means of a 100 (4") long x 13 mm (½") dia GI bolts, nuts and double washers. The earth lid flat / conductor shall be protected mechanically by means of a continuous length GI protection pipe of suitable dia up to a height of 0.6 Mtr (2') above ground level and the same shall be completely filled with bitumen compound and topped up to over flowing. All galvanization shall be hot deep quality and the galvanization thickness shall be as per latest IS specification.

A suitable trench shall be excavated about 0.60 Mtr (2') deep except where rock is encountered. The pipe electrode shall be driven to an average depth of either 3.68 Mtr (12') in case of 50 mm (2") dia or 3 Mtr (10') in case of 65mm (2½") dia internal bore below ground surface or below as directed.

For each earthing station, a masonry inspection pit of size 600 mm (2') X 600 mm (2') with suitable sized CI cover, wire mesh, funnel etc shall be constructed/ provided.

The excavated area around the electrode and the earth pit shall be backfilled and consolidated and restored properly. The site shall be left clean and tidy.

The distance between the pipe electrode where multiple earthing is employed shall be at least not less than the length of electrodes and no two pipe electrodes shall be connected together in parallel.

All electrical equipments shall be properly earthed with two number galvanized steel flat of adequate size and other power distribution boards, branch distribution boards shall be earthed with 1 Sq.mm copper wire.. Earthing attachment to 5 A and 15 A socket outlet shall be carried out with 1 Sq.mm copper wire

For neutral earthing of transformers, earthing shall be done with plate electrode of minimum sizing of 600 x 600 CI plate and not less than 12 mm thick. And shall conform to IS: 3043 (latest edition) The CI plate

shall preferably ribbed. The depth of the plate electrode shall be so buried such that its top surface is at a depth not less than 2.0 Mtr from the surface of the ground to ensure that surrounding soil is always damp.

The earth connection be joined to the plate at not less than two separate points by ½" dia (13mm) X 2½" (63mm) long GI bolts with double nuts and double washers. The joints shall be protected by a heavy coat of bitumen. The continuous earth connection from the plate electrode shall be with suitable dia GI pipe (class -B) protection from the plate electrode and at termination point above or a little below GL.

The value of resistance to earth shall not exceed one (1) ohm.

Painting

The painting works, unless other wise stated else where, shall be applicable for the following items as follows.

various equipments inclusive of electric motors, pumps, panels, control desks and accessories

all pipe work including supports, hangers.

all metallic duct work such as exhaust ducts including supports and hangers and other metallic works if any.

All metal surfaces, after preparation of surface, shall be painted with two primer coats and two finish coats.

All surfaces shall be cleaned of loose substances and foreign materials, such as dirt, rust, scale, oil, grease, welding fluxes etc in order that the primary coat is rigidly anchored to the virgin metal surfaces. The prime coat shall be applied as soon as possible after the surface preparation is completed.

The procedure for surface preparation shall be solvent cleaning, hand tool cleaning, power tool cleaning, flame cleaning, blast cleaning, pickling or combination there of as applicable.

The primer coating shall be Red lead or zinc chromate. Finish paint shall generally be applied by brushing except that spraying may be used for finish coat only where brushing may damage the prime coat. Proper brushes shall be selected for specific work pieces. The brush marks shall not be left in the applied paint as far as practicable.

Each coat of paint shall be allowed to dry sufficiently before application of the next coat to avoid damage such as lifting or loss of adhesion.

The equipments and accessories which are shop painted shall be finally painted with one coat of spray paint at site on erection of the same in position.

Shades of finished paint coat to be applied shall be as per IS:5.

Shades of finish coat of paint of major item are specified below and shall be painted accordingly. The base colour shall be applied through out entire length except, on surfaces if materials such as asbestos, aluminium, brass, bronze, galvanized steel, stainless steel and other corrosion resistant alloys and rubber / synthetic polymers.

In such cases, identification colour bands of at least 500 mm width shall be provided near each branch, valve and at distances not exceeding 10 Mtr either as local colour coating or coloured adhesive type of suitable material or label attached to the pipe work

Additional identification bands superimposed over the base colour shall be provided near each branch, valve, and at distance not exceeding 10 Mtr, the bands shall be at least 25 mm wide except in case of double bands where the first band shall be about 100 mm wide. Direction of flow shall be clearly marked on the pipeline at intervals not exceeding 10 Mtr and at all branches and change of directions

Sl. No	Items for painting	colour	Colour No of IS:5	Remarks.
1	Drinking water			
	Base	Sea green	217	
	First band	French blue	166	
	Second band	Signal red	537	
2	Vacuum			
	Base	Sky blue	101	
	band	black	--	
3	Lighting conduit			
	Base	black	--	

	Band	yellow	309	
4	Instrument conduit			
	Base	black	--	
	Band	red	537	
5	Power conduit			
	Base	black	--	

Hand operated overhead travelling crane

Entire erection of HOT crane at site shall be done in most engineering like manner and shall comply all safety factors and norms as stated in relevant BIS. Prior to dispatch, complete HOT crane shall be tested at manufacturer's shop in presence of the departmental engineer or any other third party decided by the department. All tools, tackles, testing load, equipments, and instruments as required shall have to be provided by the manufacturer.

Following minimum tests may be conducted at manufacturer's works.

Visual Check : The crane assembly shall be checked any defect in the workmanship

Dimensional Check: All dimensions of the crane shall be checked as per approved general arrangement.

Diagonal measurement of the crane and the trolley shall be carried out before dispatch to the site.

No load free running of Hoist, CT & LT shall be done for the functional and performance test of the crane. Load test for crane shall be carried out as per IS: 3177.

Over load test at 125% of safe working load is to be shown and necessary certificate by the competent person is to be submitted before commissioning.

Deflection of the crane Girder is to be measured with safe Working load at middle position of the span.

Following drawing shall be provided to the department prior to commissioning of the crane:- GA drawing showing all leading dimensions and installation details Circuit and wiring diagram , O & M manuals.

Recommended spare parts list Test certificates :Details of all bought out items

such as motors, gear box, brakes, wire ropes, etc.

All Miscellaneous Items:

The tenderer shall include installation cost of all miscellaneous supplies mentioned in this document in different places like fire extinguishers, various type of fans, sign board / signage etc in their itemized offered cost. This shall also include cost of all hardware required for such job.

List of Preferred MAKE of equipments and accessories

The tenderer are advised to offer within the below mentioned list of approved MAKES and to mention clearly in the technical offer the makes of the equipments and accessories they have offered. In case, the tenderer offer with more than one make listed below for a particular item, separate data sheet shall be furnished.

Main Equipments

Sl no	Item	Make	Brand
1	Horizontal Split Case Pumps	Kirloskar Brothers Ltd. Mather & Platt Pumps Ltd Flow more Ltd Worthington Pump (I) Ltd	KBL M&P Flow more WPIL
2	Vacuum Pumps	Kirloskar Brothers Ltd.	KBL
3	Submersible Dewatering Pump	KSB Pumps Ltd Kirloskar Brothers Ltd. Calama Industries Pvt Ltd	KSB KBL Calama
4	Valves (BFV , NRV, SV, AV)	Indian Valve Company (Nasik) Kirloskar Brothers Ltd. Durga Valves AVK Valves	IVC(Nasik) KBL AVK
5	Valve Actuator	Rotork (I) Ltd Auma	Rotork Auma
6	Motors	Marathon Electric Motors india Ltd. Kirloskar Electric Co Crompton Greaves Ltd ABB Ltd Siemens Ltd	Marathon KEC CGL ABB Siemens

7	HT Switch Board	Siemens Ltd Areva T& D Ltd Crompton Greaves Ltd ABB Ltd Andrew Yule & Co.LTD	Siemens Areva CGL ABB Andrew Yule
8	Transformer	Crompton Greaves Kirloskar Electric Co Schneider Electric Volt Amps Ltd (Baroda)	CGL KEC Schneider Volt Amps
9	MCC cum PDB	Hindustan Controls & Equipment Pvt Ltd System & Control India Pvt Ltd Sellwin Electricals Pvt Ltd PCE Projects Pvt Ltd	Hindustan System &Control Selwyn PCE
10	Control desk cum instrumentation panel	Hindustan Controls & Equipment Pvt Ltd System & Control India Pvt Ltd Sellwin Electricals Pvt Ltd PCE Projects Pvt Ltd	Hindustan Control System &Control Selwyn PCE
11	Control Panel for Exhaust fan & others	Hindustan Controls & Equipment Pvt Ltd System & Control India Pvt Ltd Sell win Electricals Pvt Ltd PCE Projects Pvt Ltd	Hindustan Control System & Control Sell win PCE
11	DC Power Pack	Cal dyne (I) Pvt Ltd Electro Service Gear Pvt Ltd Dekem Engineering Pvt Ltd	Cal dyne Electro service Dekem
12	Cables	Cable Corporation of India Ltd National Insulated Cable Company Gloster (I) Ltd Polycab Industries Ltd Crystal cables Pvt. ltd	CCI NICCO Gloster Polycab Crystal
13	Wires	Crystal cables Pvt. ltd Finolex Cables Ltd RR Kables	Crystal Finolex RR Kables
14	Piano Switches	Anchor Daewoo Industries Ltd Wipro Ltd (North West)	Anchor North West
15	Flow meter	ABB Ltd Khrone Marshall Emerson (Rosemount) Siemens ltd	ABB Khrone Rosemount Siemens
16	Ultra sonic type level meter	Siemens ltd Honey well (I) Pvt Ltd Emerson (Rosemount)	Miltronics Honey well Rosemount
17	EOT Crane	Sureka Indian Engineering & Implements company Plicare	Sureka IEICO Plicare

Components

Sl no	Item	Make	Brand
1	Pressure Transducer	ABB Ltd Honeywell Ltd Siemens Ltd Micro System	ABB Honeywell Siemens Micro
2	Pressure Gauge	Taylor Ltd H.Guru Industries G I Instrument	Taylor H.Guru GI
3.	Dial type temperature gauge	H.Guru Industries	H.Guru
4	Digital pressure indicator	Siemens Ltd Schneider Ltd	Siemens Ltd Schneider
5	GM Valve	Leader	Leader
6	GI Pipe	Indian Tube Co Jindal Ltd	Tata Jindal
7	Capacitor	Universal Cables Ltd L&T Ltd Epcos	Unistar Meher Epcos
8	Cable jointing Kit (HT)	Mahindra Engineering & Chemical Products Ltd Frontier Technologies Pvt.Ltd	M-seal Frontech
09	Current Transformer	Kappa Instrans Engineering & Mfg. Pvt. Ltd. BMC Electro Plast Pvt Ltd Plasto Fab (I) Ltd	Kappa Instrans BMC Plasto Fab
10	Relays	Areva Ltd ABB Ltd	Areva ABB
11	Ammeter / Voltmeter	Automatic Electric L&T Ltd Secure Ltd	AE L&T Secure
12	Selector Switch	Kaycee Ltd	Kaycee
13	Push Button & Indicating Lamps	Siemens Ltd Larsen & Toubro Ltd Bhartia Cutler Hammer Ltd	ESBEE L & T BCH
14	Switch Disconnecter Fuse	ABB Ltd L&T Ltd Bhartia Cutler Hammer Ltd Schneider Electric India Pvt Ltd Siemens Ltd	ABB L&T BCH Schneider Siemens
15	Contactors	Same as Sl no 14	Same as Sl no14
16	Distribution Board & MCB	Legrand (India) Pvt Ltd Siemens Ltd	Legrand Siemens
17	Wiring Terminals	Elmex Connectwell	Elmex Connectwell
18	Air Circuit Breaker	ABB Ltd Siemens Schneider L&T Ltd	E-Max 3WT Master pact (NW) U-power
19	Soft starter	ABB Ltd Siemens Ltd Schneider Electric India Pvt Ltd	PMax 3RW Altistart

20	Luminary (Indoor)	Philips Electronics India Ltd Crompton Greaves Ltd Wipro Consumer Care & Lighting Canara Lighting Industries Ltd	Philips CGL Wipro Canara
21	Luminary (Outdoor)	Philips Electronics India Ltd Kaylite Industries Ltd	Philips Kaylite
22	Fire Extinguishers	Fire Shield Engineering Equipments Godrej & Boyce	Fire Shield Godrej
23	Anti Corrosive Treatment of UG Pipe Line	IWL India Limited	Pype kote
24	Exhaust Fan & Air Circulator	EPC Marathon	EPC Marathon
25	Ceiling Fan	Crompton Orient EPC	Crompton Orient EPC
26	Inverter	American Power Corporation Genus	APC Genus
27	Battery bank	Exide HBL	Excide HBL

WTP some major components:

Sl no	Item	Make
1.	Gearbox	Premium or equivalent
2.	Air Blower	KAY, USHA, SWAM or equivalent
3.	Compressor	Ingersolrand or equivalent
4.	Chlorinator	Industrial devices (India) Pvt. Ltd., Capital Control or equivalent
5.	Weigh bridge	Avery or equivalent
6.	Control Console	Sellwin Electricals . Reliable or equivalent
7.	Gates	Durga, IVC, Jash , AVK or equivalent

Quality of Materials :-

All materials and equipments brought to the site of works must be as per the approval and satisfaction of the Engineer in Charge. In case of materials and or any equipment are not up to the satisfaction of the Engineer in Charge or his authorized representative, the Engineer in Charge reserve the rights of rejection of such items brought to the site. Rejected materials / equipments must be removed from the site within twenty four (24) hours of the issue of such rejection order/ instructions.

In case of non compliance of such removal order and or instructions, the EIC shall have the authority to cause removal at the cost and expenses of the contractor and the contractor shall not be entitled to any claim, any loss or any damage on that account.

Quality of Workmanship

All electro mechanical installations shall be done in most engineers like manner and shall satisfy the department in all respect and shall satisfy performance of the contract job. The workmanship quality for installation work, if found unacceptable as per the standards, shall be redone by the contractor upon receipt of intimation / complaint from the department. In the event of failure to re do the part or whole of the job by the contractor within a definite period of time, the same may be got done by the others. The involvement of such expenditure shall be at the cost and expenses of the contractor but the guarantee for the particular part or whole of the job shall not be void in any circumstances.

Quality testing & cost of testing

All materials and equipments shall be of the respective kinds described else where in the contract document and shall be subjected to such tests from time to time as the Engineer in Charge may direct at the place of manufacture or place of fabrication and or on erection at the place of installation or at all places or at any such places. The

contractor shall provide such assistance, machines, measuring instruments, skilled and unskilled labour as the Engineer in Charge may require for examining, measuring and testing the part or whole of works

. The department may appoint one or more firms or organizations for third party inspection, testing and or any quality checking of any or all equipments or any work done or being done by the contractor at the place of manufacturer, fabricator, or at the place of installations or at all places or any such places. The contractor shall provide assistance to the third party inspector(s) for such inspection, testing and quality checking of the equipments to be brought at site or any erection works at site. The result of such testing and suggestive measure if any for quality assurance by the third party inspection agency shall be binding upon the contractor.

. Each major components like pumps, motor, transformer, HT panel, LT panel Capacitor bank, control desk ,battery charger, flowmeter, valves ,etc. are to be inspected at the manufacturers workshop as desired by the E.I.C. The Superintending Engineer or any of his two departmental authorized representatives may visit the works of the manufacturer for the said inspection cum testing. They have each and every right to withheld / reject the materials if found unsatisfactory to them. The cost of all such inspection and testing including journey by air fare in economy class, stay, local transport etc as the case may be towards to and fro travel, for two inspectors shall be borne by the contractor. The contractor shall note that the cost and expenditure to this account (i.e. all sorts of testing required for the job and mentioned elsewhere) shall be inclusive in the offered price of the itemized works. The contractor shall in writing place inspection call of indigenous articles/ equipments indicating the venue, test date etc. at-least 21 days in advance of such inspection date. In case the article/equipment is of foreign make the call shall be sufficiently ahead to obtain statutory clearance of such foreign visits.

ADDITIONAL TERMS & CONDITIONS

1.0 GENERAL:

The specification covers the design, manufacture, testing, supply erection and commissioning of the electrical motor for the water treatment plant used in filter bed, pumping station etc. of Mal WTP. 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 \pm 10%
- Frequency 50 Hz \pm 3%
- Climatic condition Tropicalized, Humid & Dusty
- Max Ambient Temp. 45 °C
- Annual Rainfall 100 mm (approx.)
- Elevation within 50 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 % Of the pump BHP) of 415 V \pm 10%, 3 phase, 50 Hz \pm 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 deteriorate 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 with tapped hole, 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 BEEING OFFERED

(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 :
 23. 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 contract 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 water treatment plant such as flux mixture agitator motor, alum agitator, air blower motor, clarifier bridge motor, clear water pump motor etc.



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ANNEXURE - I

Soil Investigation Report

Soil test Report is enclosed herewith for general guidance. In case of disparities / confusion if any, Bidder may undertake detail soil investigation at his own risk and costs but safer value of both of them have to be chosen in designing the foundation. The Detailed soil report may be obtained from Office of the Executive Engineer, Jalpaiguri Division for assessment of foundation required to be considered.



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ANNEXURE – II

Physio-chemical and Bacteriological Characteristics of Raw Water

Simple collection:

Date of collection:

Test Report is enclosed herewith. Please note that result is indicative only. Bidders should repeat the test in order to assess actual water quality.


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ANNEXURE – III

LIST OF INSTRUMENTS

Description and Location

A) Local Indicators:

- i) Flow Indicator for Raw Water Inlet channel.
- ii) Level Indicators for each of the alum tanks (laboratory).
- iii) L.O.H. &R.O.F indicators for each of the filter beds (at Filter consoles).
- iv) Ball valve is completely closed to indicate blockage of the orifice with adequate quantity of solution is not being received into the dosing tank.

- v) Pressure Gauges at each of the Air Blowers discharges.
- vi) Pressure Gauges at each of the backwash pump discharges.
- vii) Pressure Gauges at each of the Waste Water Recirculation pump discharges.
- viii) Flow Indicator for Filtered Water.
- ix) Pressure Gauges for each of the pre & post chlorine booster pump discharges.
- x) Pressure Gauges for each of the sludge pump discharges.
- xi) Chlorine leak detector with alarm in chlorine (pre/post chlorite room) drum room and chlorine store room.

B) Filter Bed Consoles:

- i) LOH & LOF Indicator.
- ii) Maximum Loss of Head indicating lamp.
- iii) Start / Stop push buttons with indicating lamps for each of the wash water pumps and a push button to sound an alarm in the event of any of the motors not responding.
- iv) Siphon air release valve for putting siphon waste discharges into operation.



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ANNEXURE - IV

LIST OF TOOLS OF ELECTRICAL EQUIPMENT

Double Ended Spanner (6 mm to 25 mm) : 3 Sets

Screw Driver (6 mm to 25 mm)		:	3 Sets
Sliding Pipe Wrench	150 mm	:	3 Nos.
	250 mm	:	3 Nos.
	300 mm	:	3 Nos.
	350 mm	:	3 Nos.
Hand Drill (6 mm to 19 mm)		:	3 Sets
H.S. Drills (1.5 mm to 10 mm)		:	3 Nos.
Round Rough File	350 mm	:	3 Nos.
Flat Rough File	350 mm	:	3 Nos.
Steel Tape	2 Meter	:	3 Nos.
Hacksaw	300 mm	:	3 Nos.
Hammer with handle	1 kg	:	3 Nos.
	2.5 kg	:	3 Nos.
Cold Chisel	200 mm x 20 mm	:	3 Nos.
Centre Punch		:	3 Nos.
Engineering Square	200 mm	:	3 Nos.
Spirit Level		:	3 Nos.

Electrical Equipments

Multi Range Tong Tester		:	1 No.
500V Megger		:	1 No.

Multi Meter

: 1 No.



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ANNEXURE - V

LIST OF VENDORS (FOR TREATMENT PLANT)

Sl No	Equipment / Instrument	Make
1.	Clear Water Pumps	KBL/M&P/WPIL
2.	Filter bed Pumps	KBL/M&P/WPIL/MBH
3.	Air blower SYSTEM	EPC/KAY/AIRTECH/SWAM/UNIVERSALAIR
4.	Chemical Pumps	AKAY INDUSTRIES/ANTICO/EME/SAM
5.	Compressor	INGERSOLLRAND/KBL PNEUMATIC /KOSHLA
6.	Sump pump	KBL/M&P/WPIL/BE
7.	Agitator Drive	RADICONIREMI/ALLROYD/RELIABLE EQUIPMENT
8.	Motors	ABB/CGL/MARATHONE/KEC
9.	PDB/MCC	L&T/SIEMENS/EE/SALWIN/RNR/AC POWER/SMITH/PECON
10.	APFC	L & T/SIEMENS/EE/SALWIN/RNR
11.	Starters	L & T/SIEMENS/ABB/LEGRAND
12.	Clariflocculator Equipment & allied component	VOLTAS/RELIABLE EQUIPMENTS/DORROLIVER
13.	Hoist	INDEF/ROPEMASTE/BATLIBOY/SUREKHA/PLICARE
14.	Reduction Gears	ALLROYD/RADICON/ RELIABLE EQUIPMENT
15.	Current collector	VOLTAS/TRIBANI/ RELIABLE EQUIPMENT
16.	Valves (Sluice/Butterfly)	FOURESS/KIRLOSKAR/IVC /KSB/AUDCO
17.	Isolation Penstocks	JASH/IVC (CAL)/VAG /KBL/DURGA/JUPITER/CRAWLEY& RAY
18.	Filter bed control consol	SALWIN/ RELIABLE EQUIPMENT/VOLTAS
19.	Electrical Actuator	AUMA/ ROTORCK/BECON
20.	Chlorination system	INDUSTRIAL ENGINEERING DEVICES INDIA (P)LTD/NEW DELHIIPENWALT/IEC FABCHEM
21.	Chlorine leak detector	PENNWALT/INDUSTRIALENGINEERING

- DEVICES INDIA (P) LTD/IEC FABCHEM
22. Chlorine gas mask SWELORE ALLDOS/MSA (I) LTD/JOSEPH LESLIE
23. V - Belt FENNER/DUNLOP
24. Level Indicators BELLS/SWITZER /RELIABLEEQUIPMENT/ GEOMILLER VOLTAS
25. Pressure Gauge H. GURU/BELLS/MANOMETER INDIAMETER
26. Flow Meters BELL/TOSHNIWALBROS/ROCKWIN FLOW/
RELIABLE EQUIPMENT.
27. Rate of Flow Indicators/ BELLS/TAYLOR/J.N. MARSHAL/RELIABLE
Indicator-cum-Recorders/EQUIPMENT/ABB
28. Loss of Head Indicators/ Indicator RELIABLE EQUIPMENT/ BELIS/ TAYLOR/
cum Recorders/ Integrators GEOMILLER
29. VCB HT BICCO-LAWRIE/SCHINDER/ /SOUTHERN ELECTRICAL
30. Power Transformer BHARAT
BIJLEE/AEG/CROMPTON/SCHINDER/KEC/STANELIEC
31. Current Transformers CROMPTON/BHARAT BIJLEE/EMCO/KAPPA
32. OCEF & Under voltage Relays EE/LARSEN & TOUBRO
33. Capacitor CROMPTON/KHATAU JUNDER/NCEF/UNISTAR/L & T
34. Air Circuit Breakers GE/L&T/ ALSTOM/ LEGRAND ABB/SIEMENS/SCHIEINDER
35. Ammeter, Voltmeter AE / IMP/ L&T
36. Control Switches SIEMENS / L&T / ABB/ANCHOR
37. Push buttons, Selector SIEMENS / L&T/ABB/SIEMENS

Switches, Indicating Lamps

38. Contractors	LARSEN & TOUBRO/SIEMENS/GE / SCHEINDER
39. Light Fitting including Lamps & Tubes	PHILIPS/BAJAJ/CROMPTON/HAVELLS
40. Ceiling Fans & Cabin Fans	CROMPTON/USHA/ORIENT
41. Exhaust Fans	SCHINDER/CROMPON/ BAJAJ
42. 10-A Industrial Plug Socket outlets	ANCHOR
43. Power Cable (Aluminum)	INCAB/UNIVERSAL/GLOSTER/NICCO/FINOLEX/KEI/POLYCAB
44. Control Cable (Copper)	INCAB/ UNIVERSAL/ NICCO/ FINOLEX/KEI/POLYCAB/GLOSTER
45. Multi-range Tongue Tester	MOTWANE/MECO
46. Avo-meter	MOTWANE/HITACHI /MECO
47. 500 Volt Megger	HITACHI/MOTWANE /MECO/WACO
48. Liquid Chlorine Tonners	DCPL/JOHNTHOMPSON/CAUVERI/BHARAT PLATES & VESSELS/PROTECTIVEAPPLIANCES.
49. Paints	ICICI/JONSON & NICHOLSON/ASIAN/BERGER
50. Epoxy Resin	CIBA - GEIGY

51. Fibre Glass Mat FIBRE GLASS PILKINGTON

52. Full bore Flow Metre ABB/INRESS+HOUSER



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ANNEXURE - VI

LIST OF LABORATORY INSTRUMENT SUPPLIED BY THE BIDDER FOR LABRATORY

- | | |
|--|---|
| 1. Mono pan Electrical Balance | DONA / KAY RAY |
| 2. Distilling Apparatus electrically heated with low water out off and automatic shut off 1 gph. | LYNX / CHEMINCO / ADCC / LUNAR |
| 3. Autoclave Vertical type | ADCO / AIMIL / LYNX / LUNAR |
| 4. Muffle Furnace | ADCO / LYNX / TESTING INSTRUMENT
MANUFACTURIENG CO. / LUNAR |
| 5. Centrifuge - International clinical model | REMI / AD CO / TESTING INSTRUMENT
MANUFACTURIENG CO. |
| 6. PH Meter | ECIL / PHILIPS / E - MARC |
| 7. Jar Test Apparatus | ADCO/REICO/TESTING INSTRUMENT
MANUFACTURING CO/LUNAR/E-MARC. |
| 8. Electric Operated Turbidity meter (Nephelometric Method) | E-MARC/TESTING INSTRUMENT
MANUFACTURIENG CO |
| 9. Hot Plate | ADCO / CHEMINCO / REICO / LUNAR |

- | | |
|---|---|
| 10. Hot Air Sterilizer Electrically
operated on 220/230 Volts. | ADCO / REICO / AIMII / LUNAR |
| 11. Magnetic Stirrer | REMI / ADCO / SYSTRBUC |
| 12. Dissolved Oxygen Meter (Analyzer) | METTLER / APCOPET / ELICO |
| 13. Refrigerator 165
Litters (Approx) | GODREJ / KELVINATOR / VIDEOCON / BPL |
| 14. Crucible, Gooch, F 30 ml. | BOROSIL / LUNAR |
| 15. Crucible Holders Glassware. | BOROSIL / LUNAR |
| 16. Rectangular Water Bath made of
Copper / Stainless Steel | LYNX/ADCO/REICO/LUNAR |
| 17. Thermometers | LUNAR / ZEAL |
| 18. Interval Timer, Spring Wound | ANGLO SWISS / ROCKER |
| 19. Chloroscope for measurement of
residual chlorine with
necessary reagents. | TESTING INSTRUMENTMANUFACTURIENG CO/
SCIEN TRUMENT / ELICO |
| 20. Pedestal Fan (Industrial type) | BAJAJ / CINNI / SCHINDER/CROMPTON |
| 21. PVC Door | SYNTEX |



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ANNEXURE - VII

LIST OF DRAWINGS ETC. TO BE FURNISHED BY THE SUCCESSFUL BIDDER

1. Pump thrust bearing housing details.
2. Pump non-reverse ratchet details.
3. Pump sectional drawing with part no.
4. Finally approved pump house layout with load data.
5. Finally approved single line diagram of the electrical system and earthing.
6. Cable schedule and termination chart.
7. GA details of H.T. Board, L.T. Board, and Control & instrumentation panel.
8. Sectional drawing with part nos. for pump discharge valve, sluice valves, actuators.
9. Schematic power wiring drawings (both H.T. & M.V), panel wise.
10. Schematic Control Wiring drawings panel wise.
11. Purchase order references of individual equipment.
12. List of authorized service centres of individual equipment.
13. List of special tools & tackles required for effective installation & maintenance.
14. Installation, operation, maintenance manuals for all equipment.
15. Schematic wiring diagram for D.C. system & battery charge.
16. Design calculation for earthing system & earth station.
17. Completion drawings for all electrical circuit diagrams, layout Terms & Conditions.
(The drawings etc. shall be furnished on transparency along with the copies mentioned).

18. Details/type of bearings of pump & motor.



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ANNEXURE -VIII

SITE PLAN WITH LEVELS

One copy of 'Site Plan' together with level drawing of proposed Water Treatment Plant" located at J.L. No.44 and P.S:-Mal, in Ward No. 02 , District - Jalpaiguri enclosed herewith for Bidders ready reference. They are requested to visit the Site physically and to verify the dimensions of the proposed Plot and to judge all other conditions if any, which may affect their Design and proposal.



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ANNEXURE -IX

KEY PLAN SHOWING LOCATIONS OF OHR'S

A key plan is attached herewith as Annexure IX.



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ANNEXURE -X

LABORATORY EQUIPMENTS/INSTRUMENTS & CHEMICALS TO BE SUPPLIED

As per Bid Document.



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ANNEXURE -XI

TENTATIVE LAY OUT OF SUB STATION BUILDING

Attached as Annexure XI.



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